

Inequality and Employment Sensitivities to the Falling Labour Share*

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Abstract: This paper examines whether the labour share (wage-productivity gap) is a major factor in the evolution of inequality and employment. To this end, we use annual data for the US, UK and Sweden over the past forty years and estimate country-specific systems of labour demand and Gini coefficient equations. Further to the statistical significance of our models, we validate their economic significance through counterfactual simulations. In particular, we evaluate the contributions of the labour share to the trajectories of inequality and employment during specific time intervals in the post-1990 years. We find that during the 1990s the cost of a one per cent increase in employment was in the range of 0.7 per cent-0.9 per cent higher inequality in all three countries. However, in the 2000s, whereas the inequality-employment sensitivity ratio slightly fell in the US, it exceeded unity in the countries on the other side of the Atlantic. It obtained its highest value in the UK, where a 1 per cent growth in employment was achieved at the expense of 1.3 per cent worsening in income inequality. We argue that the inequality-employment sensitivity ratio can be viewed as a barometer of socio-economic pressure, and thus the evolution of the wage-productivity gap and its impacts on the personal income distribution and labour demand deserve the attention of policy makers.

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I INTRODUCTION

This work dwells on the influence of the labour share (wage-productivity gap) on two vital macro-labour outcomes: employment and income inequality. Since the late 1960s, the relationship between macroeconomic activity and inequality has been widely examined in the literature. In a seminal paper, Schultz (1969, p.83) states that the secular growth of labour's share, which tends to be more equally distributed among persons than that of profits or property, has undoubtedly worked to reduce over-all inequality of personal income. Since the 1970s, however, the labour share has fallen. In this paper we look at the impact of this decrease. Our framework of analysis identifies the wage-productivity gap as an important channel fuelling income inequality and supporting employment.

Studies that approach the inequality/macro-activity nexus from a time series perspective have mainly followed two avenues: either a measure of inequality (such as the Gini coefficient or the quintile income shares) acts as the dependent variable in a macro-labour econometric model, or a parametric distribution is fitted to the observed income distribution and its estimated parameters are, in turn, regressed on a set of macro-labour variables.¹ These analyses assert that (un)employment is a major channel via which macroeconomic fluctuations affect the size distribution of personal income.

From the plethora of papers which directly estimate the impact of unemployment on the summary statistic of income inequality, i.e. the Gini coefficient, our point of departure hints to justifiable methodological and political economy questions. First, can the positive correlation between the Gini coefficient and unemployment offer a comprehensive explanation of inequality or is it merely a statistical regularity? Second, which of the determinants of inequality can also produce a positive outcome (e.g. a rise in employment) that effectively diverts the attention of developed democratic societies from the issue of increasing inequality by "sweetening" its impact?

This paper contributes to the income distribution literature by postulating that the labour share (wage-productivity gap) is a major driving force of the

¹ The majority of the studies examining the influence of macroeconomic conditions on the size distribution of personal income have followed the inequality regression avenue, starting with Schultz (1969) who used a Gini regression, and Blinder and Esaki (1978) who used income shares regressions. The income shares approach addresses the issue of whether unemployment (and other variables) have regressive or progressive effects on the size distribution of income. Nolan (1988), Bjorklund (1991), and Mocan (1999) are among the studies that use income shares regressions, while Cysne (2009), and Checchi and García-Peñalosa (2010) are among those studies estimating a Gini regression. Fewer studies have followed the parametric distribution avenue which started with Metcalf (1969), Thurow (1970), and continued recently with Jäntti and Jenkins (2010).

evolution of inequality and employment. In this respect, our aim is to examine how the labour share channel irrigates the inequality-(un)employment landscape.

In what follows, we first produce evidence that over the past four decades a falling labour share has been accompanied by a worsening income inequality – the latter has been particularly emphasised by a variety of authors in both the academia and the press. These developments have taken place in a globalised environment featuring the interplay of technological progress, product/labour market policies, and financialisation.² We then estimate country-specific models of employment and income inequality equations for the US, UK and Sweden. We show that the widening wage-productivity gap (i.e. wages lagging further behind productivity) has, on one hand, significantly contributed to the rise in inequality (measured by the Gini coefficient), and, on the other, boosted employment. These results not only are in line with the observation by Krugman (1994, p.23) that “... the United States has achieved low unemployment by a sort of devil’s bargain, whose price is soaring inequality...”, but they also show that this is the case across the Atlantic.

