STABILITY OF LABOUR SHARES:
EVIDENCE FROM OECD ECONOMIES

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Abstract

In light of ongoing concern about rising inequality in developed economies, this paper revisits the old standing issue of the stability of labour shares. The paper focuses specifically on the empirical aspects of the problem and considers statistical properties of the labour shares in OECD economies in the 1960-2014 period, using a battery of time series models and unit root tests. We account for structural changes in labour shares using Lagrange Multiplier (LM) unit root tests with up to two structural breaks, address the problem of heterogeneous level shifts using LM panel unit root tests, and examine four types of statistical patterns (trend stationarity, mean reversion, random walk with and without drift) using the Augmented Dickey-Fuller (ADF) test. Empirical results indicate diverse patterns in labour share movements, the most preponderant being a downward deterministic trend with break(s). Upward trends are observed in a limited set of economies (Belgium, Luxembourg and the Netherlands). Overall, the stability of the labour share hypothesis appears to find only weak support. Exploratory analysis demonstrates that most of the structural breaks are economically significant and relate to the recent economic and political history of individual economies. The nature of labour share dynamics, as a country-specific and (to a large extent) policy and political phenomenon, is emphasized.

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1. Introduction

The issue of functional distribution of national income was a central thread in discussions of 19th century classical political economy. Whilst frequently super-seded in modern economics by other related topics (such as personal income distribution) and, thus, receding into the background, it has recently become topical again, following works by Blaug (1996), Atkinson (2009), Glyn (2009) and Piketty (2014). Hailed as 'the principal problem of political economy' (Atkinson, 1996: 3), functional distribution matters for several reasons.

Firstly, if the theory of the instability of labour shares is validated, the next step would be to establish the factors that caused instability and to consider implications of instability for other models and theories (for example, for production function models, such as the Cobb-Douglas model, that conventionally assumed fixed factor shares). Secondly, an unstable (or more specifically, falling) labour share may affect personal income distribution (Ryan, 1996). Thirdly, if stability of labour share is proven to hold, the re-distribution arguments (such as the demands of unions and workers for higher or 'fairer' labour share and higher wages) would be weakened: any attempts to increase wages and labour shares above 'natural' or equilibrium levels would cause distortions in the labour market, including higher unemployment.

This theoretical debate as to (im-)possibility of stable factor shares and the related empirical analyses (reviewed in detail in the next section) have been vibrant over years, albeit without firm conclusions being reached. In recent years, the focus of the analyses has been shifting to the determinants of and directions in labour share; the statistical analysis of the labour share patterns is likely to be instrumental to this end and can potentially assist the resolution of the "(un-)stable labour share" controversy.

Thus, the purpose of this paper is to provide, using new data made available in recent years, statistical evidence of stability of—or, in contrast, trends in—labour shares and, thereby, complement previous theoretical debate. In addition, without making broader generalisations regarding the determinants and drivers of labour share, the paper interprets in a qualitative manner trends and structural breaks in the labour share series in individual OECD economies in light of their economic history experience and political economic developments during the post-WWII period. The analysis of labour share patterns undertaken in this paper indicates that movements of the labour shares were to a large extend country- and period-specific phenomena, despite similar stages of economic development, growing economic and political integration across OECD economies, globalisation and increasing move-ment of capital (Arpaia *et al.*, 2009). Thereby, consideration of these specific cir-cumstances related to labour share movements would potentially assist the analysis of factor income distribution within OECD and complement conventional cross-sectional analysis that attempts to identify common drivers of labour shares across

economies. Recent empirical evidence appears to justify such an approach: as stated by Blanchard (2000), the variation of labour shares by broader economic factors (such as capital-labour substitution or real-wage-productivity divergence) explains no more than 10-40% of the variation, the remainder being likely to be related to country-specific policy and institutional factors. The sample period is limited to the past five decades and, thus, the focus of the paper is confined to medium-term movements in labour shares (i.e. changes over three to four decades, and across business cycles), as well as short-term fluctuations (changes during turning points in the business cycle or during a stage of a business cycle).

The plan of the paper is organised as follows. Section 2 reviews empirical literature pertaining to labour share measurement and labour share determinants. Section 3 discusses methodological issues relating to empirical testing. Section 4 provides empirical results and attempts to establish their statistical and economic significance. Section 5 summarises the paper.

2. Literature Review

In neoclassical economic theory, labour and capital shares are assumed to be stable, and the whole analysis of factor income distribution is confined to and subsumed within the analysis of production functions with constant elasticity of output with respect to labour and labour-augmenting technical progress (Zuleta, 2012). In fact, what was adopted was a conventional assumption of the level of labour share at 2/3 of the GDP. For such assumptions to hold, it is necessary that constant labour share is attributed to constant savings-output ratio, with propensities to save out of wages being offset by propensities to save out of profits (Kaldor, 1956) and that relative price of labour to capital is also stable, based on proportional changes of wage costs in capital-producing and capital-using industries (Lebergott, 1964). As early as the 1950s, it was argued that such a view may be unfounded.

As noted by Solow (1958), the stable labour share in national income or stable ratio of labour to capital income may hold only if movements in the relative prices of labour and capital are exactly offset by counter movements in quantities of factors. In addition, Solow argued that a labour share may be variable due to growth of income of unincorporated enterprises and human capital stock. In a similar vein, Alterman (1964) argued that proportionality of changes in wage costs in capital-producing and capital-using industries can hardly be ensured, as it also requires proportionate changes in the rate of return to capital and capital productivity. Another argument against labour share stability is put forward by Johnson (1954), attributing long-run increases of labour shares to structural changes in the economy (decline of agriculture, where labour share of output is particularly low), the growing prominence of government contribution to GDP, in the form of government employees' compensation, and the decreasing proportion of unincorporated businesses in total labour

force. In heterodox economics (in particular, post-Keynesian economics), the view of stable factor shares is likewise disputed: the imperfect competition, as well as varying mark-up power and related varying bargaining power of labour and capital, would cause factor shares to fluctuate (Stockhammer, 2009).

Empirical evidence tends to point towards instability of labour shares. Piketty (2007) argues that the labour share in selected developed economies is stable. However, his empirical results were derived from long samples, covering periods of longer than one hundred years (US, UK and France samples). In the medium-term, the evidence is overwhelmingly in favour of labour share instability, specifically when recent decades are concerned. Krueger (1999) points to the significant variation of labour share in the US over the 1939-1998 period. Rodriguez and Jayadev (2012), using economy-wide and manufacturing sector data, established the decline in labour share at national, regional and global level over the 1950-2005 period, caused by falls in 'intra-sector labour shares as opposed to movements in activity towards sectors with lower labour shares' (p. 1). The evidence of the decline in labour share since the 1980s was provided by: the IMF (2017), which documented the labour share decline of two percentage points on average for a sample of economies between 1991 and 2014; Cho et al., (2017), indicating decline in labour shares in OECD economies by an average of one percentage point over the period of 1995-2014; and Karabarbounis and Neiman (2014), who showed that the global corporate labour share declined by 7.8% over the 1975-2012 period. The labour share deterioration tendency in the mid-term is also confirmed by Atkinson (2009), Carter (2007), Bentolila and Saint Paul (2003) and Dunhaupt (2012). In many cases, empirical analyses did not consider factor shares explicitly, but, nonetheless, identified deterioration of the labour share; for instance, divergence of real wage growth from labour productivity growth and, hence, a fall in the labour share (Giammarioli et al., 2002).

On the other hand, other historical periods witnessed increases in labour share in many instances: during the industrial revolution in Britain, the rise of factory organisation and the demise of self-employment made the wage share increase (Phelps Brown and Weber, 1953). Similar developments during the 19th century were documented for the US and Germany (Scitovsky, 1964; Jeck, 1968). In other economies, there were also periods when labour share rises were experienced – for instance, in Canada in the 1920s-50s (Goldberg, 1964), Denmark in the early 1960s (Bjerke, 1966), Italy in the 1920-30 decade (Gabutti, 2016), Japan in 1916-25 (Minami, Oro, 1979). In addition, labour share dynamics are not uniform across economies, periods and economic sectors: for instance, according to Giammarioli et al., (2002), the decline in labour share was more pronounced in continental Europe, whilst in Anglo-Saxon economies the share remained stable. Harrison (2002) indicated a decreasing labour share trend in developing economies, and an upward

trend in developed ones during 1960-1997. Karabarbounis and Neiman (2014) also pointed out that, while labour share decline was experienced in the majority of economies, in 9 out of 59 economies of the sample, the trend was positive over the 1975-2012 period. Period-wise, Rodriguez and Jayadev (2012) showed that across 130 economies, and also within relevant regional groups labour share, decline was mostly a post-1980 phenomenon (with declines becoming even more pronounced in the post-1990 period), while the 1960s and 1970s witnessed a stable or increasing share.

In the short-run, fluctuation in labour share across the business cycle stages was also well documented (Rafallovich *et al.*, 1992; Young, 2004). On a theoretical front, a number of hypotheses were formulated, relating fluctuations of labour share to fluctuation in macroeconomic variables, namely: the 'overhead labour' hypothesis, implying a negative relationship between labour share and capacity utilisation (Bernanke, 2000); the 'labour hoarding' hypothesis, considering procyclical productivity and counter-cyclical wages and labour shares (Caballero, Hammour, 1998); the 'realisation failure' and 'wage-lag' hypotheses, implying a negative relationship between GDP growth and output prices on the one hand, and labour share on the other (Sherman, 1991), and the 'rising strength of labour' hypothesis, assuming a positive relationship between employment and labour share (Boddy and Crotty, 1975). Empirical analysis appeared to confirm these hypotheses: the spikes in labour shares were experienced in the time of major recessions of the mid-1970s and late 2000s (Bruno, Sachs, 1985; Grubb *et al.*, 1982; Chan-Lee and Sutch, 1985; Heap, 1980; Jankowski, 1998, Diwan, 2001). However, similarly to the medium term case, the underlying reasons for labour share spikes appeared to be different. For instance, according to McClam and Andersen (2016: 267), in Austria and Belgium, the spike of labour share was driven by inflation factors, while in Sweden the spikes were due to lagging productivity growth. Likewise, regarding the recent recession of 2008-09, distinct labour share patterns were documented (moderate decline in labour share during the recovery period in many European economies, but drastic decline in the US, Spain and Greece (IMF, 2012).

The absence of national accounts data largely restricted the analysis of factor shares in the earlier periods, in particular, making it impossible to split mixed income into capital and labour incomes and to estimate the income of the self-employed, thereby limiting empirical work to the analysis of wage (rather than labour) share. This problem has been overcome through the construction of the labour share series based on the income-side estimates of GDP. The relevant dataset construction included Rodriguez and Jayadev (2012), Karabarbounis and Neiman (2014), Guerriero (2012) and Penn World Table and Extended Penn World Table projects (Heston *et al.*, 2011; Foley, Marquetti, 2012) for a range of developed and developing economies; Neira Barria (2012) and Tosoni (2014) for Latin American economies;

and Kraemer (2011a) for a set of developed economies. Dataset construction by institutional bodies included the AMECO database by the European Commission and the Structural Analysis Database by the OECD. Most of the datasets spanned several decades, including either the most recent decades or the entire post-WWII period. Historical datasets, from as far back as the 1930s or the 19th century, are provided by Piketty (2014) and Bengtsson and Waldenstrom (2015), mostly for a small set of industrialised nations and some developing economies. In this paper the analysis is conducted based on AMECO database.

The empirical and theoretical literature identified multiple forces determining factor shares in general, and causing decline in labour share, in particular. Given that the analysis of these determinants is not the objective of this paper, we mention them in passing. The forces that potentially caused the decline in labour share (and rise of profit share) in recent decades include: capital accumulation and capital-augmenting technical change (Bentolila, Saint Paul, 2003; Raurich *et al.*, 2012); changes in relative prices of investment goods (Blanchard, 1997; Karabarbounis, Neiman, 2014); technological factors associated with the increased use of IT-based capital goods and faster obsolescence of capital goods (Ellis, Smith, 2007); financialisation and the increasing role of financial motives, financial actors and institutions in the operations of the economy (Dunhaupt, 2012); deregulation of labour markets and weakening of labour bargaining power (Blanchard, Giavazzi, 2003; Kristal, 2010), employment rationalisation during cyclical downturns, flexibilisation of labour through contract work and outsourcing, international competitive pressures on wages (Rodrik, 1997), privatisation (Torrini, 2005; Azmat *et al.*, 2011); globalisation and greater trade openness (Guscina, 2006; Elsby *et al.*, 2013); foreign direct investment and stronger financial capital flows (Furceri, Loungani, 2015), as well as various short-run macroeconomic factors, such as exchange rates and oil price changes (Dombrecht, Moes, 1998). Several factors that could have a positive effect on labour share are mentioned, such as: democratic rule (Rodrik, 1999); offsetting shifts in different industries that keep aggregate labour share stable (Young, 2010), and technological innovation and trade openness (Guerriero, Sen, 2012: 31).

Whilst considerable effort has been made in constructing the labour and capital share series, in identifying relevant driving forces and in analysing trends in factor shares, little or no formal econometric analysis has been conducted to establish stability (or its absence) in factor shares. Although a visual examination of series may suggest that labour share is in decline, a more formal analysis is needed to confirm this hypothesis (in particular, to determine sources of instability, such as presence of deterministic trends or unit root processes with or without breaks).

Formal statistical analysis could help resolve the long-standing controversy as to whether stability of the labour share is an 'illusion' or even a 'mystery', lacking a theoretical basis (Keynes, 1939: 48; Schumpeter, 1939: 575; Solow, 1958) or, indeed, a 'stylized fact' (Kaldor, 1961) or even a law (*Bowley's Law*, Bowley, 1920).

3. Econometric Methodology

3.1 Data

Labour share data has been obtained from the European Commission AMECO database. The labour share variable (ALDC0 code in AMECO database) was defined as the ratio of compensation of employees for the total economy to the number of employees in all domestic industries, divided by the ratio of GDP at market prices to employment of persons in all domestic industries. The adjusted labour share was, thereby, obtained by imputing the average employees' compensation to the self-employed, based on labour force composition. This way, the adjusted labour share of GDP is calculated (which is greater than wage share) and the systematic downward bias in labour share is eliminated (Gollin, 2002; Ellis, Smith, 2007), as the correct figure, which includes the income of self-employed agents and income of owners of unincorporated businesses, is obtained. Labour share is measured at factor costs, thereby removing the values of depreciation and taxes on production and imports and adding back the values of subsidies. This would give more precise estimates, since these items do not represent returns to production factors (Guerriero, 2012: 6).

This adopted labour share measure is likely to be superior to others used in empirical work. Firstly, it is more robust than the adjusted labour share, calculated by allocating two-thirds of the mixed income from self-employment to labour income (Johnson, 1954), which appears to be an arbitrary procedure that does not account for variation in labour and capital income proportions over time. Secondly, allocation of all mixed income to labour income (Kravis, 1959) overstates labour share, particularly in developed economies, since self-employment generates capital income. Thirdly, the measure adopted does not rely on the assumption of the same labour and capital income proportions for the self-employment sector and unincorporated enterprises as in the rest of the economy and corporate sector (Atkinson, 1983).

The period covered for each economy was set sufficiently long to examine variation in labour share, spanning 1960 to 2014 for all economies in question except Iceland (where the sample included 1970-2014 observations). The paper considers the following developed economies: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, the UK and the USA.

3.2 Model

As a first step, a log-linear trend model was estimated using the following formula:

$$\ln(LS)_{it} = c_i + \beta_i t + \mu_{it} , \qquad (1)$$

where LS denotes labour share for country i in year t, t is the year of observation and μ_{it} is a random disturbance term. The trend value is given by β_i, which represents average annual change in labour share ratio for country i over the period. Specifically, $\beta > 0$ indicates an increase in labour share, whilst $\beta < 0$ reflects its deterioration. The possibility of serial correlation dictates that the model be estimated in AR terms: to this end, the Prais-Winsten procedure is employed. By removing autocorrelation, whilst retaining the first observation, Prais-Winsten transformation improves model efficiency (Doran, 1981; Wang, Jain, 2003: 85).