It is generally believed that a shift of demand away from unskilled labour towards skilled labour has led to both increased income inequality in the US and high unemployment in Europe. Atkinson (2001) dubbed this view the ‘Transatlantic Consensus’, albeit arguing that this consensus is open to question (see also Singh, 2001). Our results are in stark contrast to the ‘Transatlantic Consensus’, since, like the US, both European countries in our sample, the “egalitarian” Sweden and “non-egalitarian” UK, are found to support their employment levels by a devil’s bargain.

Having established the statistical significance of our empirical framework of analysis, we investigate its economic significance and measure the dynamic contributions of the falling labour share to the evolution of inequality and employment. We find that during the 1990s all three countries experienced inelastic inequality-employment sensitivity ratios in the range of 0.7 to 0.9, i.e. a 1 per cent increase in employment was associated with less than 1 per cent higher inequality. However, in the 2000s, whereas the inequality-employment ratio slightly fell in the US, it exceeded unity in the countries on the other side of the Atlantic. It obtained its highest value in the UK, where a 1 per cent growth in employment was achieved at the expense of 1.3 per cent worsening in income inequality. This increase was due to the dramatic rise of the inequality-labour share sensitivity, which almost doubled from the nineties to the noughties, implying that the same percentage fall in the labour share in the 1990s led to twice as much the rise in inequality in the 2000s.

² The recent term ‘financialisation’ refers to the engagement of non-financial businesses in financial markets (Stockhammer, 2004; Milberg and Winkler, 2010).

We should, however, note that interpreting these sensitivity ratios as ‘tradeoffs’ can be debatable, since a tradeoff requires the identification of some policy instrument(s) that could directly affect its balance. The inflation-unemployment tradeoff is one such example. Regressing inflation on unemployment is a direct way to measure the tradeoff between the two phenomena, i.e. evaluate the slope of the Phillips curve. This has profound policy implications, since monetary policy is a major causal factor of the inflation-unemployment tradeoff. In contrast, as it is rather unclear how to balance an inequality-(un)employment tradeoff,³ the value added of regressing the Gini coefficient on the unemployment rate (and finding that unemployment increases inequality) is questionable.

The rest of the paper is structured as follows. Section II defines the measures of income distribution, acknowledges the inequality problem in the US, UK and Sweden, and discusses their evolution from the mid 1960s to 2008. Section III analyses the anatomy of the labour share channel and outlines our labour demand and Gini coefficient equations. Section IV presents the estimation results. Section V evaluates the contributions of the labour share to economic activity, and gives the associated statistics of the inequality-employment sensitivity ratio during the 1990s and 2000s. Section VI concludes our thoughts.

II PERSONAL AND FUNCTIONAL INCOME DISTRIBUTIONS

In our analytical and empirical framework we measure the personal income distribution by the Gini coefficient and the functional income distribution by the labour share, and offer an assessment of their time paths from 1960 to 2008 in the US, UK, and Sweden.

Finding that the labour share is a positive determinant of employment in our earlier work (Karanassou and Sala, 2010), led us to the joint modelling of inequality and labour demand equations, both driven by the wage-productivity gap factor, with the scope to measure the contributions of the labour share to the Gini coefficient and employment trajectories, and consequently, evaluate the inequality-employment sensitivity ratio. As wages are lagging behind productivity, this sensitivity ratio offers a barometer signposting the degree of worsening inequality vis-à-vis job creation.

³ The inequality-unemployment tradeoff is discussed in Hellier and Chusseau (2010), among others.

2.1 *Defining the Measures*

Our models use the Gini coefficient as the summary measure of personal income inequality in a population.⁴ Nevertheless, we briefly discuss the advantages/disadvantages of two alternative ways of capturing income inequality: the Gini statistic and the top income shares. To highlight the differences between these two approaches, we focus on the US data sources of the Current Population Survey (CPS) and the Internal Revenue Service (IRS).⁵ On one side, the internal CPS survey provides the data which the Census Bureau uses to construct the Gini index, and, on the other, income trends in terms of top shares are derived by the IRS tax return data.