It is acknowledged (Nelson, 1987) that, if the dependent variable is non-stationary, the OLS estimator may turn out to be inefficient, resulting in spurious trend results (a statistically significant trend when none is, in fact, present). To address this potential problem, we adopt an autoregressive specification of equation (1) that includes trend- and difference-stationarity (Bleaney, Greenaway, 1993; Athukorala, 2000). When re-parametrized in differences and lagged variables, it takes the form of the Augmented Dickey-Fuller (ADF) test regression as follows:

$$\Delta \ln LS_{it} = c + \beta_i t + \sum_{i=1}^{m} E^* \Delta \ln LS_{t-1} + \Phi \ln LS_{t-m} + \mu_t \qquad (2)$$

where $\Phi = -\left(I - \sum_{i=1}^{m} E^* \right)$ and long-run trend in labour share is $b = -\beta \Phi^{-1}$. The model incorporates four alternative hypotheses: the presence of deterministic trend ($\beta < 0$, $\Phi < 0$ or $\beta > 0$, $\Phi < 0$), reversion to historical mean ($\beta = 0$, $\Phi < 0$), random walk with drift ($\beta < 0$, $\Phi = 0$ or $\beta > 0$, $\Phi = 0$) and random walk without drift ($\beta = 0$, $\Phi = 0$). Equation (2) is conceptualised as an ideal error-correction model if coefficient Φ (the error-correction term) is significant and belongs to $-1 < \Phi < 0$ (Bleaney, Greenaway, 1993: 351). In this case, change in LS is negatively related to its current level, with LS being pulled back to deterministic trend or historical mean. In contrast, when $\Phi = 0$, no such reversion occurs and random walk patterns are present.

We also implement more robust unit root tests to confirm the presence (or absence) of trend stationarity, specifically Lee-Strazicich univariate and panel Lagrange Multiplier (LM) unit root tests with up to two structural breaks (Lee, Strazicich, 2003, 2004; Im et al., 2005).

Both univariate and panel versions of the LM test were implemented using Model C, allowing for two shifts in the intercept and trend. Breaks were considered to occur at unknown times and were determined endogenously through a grid search over [0.1T; 0.9T] interval, where T is the number of observations in the sample. The null hypothesis was the presence of unit root with up to two breaks, whilst an alternative hypothesis was trend stationarity with up to two breaks.

The test statistic was estimated using the following equation:

$$\Delta LS_t = d' \Delta Z_t + \phi \tilde{S}_{t-1} + \sum \delta_i \Delta \tilde{S}_{t-i} + \varepsilon_t \qquad (3)$$

where $\tilde{S}_t$ is a de-trended series, ε_t is an independently and identically distributed error term, Z_t is a vector of exogenous variables, ϕ is a relevant estimator used in calculating minimum LM statistic. The latter is defined as $LM = \inf_{\lambda} \tau(\lambda)$, where λ is the break location and τ is a ratio of estimator ϕ to its standard deviation. The number of augmenting terms ΔS_t (included to correct for serial correlation) was obtained through a general-to-specific procedure, with the maximum number of augmenting terms k set at $k_{max} = 8$.

The panel LM unit root test is performed to ensure greater robustness of results, given the low power of univariate tests in small samples (Shiller, Perron, 1985). The panel LM test statistic is calculated as an average of univariate LM test statistics for each economy in the panel, as follows:

$$\bar{LM}_{NT} = \frac{1}{N} \sum_{i=1}^{N} LM_i^{\tau} \qquad (4)$$

The standardised panel LM test statistics is calculated using expected value and variance of LM_i^{τ}; in effect, $E(L_T)$ and $V(L_T)$ as contained in Im *et al.* (2005). Due to the possibility of heterogeneous autocorrelation errors, these values are selected based on the weighted average of k, determined by the univariate LM test for individual economies.

The standardised panel LM test statistics are, thus, given as:

$$\Gamma_{LM} = \frac{\sqrt{N}[\bar{LM}_{NT} - E(L_T)]}{\sqrt{V(L_T)}} \qquad (5)$$

The univariate models (log-linear trend, ADF and LM tests) were implemented sequentially. The trend and ADF models were estimated initially with no structural dummies and, if diagnostic problems appeared (heteroscedasticity, serial correlation and non-normality of residuals), they were re-estimated with dummies and/or additional lag terms. The structural breaks and respective dummies in ADF and trend models were determined through a combination of procedures (residuals from ADF regressions, recursive residuals, N-step forecasts and the Quandt-Andrews test).

The univariate LM test was first implemented with two structural breaks. If only one break was significant (in effect, only one trend dummy variable D_t was significant), the LM test with one break was performed (irrespective of the acceptance or rejection of the null hypothesis). If no breaks were significant, the LM unit root test with no breaks was implemented (Schmidt, Phillips, 1992).

We consider the possibility that three univariate tests (log-linear trend model, ADF and univariate LM tests) and visual inspection may be delivering conflicting results. For this reason, an eclectic procedure is adopted. It is well-known (Kendall,

1953) that *ad hoc* visual inspection without a sensible statistical model is prone to delivering spurious results and patterns; hence, visual inspection is performed, in conjunction with formal tests and based on an analysis of the economic significance of labour share changes. With regard to the log-linear trend model, several authors (Granger, Newbold, 1974; Nelson, 1987) indicate likelihood of spurious trends, whilst others argue that trend models are valid and robust (Canjels, Watson, 1997; Kakwani, 1997), as long as asymptotically valid inference is possible and efficient estimators are available.

The Dickey-Fuller methodology suffers several shortcomings, specifically: the false non-rejection of the null hypothesis of unit root when structural breaks are not considered; low power against an alternative hypothesis of stationarity when large autoregressive root is present, and the tendency to over-reject the null when series contain large negative MA root. At the same time, given that conventional unit root tests results are not definitive sources of information about the series but rather results of an exploratory procedure (Mahadeva, Robinson, 2004: 12) and that adopting a general form of ADF test allows testing multiple hypotheses and detecting a variety of statistical patterns, the results are informative.

Lagrange Multiplier tests are superior to ADF and to standard unit root tests (Perron, 1989), as well as many of the unit root tests with structural breaks. Contrary to Perron tests, LM tests determine the timing of the breaks endogenously. As opposed to Zivot-Andrews and Lumsdaine-Papell tests, LM tests allow for unit root behaviour with breaks under null hypothesis, and, hence, can convincingly accept/reject unit root null (Christiano, 1992; Lee, Strazicich, 2003). Thereby, we consider them the principal analytical instrument with which to make inference.

Six alternative outcomes are possible: (1) if all three tests point to a trend in the series (with or without breaks), it is concluded that labour share is not stable and earlier balanced growth assumptions are less justified; (2) A similar conclusion is reached (albeit in a weaker form), if univariate LM tests suggest trend (with one or two breaks) that one of the other procedures adopted points to the same; (3) If univariate LM tests reject the trend hypothesis and only one of the other tests indicates the trend, whilst another one does not, we conclude that no trend (with or without breaks) was present; (4) Likewise, if univariate LM tests indicate the trend hypothesis, but two other tests do not, the conclusion is that there is no trend (with or without breaks). (5) If all three tests point to non-deterministic behaviour, the trend is not present. (6) If the results of ADF and log-linear trend models override the results of the LM tests (the former suggest trends, whilst the latter do not), no conclusion is reached and further testing is required.

With outcomes (3), (4) and (5), the series tend to revert to the historical mean (particularly when ADF points to mean reversion); hence, labour share is considered stable in line with the predictions by Kaldor (1961) and Bowley (1920). Alternatively, labour share is seen to follow random walk, with or without drift, and no definite conclusions regarding its future direction are possible.

4. Empirical Analysis

4.1 Test results

The visual representation of the labour share series (Figure 1) suggests that, in most economies, the level of labour shares at the end of the sample period was lower than at the beginning of the period. Belgium, Denmark, Luxembourg and the Netherlands stand as exceptions, showing positive changes in labour share.