Whereas in the CPS literature income is defined as pre-tax post-transfer income excluding capital gains, the IRS definition is pre tax excluding most transfer income (since the latter is generally not taxable) and including capital gains, stock options and bonuses. Survey data have been criticised for not being able to fully capture the top end of the distribution due to topcoding,⁶ undercoverage, and under-reporting of top incomes. The availability of tax return data for longer time spans than survey data is a further attractive feature of the former. On the other hand, the Gini coefficient (like other CPS statistics) is a more comprehensive measure of inequality as it uses data on all incomes rather than just the richest end of the spectrum. Another advantage of the CPS data source is that it includes many socio-demographic variables, since the CPS survey questions about income are broader than those on IRS tax forms.

The most common interpretation of the Gini relative income is a geometric one: it is the area between the curve in a Lorenz diagram and the diagonal (45°) line as a ratio of the area below the diagonal. The Lorenz curve plots the cumulative population shares, from the poorest to the richest, against their cumulative income shares (e.g. see Brewer *et al.*, 2006, p.68). The values of the Gini coefficient are in the [0,1] range and a higher coefficient is associated with higher income inequality: zero is the case of perfect equality with each member of the population receiving exactly the same income, whereas one is the case of perfect inequality with a single member receiving all the income and the rest receiving none.

⁴ The Gini coefficient (Gini ratio, or relative income) is most easily calculated from unordered size income (x) data as the “relative mean difference”, i.e., the mean of the difference between every

possible pair of individuals, divided by the mean size μ ,
$$Gini = \frac{\sum_{i=1}^n \sum_{j=1}^n |x_i - x_j|}{2n^2 \mu}.$$

(<http://www.wolframalpha.com/input/?i=gini+coefficient>)

⁵ For a detailed analysis on the topic see the authoritative work by Burkhauser *et al.* (2012).

⁶ Though the prevalence of topcoding in internal CPS data is much lower than in the public-use dataset.

However, using the above standard definition, a specific Gini coefficient value falls short of immediate comprehension. Shorrocks (2005) offers an intuitive and easy to understand interpretation of the value of the Gini coefficient as a division of a “pie” into two unequal shares. For example, he explains that a Gini value of 0.40 is obtained from the division of an aggregate economic pie worth \$1 into 90c and 10c. Presenting inequality as a 2-way division of a pie in which one person gets 9 times the other is a powerful way of capturing the extent of income differences. Since the “fair” share in a 2-way division is 0.5, the Gini value of 0.40 represents the excess share of the richest person (Gini). Put differently, the Gini value can be comprehended as the excess share of the rich in a 2-class society. In a 10 person society, the Gini value of 0.40 can be pictured as the division of a \$1 pie between one person receiving 0.50 of the pie and nine people each getting 0.05. In other words, the share of the richest person is the fair share 0.1 plus the Gini value.

Regarding the labour income share, i.e. the average real wage as a ratio of productivity, it is important to recognise that it is equivalent to the wage-productivity gap:⁷

$$\text{labour share} \equiv \frac{\text{wages}}{\text{GDP}} = \frac{\text{wages/employees}}{\text{GDP/employees}} = \frac{\text{avg. wage}}{\text{productivity}} \equiv \text{wage gap} \quad (1)$$

If, say, a 10 per cent productivity gain is accompanied by a 10 per cent growth in the average real wage, then the wage gap is zero. However, the lower the wage growth, the more wages trail productivity gains and thus the higher is the wage gap. (Detailed definitions of the variables used in our empirical analysis are given in Section 4.1.)

2.2 *The Rise in Inequality*

Although we utilise the Gini index to explore the trends in personal income distribution, and although the issue of how closely top income shares track the Gini coefficient is far from being resolved,⁸ it is worthwhile to consider some poignant results of the research based on top income shares data. We believe that examining the high end of the distributional spectrum can enhance our understanding of the various socio-economic developments.