Figure 1. Labour share (%) in OECD economies, 1960-2014
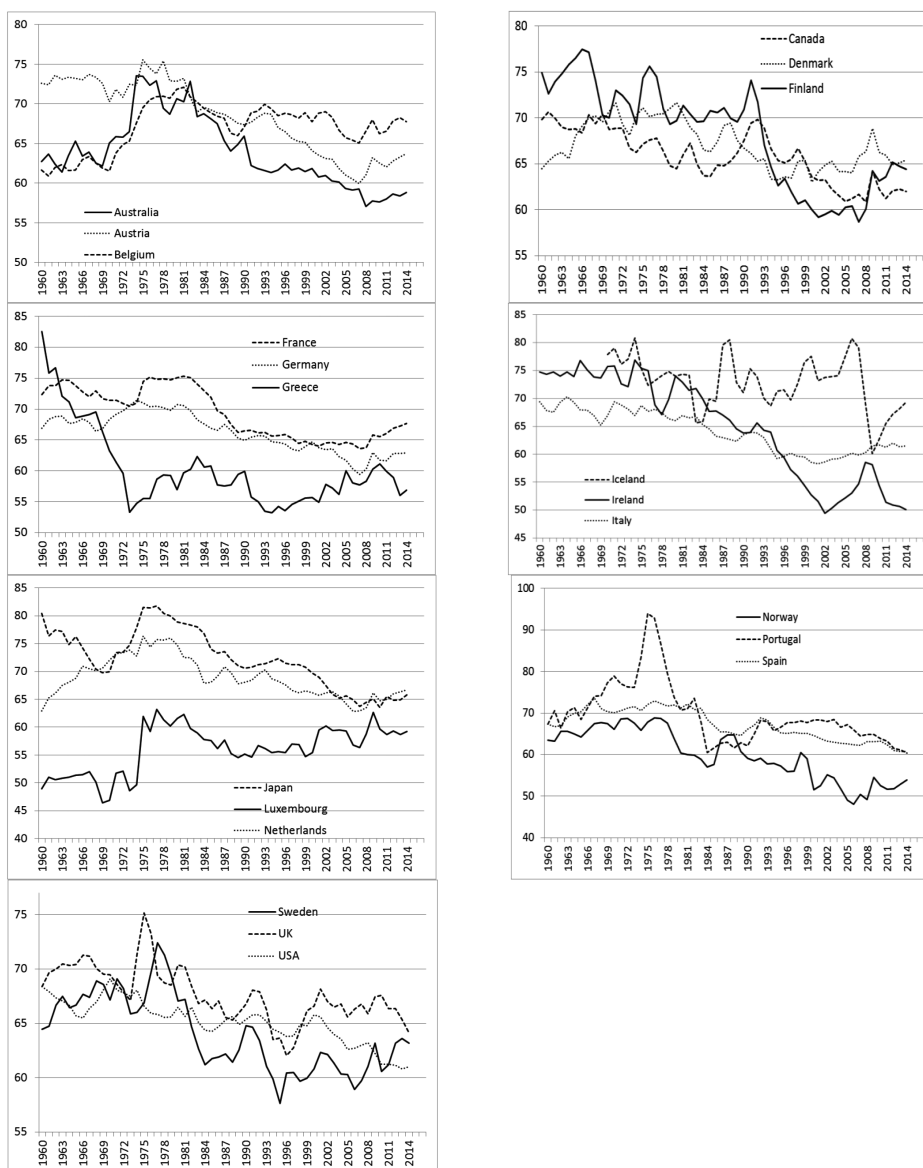
In other economies, a decline in labour shares was observed, either without major breaks in the series (the case of the USA), or with changes in the intercept of the series (Greece), with temporary increases (Australia, Portugal), or possibly stepwise decline (Norway). In several instances, labour shares appeared to show no distinct patterns or tendencies (Iceland). In terms of magnitude of changes, the largest or most precipitous declines were observed in Greece and Ireland (with labour shares in 2014 standing at 68.8% and 67.0% of their levels in 1960, respectively) and the largest increases in Luxembourg (20.9% increase over the period studied). It is acknowledged that inspection of time plots or estimation of log-linear trend models may lead to spurious trend results and invalid inference, and, therefore, ADF regression is considered.

The results of log-linear trend model with the Prais-Winsten transformation are presented in Table 1.

Table 1. Log-linear trend model estimates

Country	Trend	Cumulative change (%)	p-value	rho	Break	Model
Austria	-0.0032	-17.49	0.00	0.85		TS
Australia	-0.0017	-9.29	0.22	0.91	1974	
Belgium	0.0016	8.85	0.14	0.94		
Canada	-0.0023	-12.34	0.00	0.73		TS
Denmark	-0.0007	-3.62	0.35	0.83		
France	-0.0016	-8.47	0.14	0.96	1975	
Finland	-0.0038	-20.51	0.00	0.84		TS
Germany	-0.0018	-9.69	0.01	0.89		TS
Greece	-0.0058	-31.14	0.01	0.91		TS
Iceland	-0.0020	-8.87	0.12	0.63	2009 or 1983	
Ireland	-0.0081	-43.63	0.00	0.85		TS
Italy	-0.0027	-14.84	0.00	0.86		TS
Japan	-0.0037	-19.72	0.00	0.91		TS
Luxembourg	0.0032	17.49	0.01	0.80	1975	TS
Netherlands	0.0004	2.21	0.78	0.95		
Norway	-0.0051	-27.75	0.00	0.70		TS
Portugal	-0.0027	-14.67	0.17	0.88	1975	
Spain	-0.0024	-12.89	0.00	0.89		TS
Sweden	-0.0016	-8.73	0.07	0.84		TS
UK	-0.0014	-7.60	0.00	0.72	1974-5	TS
USA	-0.0018	-9.91	0.00	0.79		TS

Note: TS represents stationarity around deterministic trend.

Negative trends were present in 18 out of 21 economies, and positive trends were identified in three economies (Belgium, Luxembourg and the Netherlands). Out of 18 negative trends, 12 were found to be statistically significant (at 1% or 5% levels, with the exception of Sweden, where the downward trend was significant at a 10% critical level). Out of the three positive trends, only two were significant (in Belgium and Luxembourg). The largest, statistically significant declines in labour shares occurred in Ireland, Greece, Norway and Finland (-43.63%, -31.14%, -7.75% and -20.51%, respectively) and the smallest in the UK (-7.60%). The larges, statistically significant increase was experienced in Luxembourg (17.49%). These results are supported by a visual inspection of the series.

The ADF model estimates are presented in Table 2.

Table 2. Augmented Dickey-Fuller (ADF) model estimates

Country	δ	p-value	ψ	t-statistics	Break	Trend	R^2	Notes	Model
Austria	-0.0008	0.02	-0.200	-2.60	1975	-0.39	0.21		DT
Australia	-0.0004	0.08	-0.121	-2.27	1974	-0.34	0.35		DT
Belgium	0.0000	0.92	-0.099	-2.11	1974	X	0.17		MR
Canada	-0.0007	0.00	-0.266	-3.29	2009	-0.26	0.26	NW	DT
Denmark	-0.0005	0.01	-0.247	-3.28	2009	-0.22	0.21		DT
France	0.0000	0.91	-0.049	-1.08	1975	X	0.35		RW
Finland	-0.0010	0.03	-0.220	-2.85	1975	-0.43	0.26		DT
Germany	-0.0004	0.10	-0.091	-1.35	2009	-0.39	0.26	$\Delta lnLS_{t-2}$	ST
Greece	-0.0003	0.42	-0.165	-3.05	1973	X	0.30		MR
Iceland	-0.0006	0.33	-0.497	-4.20	2009	X	0.37		MR
Ireland	-0.0020	0.00	-0.219	-3.04		-0.94	0.17		DT
Italy	-0.0006	0.05	-0.196	-2.53	1975	-0.30	0.15		DT
Japan	-0.0002	0.37	-0.062	-1.16	1971	X	0.15		RW
Luxembourg	0.0008	0.03	-0.189	-2.62	1975,1977	0.40	0.64	$\Delta lnLS_{t-2}$	DT
Netherlands	-0.0005	0.01	-0.186	-3.48	1975	-0.27	0.27		DT
Norway	-0.0025	0.00	-0.411	-3.88		-0.62	0.19		DT
Portugal	-0.0010	0.00	-0.282	-5.27	1975, 1984	-0.34	0.52		DT
Spain	-0.0008	0.00	-0.225	-3.64		-0.38	0.25		DT
Sweden	-0.0007	0.02	-0.283	-3.37	1977	-0.25	0.18		DT
UK	-0.0005	0.01	-0.347	-4.39	1974-5	-0.14	0.48		DT
USA	-0.0005	0.01	-0.266	-2.94	1983	-0.18	0.19		DT

Notes: DT, MR, ST and RW represent deterministic trends, reversion to historical mean, stochastic trends and random walk. X indicates that the trend coefficient is not statistically significant. NW indicates Newey-West standard errors due to presence of heteroscedasticity and autocorrelation. $\Delta lnLS_{t-2}$ is an additional lag term to overcome autocorrelation. The t-statistics critical values for a small sample (n = 55) are 2.668, 2.004 and 1.673 at 1%, 5% and 10% significance levels, respectively. ADF test critical values for n = 55 are -4.15, -3.50 and -3.18 at 1%, 5% and 10% significance levels, respectively.

The coefficient of error-correction term (Φ) is negative and, hence, the model is valid. The models passed the usual diagnostic tests (normality, autocorrelation, heteroscedasticity, joint significance of variables). In the case of Canada, the Newey-West estimator was used to overcome autocorrelation and heteroscedasticity and respective standard errors were obtained. In the case of Germany and Luxembourg, the additional lag of the difference variable was introduced to address autocorrelation.

Deterministic trends are likely to be present in 15 economies ($\beta \neq 0, \Phi \neq 0$), if conventional t-statistics critical values (2.004 at 5% significance level for a n = 55 sample) are used to determine the significance of Ψ, or in four economies, if the Dickey-Fuller critical value is used (-3.50 at 5% critical level). In the latter case, the deterministic trend is present in Norway, Portugal, Spain and the UK. With the exception of Luxembourg, all identified trends are negative. The largest decline in labour shares along deterministic trends was experienced in Ireland (-0.94% p.a.) and Norway (-0.62% p.a.). Reversion of the series to historical mean was witnessed in Belgium, Greece and Iceland. Labour share appeared to follow random walk in France and Japan, and a stochastic trend in Germany.

In the majority of cases, the correctly specified model was obtained if dummy variables (of impulse of shift form) representing structural breaks in series were included. The majority of breaks appeared to occur in the mid-1970s (12 breaks), 2009 (four breaks) and early 1980s (two breaks). Importantly, the majority of breaks in the labour share series correspond to rise in the level of the series. Structural breaks in Greece (1973), Italy (1975), Portugal (1984), Spain (1984), Sweden (1977) and USA (1983) stood as exceptions.

The LM unit root tests with breaks demonstrate mixed results (Table 3). For the labour share variable, structural breaks were present in all economies in question (one break in Greece, Iceland, Italy, the Netherlands and Sweden; two breaks in the remainder of the sample) and at least one of the dummy variables representing a change in level or trend was significant at a 5% level. Schmidt-Phillips unit root tests were, therefore, not performed.

Trend stationarity with break(s) was witnessed in all economies except Canada, Germany, Greece, Ireland, Italy and the Netherlands, implying that labour shares were not stable over the study period. The location of the breakpoints was less precise than with the ADF test, with less correspondence to actual economic developments (this, as shown below, being the major shortcoming of the LM test). Nonetheless, out of 37 breakpoints, ten were located in the 1970s, another ten in the early 1980s and one in the late 2000s.

Table 3. Univariate Lagrange Multiplier (LM) test results

Country	LM test (2 breaks)					LM test (1 break)			Break date	Model
	Break significance			Break dates		Break significance				
Austria	-7.621*	[7]	B1D1B2D2	1973	2002					TSB
Australia	-6.038	[8]	B1D1B2D2	1972	1985					TSB
Belgium	-5.299**	[6]	B1D1D2	1972	1984					TSB
Canada	-4.669	[1]	D1D2	1988	2000					URB
Denmark	-5.671	[6]	B1D1D2	1974	2000					TSB
France	-6.290	[7]	B1D1D2	1983	1998					TSB
Finland	-6.634*	[6]	D1D2	1988	1999					TSB
Germany	-5.223	[3]	D1B2D2	1981	2009					URB
Greece						-3.564	[8]	D1	1975	URB
Iceland						-4.708	[3]	D1	2006	TSB
Ireland	-5.175	[8]	B1D1D2	1982	1994					URB
Italy						-3.853	[8]	D1	1992	URB
Japan	-5.474**	[6]	D1D2	1978	1983					TSB
Luxembourg	-7.612*	[1]	B1D1B2D2	1976	1990					TSB
Netherlands						-3.328	[5]	B1D1	1978	URB
Norway	-5.743*	[7]	D1B2D2	1978	1999					TSB
Portugal	-5.672	[1]	D1D2	1977	1991					TSB
Spain	-5.705	[6]	B1D1D2	1982	1995					TSB
Sweden						-4.617	[1]	D1	1981	TSB
UK	-5.920	[1]	D1D2	1980	1998					TSB
USA	-6.560*	[8]	B1D1D2	1981	1998					TSB

Notes: TSB indicates trend stationarity with break(s), URB represents unit root with break(s). B1, D1, B2, D2 indicate significant (at 5% level) intercept and trend dummy variables (for the first and second breakpoints, respectively). Lags selected by general-to-specific procedure are shown in square brackets. In Model C, with one break at 5%, critical values range from -4.45 to -4.51. In Model C (two breaks) critical values are: -6.16 to -6.45 (1% significance level); -5.59 to -5.74 (5% significance level); -5.27 to -5.33 (10% significance level, depending on the location of the breakpoint. In Model C (one break) critical values are: -5.05 to -5.15 (1% significance level); -4.45 to -4.51 (5% significance level); -4.17 to -4.21 (10% significance level, depending on the location of the breakpoint. Series are trend stationary with breaks at 5% significance level unless otherwise indicated; symbol (*) indicates significance at 1% level and symbol (**) significance at 10% level.

The panel LM unit root test (Table 4) was firstly conducted on a full sample of 20 economies, excluding Iceland (for which earlier observations were not available). Secondly, to ensure robustness of results and to account for the possibility of rejection of unit root null, due to only one of the series being stationary (Taylor, Sarno, 1998), the test was implemented on a curtailed basis, consisting only of economies for which the univariate LM test did not reject the unit root null hypothesis (five such economies in the case of the LM test with two breaks and 15 economies in the LM test with single break).

The results of the panel LM unit root test (run on both full and smaller samples) confirm univariate test results. Univariate LM tests pointed to 15 instances where unit root null was rejected. The panel LM unit root test, likewise, indicates very strong rejection of unit root, suggesting, firstly, the higher power of LM tests in a panel framework, and, secondly, the high likelihood of trends in labour shares across economies (as opposed to stability or random walk).

Table 4. Panel Lagrange Multiplier (LM) test results

Panels	LM unit root test with 1 break	LM unit root test with 2 breaks
Panel of 20 economies	-13.804	-27.990
'Unit root' panel	-12.447	-21.323

Notes: The sample for panel LM unit root testing includes all economies, except Iceland. Critical values for the panel LM unit root test at 1%, 5% and 10% significance levels are -2.326, -1.645 and -1.282, respectively.

4.2 Interpretation of results

Systematic analysis of the determinants of labour shares and the identification of common drivers and general regularities require proper econometric analysis in a multivariate setting. However, the focus and the argument of this paper is that most labour share changes in individual economies were country-specific and driven by a set of unique factors. Thereby, even similar economies were frequently exhibiting diverse labour share patterns. We analyse these country-specific developments on a case-by-case basis, looking at the magnitude of changes in labour shares, and by examining the timing of structural breaks and reversals and discontinuities in labour share trends. Given the limited space, we mention only major country-specific factors, while comprehensive case study of labour shares in individual economies can become a fruitful research project on its own.