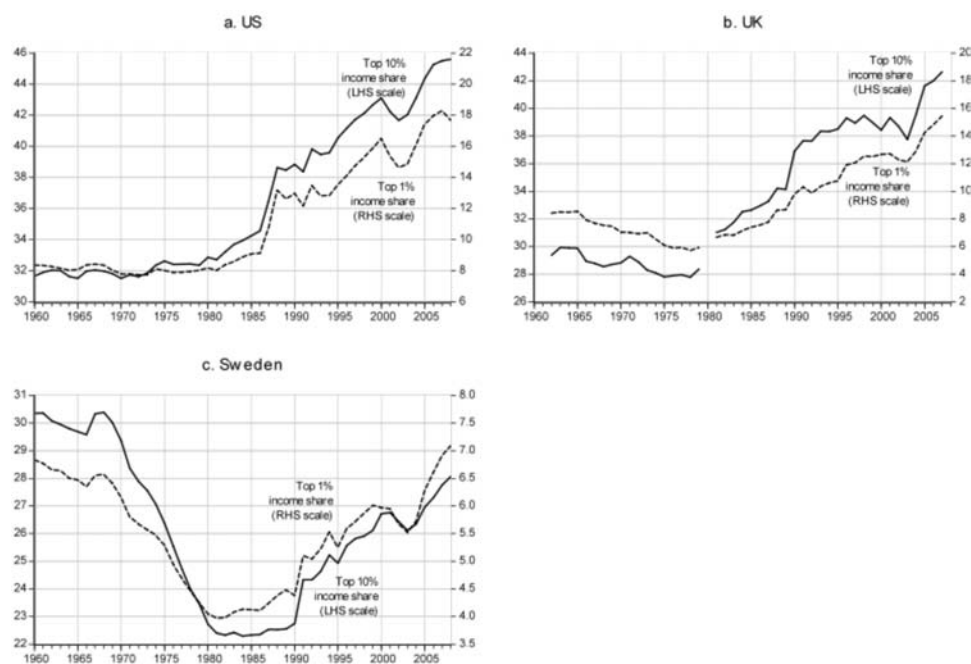
With respect to the income inequality gap in the US, the findings in Piketty and Saez (2006) are quite revealing: during the 20th century the top

⁷ We should also note the intricate association of the labour share to the (real) unit labour cost; the latter is defined as the average (real) cost of labour per unit of real output.

⁸ The study of Burkhauser *et al.* (2012) is particularly informative about the differences in estimated inequality trends that can arise from differences in the definition of income (and the way its distribution is summarised) or from differences in the data sources. Nevertheless, the focus of our work does not lose weight.

percentile has fluctuated from around 18 per cent before WWI, to only around 8 per cent in the 1960s and 1970s, and back to around 17 per cent by 2000. Following up, Saez (2010) argues that the personal income distribution today closely resembles that on the eve of the Wall Street crash; the top 0.01 per cent in 2008 took in 5 per cent of the national income, a level only witnessed in 1928 (Figure 1).

Figure 1: *Top 10 Per Cent and Top 1 Per Cent Income Shares*



Source: Alvaredo *et al.* (2011).

Note: for the UK, until 1974 estimates relate to income net of certain deductions; from 1975, estimates relate to total income; until 1989 original estimates relate to tax units.

Looking at the rich-poor divide in the UK, statistics are also quite striking: the share of the top 1 per cent of the income distribution decreased from around 17 per cent before WWII to around 6 per cent in the second half of the 1970s, but increased to 14.6 per cent by 2007 (Alvaredo *et al.*, 2011). In the independent report of the High Pay Commission (2011) on the rising pay of those at the top of the public and private sectors in the UK, we read that the share of the top 0.1 per cent of earners has reached 5 per cent of national income. The non-partisan commission (*ib.*, p.6) further highlights the risk that

“If current trends continue,... by 2030 we will have gone back to levels of inequality not seen since Victorian England”.

In the case of Sweden, Gustafsson and Jansson (2008) show that since the 1980s the top of the income distribution has evolved more favourably than for other groups and the highest centile has experienced the most rapid increase. These inequality developments are also evidenced by Roine and Waldenström (2010) who find that an homogenous series of top income shares over the 1903-2003 period follows a U-shaped pattern which dips around 1980.

The dramatic change in trends in top income shares that has dominated debate in recent years is plotted in Figure 1. Note, for example, that in 2008 the top 1 per cent in the US appropriated 17.7 per cent of the national income (the UK share in 2007 was 15.5 per cent, and in Sweden 7.1 per cent in 2008). The trends are even more worrying than the actual levels: since 1990 the top 1 per cent increased its share by 36 per cent in the US, 58 per cent in the UK, and 62 per cent in Sweden. The large increases in the top end of the income distribution represent the continuing squeeze of the middle classes since the 1980s, as 99 per cent of the society is left with decreasing income shares.