1).   *Australia.* In Australia, a sharp increase in labour share in the mid-1970s was associated with wage-push inflation and 'real wage overhang' (Riach, Richards, 1979; Stegman, 1980: 302). The labour share decline in the 1980s was due to Price and Incomes Accords that brought moderation in wages in exchange for increased benefits outside labour remuneration (Cockerell, Russell, 1995). Further on, the labour share continued to decline steadily throughout the 1990s and 2000s. As put by Australian Bureau of Statistics (2018), the share declined in 11 out of 16 major industries and sectors. Manufacturing experienced an increase in labour share, but the relative contribution of manufacturing to the GDP has declined substantially. In contrast, labour share in finance and insurance and agriculture (which are major sectors in Australian economy) has declined, as these industries were becoming more capital intensive. Expansion of mining (which was increasingly important for

Australian economic development and growth) reduced its labour share by 1.5 percentage points over two decades. Parham (2013) provides similar evidence: labour share fell by over 4 percentage points since 2000. Commodity boom and drastic increase in producer prices (well ahead of the increase in consumer prices) and associated improvement in terms of trade resulted in increase for both labour and capital income. The latter, however, grew faster than the former, thereby leading to a fall in labour share; the real purchasing power of labour did not decline and it offset the fall in labour share. The overall increase in capital stock and capital intensity in the total economy substantially changed economic structure: even with moderation of terms of trade, the reversion of labour share to initial levels will, thereby, be unlikely (indeed the reduction in commodity prices may spur cost cutting by minerals producers and, hence, further fall in the labour share, Stanford, 2017: 6).

2). *Austria*. Possible breaks in labour share were identified for 1973, 1975 and 2002. In line with McClam and Andersen (2016), we argue that the break in 1973 was likely due to the deterioration of Austrian terms of trade ("first oil shock") that heavily affected Austria due to its status of being an oil importer. The labour share declined moderately in the 1980s, stabilized in the early 1990s and fell precipitously in the 2000s. This is likely due to the nature of wage policies in Austria that are strongly geared towards changes in macroeconomic conditions. Real wages are flexible with respect to external and internal macroeconomic shocks and are subservient to a consensual goal of maintaining low unemployment (Hofer *et al.*, 2014: 4-5). Until the mid-1990s, the real wage growth was commensurate with productivity growth, resulting in a rather stable labour share. Onwards, the real wages lagged behind productivity, resulting in a declining labour share, while maintaining the competitiveness of the economy and exports. In addition, given the prominent place of Austria in European economic relations with Eastern Europe, trade with this region and outward FDI had strong negative effects on the Austrian employment and labour markets (Onaran, 2008). The effects concerned both high- and low-skill workers and industries, principally originated from the expansion of foreign affiliates of Austrian companies, and, in regard to wage share, were most pronounced in the industry (as opposed to the total economy). In line with this paper's findings, Onaran shows that the expansion of FDI to Eastern Europe resulted in a 25.2% decline in real wages and 18.1% decline in wage share during 1996-2005. Similar negative effects were experienced when final and intermediate imports from Eastern Europe were concerned.

3). *Belgium*. Breaks in the labour share were identified for 1972, 1974 and 1984. The former two roughly correspond to external shocks faced by Belgium in the early 1970s, specifically by the drastic fall in productivity and terms of trade: as

an early industrialised country with a large base manufacturing sector (steel, chemicals and machine building), Belgium experienced significant negative effects during the time of oil shocks (Biatour, Kegels, 2015). Labour share dynamics in the 1970s and 1980s constituted an outlier case, compared to other European economies: the labour share has grown substantially since the early 1970s and has never declined to original levels. On the one hand, this was a result of consistently slow productivity growth in manufacturing, as evidenced by a low degree of ICT penetration and lack of innovative leaders in manufacturing (Biatour *et al.*, 2011). On the other hand, this was due to highly regulated labour markets, with a high level of union membership (that did not decline significantly in the past decades) and the coverage of collective bargaining that remained the highest within the OECD (Marx, Van Cant, 2018). The path of labour policy reform has been protracted over the years (Cox, 2007), and this has contributed to a stable and rising labour share (as well as low income inequality and solid income growth of the middle class) at the expense of competitiveness.

4). *Canada.* In Canada, the labour share fluctuations were similar to those of the US, not a surprising fact given the tight integration of these economies (this particularly concerns the stagnation of real wages and the wage-productivity gap, Harrison, 2009). The major difference was a substantial increase in labour share in the mid- to late 1980s. Morel (2006: 4) argues that this was likely a statistical artefact: with self-employment rising from 14% to 17% of total employment, the increase in proprietors' income boosted the labour share. The fall in the early 1990s can be attributed to competitive pressures on the economy and wages due to higher openness and integration with the US under NAFTA (Campbell, 2001). Labour share dynamics in the late 1990s and 2000s mirrors Australia and other resource-exporting economies – expansion of 'low labour share' sectors (mining and oil and gas extraction), resulting in commodity price increases, a wedge between producer and consumer prices and expansion of profits.

5). *Denmark.* In Denmark, the labour share experienced an increase in the 1960s and early 1970s, stability during the 1970s, a decline in the 1980s and 1990s, and stabilization in the 2000s (with respective structural breaks in 1974 and 2000). The labour share increase of the 1960s is attributed to sectoral reallocations: relative decline of agriculture, rise of wages in manufacturing and retail and wholesale trade (Bjerke, 1966). The stable share in the 1970s was a result of pressures for higher wages on the part of organised labour, similar to many other developed economies at that time. A decline in the late 1980s-early 1990s is likely attributed to the reorganisation of a system of collective bargaining: merger and centralisation of employers' organisations (Nieminen, 1997). The reorganisation included introduction of wage regulation mechanisms, limiting the number of times when collective bargaining can take place (Nieminen,

1997), ceilings on pay increases, as well as the move towards more flexible pay systems (minimum-wage agreements, minimum-pay agreements and agreements without minimum rates), where the actual pay is fixed at the firm level (Abildgren, 2008). Arguably, the very moderate decline in labour share over 1960-2014 (and stability in the 2000s) is a result of Denmark making substantial headway in restructuring towards high-value-added sectors or industries, such as transportation services, biotechnology and high-tech agriculture (OECD, 2007).

6). *Finland*. Labour share in Finland experienced a dramatic decline in 1992-94, stabilised to a new normal level and experienced some recovery in the 2000s (Sauramo, 2005). These changes are not solely attributed to the rapid restructuring of the Finnish economy after the breakdown of COMECON and the changed trade arrangements with Eastern Europe (relevant structural breaks were identified for 1975, 1988 and 1999, but not for 1991-92). Indeed, the structural reforms, similar to those conducted in Ireland, have taken place since the mid-1980s (and, hence, the break in 1988) and included de-regulation of the economy, and, in particular, liberalisation of inward FDI regime (Hoj, Wise, 2004; Golub, 2003). While deregulation and greater competition were supposed to reduce profit margins and increase labour share, the effect depended on the structure of wage setting institutions, and the path of creative destruction process (in the latter case, productivity increases due to deregulation could exceed wage growth, and, hence, lower labour share). Deregulation of the economy was assisted by flexible labour market institutions (the absence of firm-level strikes, mild employment protection), while low administrative barriers for business start-ups allowed reallocation of labour to more profitable and productive firms and industries (e.g. information and communication technologies), i.e. assisted creative destruction and new business creation (Kyyra, Maliranta, 2008). The decline in labour share was also driven by cuts in the welfare system, fast recovery in asset values and capital incomes in the post-1991 recession period, and tax system distortions, diverting labour income into capital income. (OECD, 2010: 108).

7). *France*. Labour share in France largely followed the patterns experienced by other European economies, with increases in the mid-1970s (respective structural break in 1975). However, the 1983 break is country-specific: reforms in labour legislation introduced by F. Mitterand's government substantially weakened collective labour, and resulted in greater flexibility of employment and the rise of part-time and contract work arrangements; ironically, such change was introduced and implemented by a socialist government (Sachs, Wyplosz, 1986: 263, 267). In addition, the decline in union membership and animosity between trade unions also played its role (Giammarioli *et al*., 2002: 16-17; Goetschy, Rozenblatt, 1992).

8). *Germany*. In Germany, two major instances of labour share decline are identified. Firstly, the labour share fell in the early 1980s (break in 1981), during the period of reconsideration of Keynesian policies and less reliance of the ruling coalition governments on the support of trade unions (Giammariolli *et al.*, 2002: 14-15; Tutan, Campbell, 2005). Secondly, the labour share fell during the early 2000s during the implementation of Hartz reforms, a major change in the labour market policy (Guschanski, Onaran, 2016: 15). It should be noted that German reunification did not appear to have any significant effect on the labour share, i.e. no structural breaks occurred in the early 1990s and no trend reversals took place, in contrast to the drastic decline in union membership following reunification (Ebbbinghaus *et al.*, 2000). Indeed, there was some moderation of labour share in the early 1990s, when a sharp rise in wages was experienced (particularly in East Germany, as part of wage equalisation policies, Hoffman, 2000).

9). *Greece*. In Greece, the labour share experienced some increase for a brief period in the mid-1960s, due to the strengthening of trade unions, as one of the manifestations of the democratisation process. However, the share fell drastically in the late 1960s and early 1970s, as a result of anti-labour and pro-business policies of the "regime of the colonels", 1967-74 (Ioakimoglou, Milios, 1993: 96-97). The breaks in 1973 and 1975 represent the end of this downward trend: the share rose moderately in the post-1974 period, thereby supporting the view that democratization has positive effects on wages and the labour share (Rodrik, 1999). The share, however, never fully recovered. The political-economic regime that got entrenched in the 1980s was not conducive to efficiency and economic growth: the slow-growing economy with distortions in product and factor markets and high unemployment rates made it increasingly difficult to redistribute income among the labour force (Alogoskoufis *et al.*, 1995).

10). *Iceland*. Of all economies in the sample, Iceland exhibited the most volatile labour share, as well as its most drastic decline during the 2008-09 global financial crisis. This pattern illustrates a set of unique characteristics of the Icelandic economy. Iceland is a small open economy dominated by few resource industries (fishing and aluminium production); as a result, the country depends more heavily than other OECD economies on international commodity prices and is affected by investment cycles in the aluminium industry (Feldbaum-Vidra, 2005). The labour markets in Iceland are flexible: labour supply responds dynamically to the economic cycle and nominal wages are adjusted to cushion external shocks (through reduction of working hours or shifting to part-time work), with low levels of unemployment typically being a favourable result (OECD, 2013: 13; Andersen *et al.*, 2011). The debt crisis that took place late in 2008 hit the economy particularly hard and required bigger than usual downward adjustments in wages and the labour share.

11). *Ireland*. In Ireland, the labour share fall proceeded from an originally higher level. The fall was, thus, due to initially low profitability; it also related to distorting tax and accounting practices, such as under-reporting or rental incomes and profits under the older tax regime, and the dramatic increase in profit share following relocation of the headquarters by multinationals, due to the favourable tax regime, and associated transfer pricing practices that started in the early 1990s (Sweeney, 2013: 112, 116; Sharpe, Uguccioni, 2017: 37). The breaks identified for 1994 reflect this development.

12). *Italy*. In Italy, one of the breaks was identified in 1992, representing an accelerated decline in the labour share. This roughly corresponded to the structural reforms of the labour market that took place in 1993 (Pontoriero, 2017). The reform intended to alleviate structural and macroeconomic problems that pervaded the Italian economy in the 1970s, i.e., high inflation, accompanied by devaluation of the Italian Lira, as well as automatic wage indexations in line with inflation, leading to downward pressures on competitiveness. As a result of the reform, the automatic wage indexation was abolished, and tighter connection of wage purchasing power change to productivity change was established, both leading to the decrease in the labour share. It is worth noting that this paper's empirical findings do not identify similarly deep effect by further labour market reforms (1997 Treu law, and 2003 Biagi reform) on the labour share as that caused by the 1993 agreement. In other respects, Italy stands as an exceptional case in that its labour share decline was reversed in the early 2000s and continued rising until present times (Torrini, 2016). Torrini attributes this development to the reduction of mark-ups over marginal costs and the loss of competitiveness of the Italian economy. Furthermore, the rising weight of housing services and the increasing value of imputed rents were also responsible for the labour share fall in the mid-1970s.

13). *Japan*. In Japan, the labour kept falling during the times of rapid capital accumulation and economic growth (the 1960s), starting from a relatively low economic base, accompanied by conservative fiscal and monetary policies within a corporatist and centralised economic management that deliberately weakened labour vis-à-vis capital. The fall of the labour share in Japan that continued until the early 1970s has been well documented by Pempel (1978) citing capital share tripling between 1953 and 1974. Pempel indicates that in the aftermath of the first oil shock, labour unions managed to secure large wage increases (as represented by the structural breaks in 1971 and 1978). Regarding overall decline during the post-war period, Shalev (1990: 71-72) explains sluggish labour in terms of a series of moves by the government to strengthen divisions in the labour movement, creating conditions to nurture loyalty to enterprises, co-optation of trade unions by the firms, deferment of wage increases through seniority-based mechanisms or generous pension packages and the like.

14). *Luxembourg*. The labour share in Luxembourg exhibited similar patterns to Belgium throughout the period (given tight integration of the economies, comprising economic union). The breaks 1975 and 1977 represented the conventional response of the labour to the economic turmoil of the mid-1970s. The further dynamics was different, however: Luxembourg managed to introduce wage moderation policies in the early 1980s (and suspend automatic wage indexations in 1982), thereby restoring competitiveness. It also made substantial progress in economic restructuring towards a service economy dominated by the financial sector (in turn assisted by the rise of Eurodollar markets), and rationalization of the steel production (Zahlen, 2007).

15). *The Netherlands*. One of the structural breaks was identified for 1978. This roughly corresponds to a decline in the labour share due to rapidly increasing unemployment rates in the late 1970s, and the Wassenaar Agreement of 1982 that aimed to reform welfare institutions and to introduce wage restraints in exchange for greater investment, job creation and shorter working hours (Hartog, 1999). The effect of the Wassenaar Agreement was lasting, with wages growing modestly on a par with or below productivity growth rates and the wage share falling dramatically in the 1980s (Salverda, 1998).

16). *Norway*. In Norway, the decline in labour share was attributed to the offshore expansion of the oil industry and related policies to counteract the negative effects of such expansion (OECD, 2012: 148). Indeed if the industry was excluded from calculations, the labour share would turn out to be stable over the study period. As argued by Larsen (2006) and Cappelen *et al.*, (2000), Norway managed to avoid the negative effects of the "Dutch disease" and resource curse and to manage well the gains that the development of the oil and gas industry brought. Specifically, the country managed to maintain the competitiveness of the non-resource economy, to diversify exports, and to prevent uncontrolled wage increases (hence, raising the labour share). This was achieved by means of wage controls and income coordination programmes that allowed wages to rise in line with productivity.

17). *Portugal*. In Portugal, the sharp labour share spike of the mid-1970s was driven by a combination of political and external economic factors (Vilares, 1986: 184-185). The spike in 1974-5 can be related to the pro-labour policies of the left-wing government that came to power after the "carnation revolution" of 1974, resulting in sharp increases in real wages (15.8% and 12.6% in 1974 and 1975, respectively) and redistribution of income in favour of labour. Accompanying factors were the drastic decline in GDP, the loss of colonies and disintegration of the colonial empire, massive emigration out of the colonies, as well as the increase in oil prices that affected Portugal, as an open economy, more substantially. Since the mid-1980s the labour share has practically remained

unchanged (with minor upward fluctuations): this reflects the most stringent job protection rules within the OECD, favourable collective bargaining and strike laws, workers' participation and oversight in enterprises, dating back to the 1976 Constitution that aimed to construct a "socialist society" (Bover *et al.*, 2000; Cardoso, Branco, 2017: 6).

18). *Spain*. In Spain (Prados de la Encosura, Roses, 2009: 1082; Roman, 2002: 97), the rise in the labour share took place between the early 1960s and the end of Franco's regime in 1975, resulting in the decrease of the capital share of income and profit rate. This is due to real wages growing faster than productivity, starting from a low base (which, in turn, is explained by the deliberate efforts of Spanish economic planners of the 1940-50s to compensate for the lack of foreign investment and the low capital base with profit reinvestment). The moderate wage share (with real wages growing slower than labour productivity) played a role in Spain after 1977, following the demise of Gen. Franco's regime (the demise of the old corporatist wage bargaining system, and the implementation of wage restraints and anti-inflationary policies as part of the Moncloa Pact and the social pacts of 1978-86). These effects are documented by Fina *et al.*, (1989: 114-116). In addition, the fall in the labour share (as evidenced by the structural break in 1982) is explained by the adjustments to labour policies that were enacted as part of the accession of Spain to European Community (Giammarioli *et al.*, 2002: 18).

19). *Sweden*. In Sweden, the period from 1960 until the late 1970s (the "golden age" of the Swedish welfare state model), witnessed expansion of the welfare state and growing strength of the trade unions, resulting in the labour share growing faster than labour productivity, and, respectively, in labour share increase (Bengtsson, 2014: 298; Bengtsson, 2013). The major labour share spike occurred in 1977-78 (as shown by the structural break identified): this was the result of the failed attempts by the social democratic government to slow down wage growth in exchange for tax reductions, i.e., the so-called 'Haga agreements' (Ahlen, 1989). A series of devaluations implemented in 1976 and 1982 reversed the previous upward trend and resulted in the restoration of the profit share and of the competitiveness of the Swedish corporate sector (this is represented by the 1981 structural break). Real wages continued to fall during 1980-85, accompanied by a decentralisation of the wage-bargaining system. Further reforms implemented in 1996-7 were more conducive to wage moderation and decrease in wage pressures: specifically, the new mechanism of bargaining was based on the export sector setting the norms/limits for wage increases (Bengtsson, 2014: 305).

20). *The UK*. In the UK, the labour share spike in 1972-75 stands out (represented by the structural break in 1974-5). This corresponds to the period of industrial

strife and radicalisation of trade unions and labour politics in general (Brown, 2004). The election of E. Heath's conservative government marked an assault on organised labour, as manifested by imprisoning union leaders and passing the Industrial Relations Act (1971) that mandated compulsory ballots before strikes and established the Industrial Relations Court to handle administrative and civil cases against unions. The national coal strike (January 1972) that followed resulted in a complete victory of the unions and in wage increases (in mining by 17-24%). Inflation and nominal wage growth levels peaked in 1975. The labour governments of H. Wilson and J. Callaghan (1974-79) pursued a less confrontational approach: the proposed "social contract" of 1975-77 intended to stymie the wage growth through voluntary wage restrains achieved in consultation with trade unions (Ryan, 1996). Partly successful, the "social contract" policies resulted in stabilisation of real wages for a period of three years; however, major discontent with such policies in times of accelerating inflations led to disintegration of the contract and the general strike of 1978-9 during the so-called "winter of discontent" (Fiorio, 2013: 36). The consecutive conservative governments of Thatcher and J. Major secured the profit share restoration and firm wage restraints during the 1980s and early 1990s through a broad-brush economic deregulation. The partial restoration of the labour share noted in the second half of the 1990s attributed to real wages growing in excess of productivity (Batini *et al.*, 2000).

21). *The USA*. In the USA, the labour share exhibited a downward deterministic trend with possible breaks in 1981, 1982 and 1998. The share steadily declining starting from the early 1970s and acceleration in the decline took place in the early 2000s. Elsby *et al.*, (2013: 29) attribute the break in the early 1980s to the growth in average labour productivity exceeding hourly compensation growth, while Fleck *et al.*, (2011) identify this deviation as early as the 1970s. Importantly, Elsby *et al.*, (2013) maintain that the driving forces of the labour share decline were not associated with capital-labour substitution or capital deepening. Following Piketty (2014: 309-10), CEA (2013), Schorr (1991) and Burgmann (2016), the downward trend and, specifically, the structural break in the early 1980s can be attributed to policy and political-economic factors: stagnation of minimum wages during R. Reagan and H. Bush administrations, weakening of organised labour in the 1980s, tax distortions that favoured the corporate sector, financial deregulation (as manifested in the rise of interest share of income in the early 1980s, Dagum, 1988: 215), intensification of work and increase in working hours. With regard to the accelerated decline in the 2000s, the demise of the manufacturing sector is likely to have been a factor: as noted by the Council of Economic Advisers (CEA, 2013), half of the decline in the labour share in the 2000s was due to the decline in manufacturing. In

addition, as argued by Parham (2013: 16, 46), during the 2000s, distributional changes were taking place against the backdrop of economic growth slow-down: although both labour and capital income presented deceleration, the former slowed down more than the latter.

5. Conclusion

The principal empirical finding of this paper is that diverse labour share patterns were present and definitive conclusions could be drawn only for a smaller set of economies. Firstly, all three univariate tests suggested the presence of a deterministic trend with two breaks in Austria, Finland, Luxembourg, Norway, Spain, the UK and the USA and a deterministic trend with a single break in Sweden. Secondly, two tests indicated a deterministic trend with two breaks in Australia, Denmark, Japan and Portugal. Thirdly, in the case of Canada, Ireland, Italy and the Netherlands, no definitive conclusions have been possible and additional tests may be needed. Fourthly, in the remainder of the sample, no deterministic trends with breaks were discovered. The ADF indicated possible non-deterministic patterns: mean reversion in Belgium, Greece and Iceland; random walk without drift in France; and a stochastic trend in Germany. Importantly, the labour share direction was not uniform: while in most economies the level of the labour share was lower in 2014 than in 1960, three economies managed to increase their labour shares over the years (Belgium, Luxembourg and the Netherlands).

Overall, rather weak evidence was provided for the stability of the labour share as a 'stylised fact' of economic growth or even as a law of growth. Given the empirical evidence, it appears to be more appropriate to conceptualise stability of the labour share as a working hypothesis with respective implications for production function models, distribution theories and economic policy. Panel LM unit root tests confirmed this finding: seen as a panel, the labour share is more likely to exhibit deterministic trends than to revert to the mean. Regarding the economic significance of labour share patterns, the exploratory analysis of AMECO labour share data and empirical findings suggested that the identified breaks and trends were generally in line with the events and developments in the economic history of industrialised economies between the 1960 and 2010s.

The paper demonstrated that labour share dynamics in short and medium term is likely to be a result of a complex interplay of economic, structural and political forces. Each country likely had its own unique combination of factors that affected its labour share, with possible offsetting or synergistic effects present, making generalisations and identification of a single principal factor behind labour share fluctuations difficult. Certain common tendencies are evident (such as the general decline of labour shares in the majority of economies, and labour share spikes during the mid-1970s). However, the relative strength of the underlying causal

factors behind these tendencies (e.g. industry offshoring, privatisation, technical change, trade openness, or decline in the bargaining power of the labour) tended to vary in individual economies. In many cases the shifts in labour shares, the timing of structural breaks and directions of the trends were not in line with these causal factors. Likewise, a similar type of factor could have a differential effect on labour shares. Methodologically, this may suggest that case studies and analyses of country-specific policies and institutional factors may be an appropriate complement to econometric models of labour share determinants.

There are several avenues for future research into labour share stability. Firstly, a more systematic approach may be adopted to distinguish labour and non-labour incomes. Instead of multiplying unadjusted wage share by an adjusting factor (the ratio of the number of persons employed to the number of employees) in an *ad hoc* manner, a preferable approach may be to use national accounts and other supplementary data to separate compensation of employees from gross operating surplus (and other capital and property incomes, such as incomes from homeownership, holding financial assets, capital-funded pensions) for individual economies. To this end, the database of capital shares constructed by Bengtsson and Waldenstrom (2015) for a sample of 19 developed and developing economies may be a useful source. The database, whilst giving robust figures for capital share, covers a limited set of countries, contains time gaps and, more importantly, does not allow comparison of labour and capital shares across economies (one of the reasons is the calculation of labour shares based on either gross or net value added in individual economies). Secondly, this paper attempted only a cursory approach to examining the driving forces of labour shares and identifying breaks. Once established that a labour share was stable or trending, a formal decomposition analysis might be conducted, akin to the one performed by Kraemer (2011b). This is particularly the case for economies subject to multiple political and economic influences in a short period of time (for example, Spain and Portugal in the 1970s and the 1980s). Thirdly, in cases where definitive conclusions were not possible, additional tests could be recommended. Future research might use other conventional unit root tests (Kwiatkowski–Phillips–Schmidt–Shin/KPSS, Phillips-Perron/PP or Elliott-Rothenberg-Stock/ERS), as well as more advanced unit root tests with structural breaks and non-linear unit root tests (such as those developed by Harvey, Mills, 2004; Kapetanios, 2005, in the univariate context; or Westerlund, 2006, for panel data). Finally, future research might concern the effects of labour share changes on other economic variables; for example, investigating the relationship between factor income distribution and rising income inequality or the effect of falling labour shares on aggregate demand or investment activity.

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