2.3 *A Tale of the Time Paths*

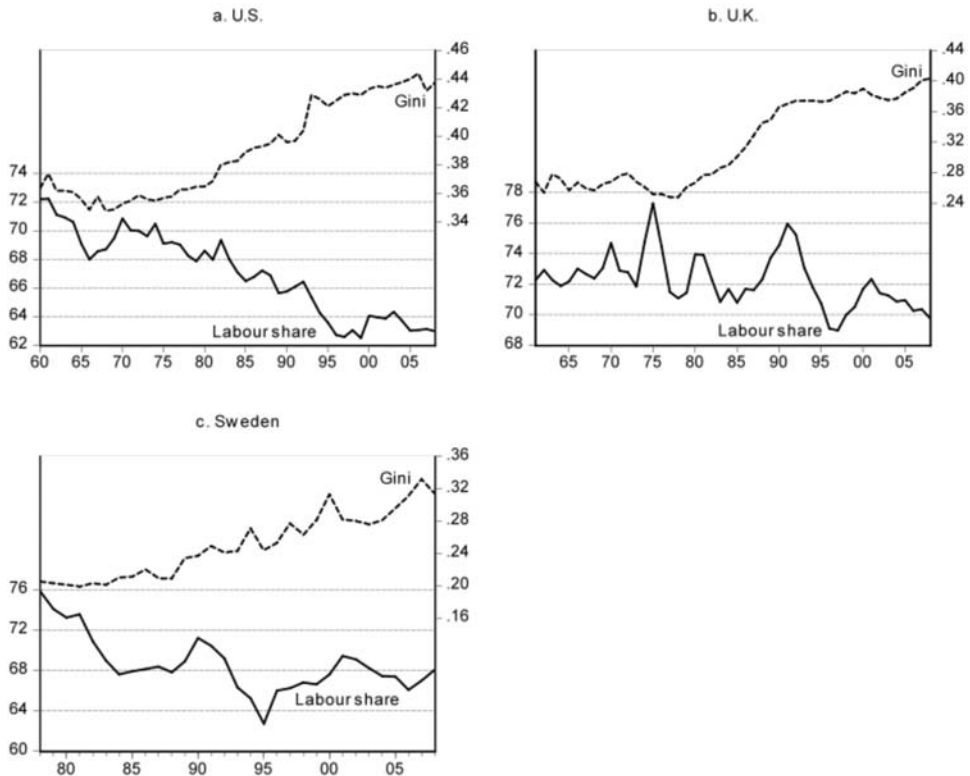
Figure 2 plots the Gini coefficient and the labour share in the US, UK and Sweden. With respect to the personal income distribution, the graphic evidence suggests that, since the late 1970s, income inequality has evolved in terms of upward ‘trends’ rather than ‘episodes’ of falling/increasing inequality. As inequality has been growing in all three countries, the US has been experiencing the highest levels, followed closely by the UK and with Sweden approaching rather fast.

Characteristically, in the mid/late 1970s, the Gini coefficient was close to 0.35 in the US, 0.25 in the UK, and 0.20 in Sweden. By 2008 the statistic of inequality reached the value of 0.44 in the US, 0.40 in the UK, and 0.32 in Sweden. It is important to bear in mind that, in the US and the UK, whereas the macroeconomic environment of the stagflating 1970s featured rapidly rising unemployment rates and modest levels of income inequality, the roaring 1990s were characterised by relatively low unemployment rates and ever increasing inequality.

Note, however, that although the levels of inequality witnessed in the two European countries have been lower than those in the US, they have been growing at much higher rates over the past 30 years: inequality increased by 60 per cent in the UK and 55 per cent in Sweden, compared to 15 per cent in the US. Regarding the UK, Atkinson (1997, p.301) noted that the country stands out for the sharpness of the rise in recorded income inequality in the 1980s... The apparent fall in the redistributive impact of transfers and direct

taxes since the mid-1980s is circumstantial evidence that policy changes have contributed to the rise in income inequality (ibid, p.306). Using both National Accounts annual data and micro-data from the 1977 Family Expenditure Survey, Nolan (1987) showed that after the late 1970s the share of top income groups had risen in a way that was unprecedented since the late 1940s, and this was mostly at the expense of the middle of the distribution. Regarding Sweden, it is worth pointing out that the breakdown of centralised bargaining and the subsequent earnings compression of the mid-1980s signalled the upward trend in inequality over the past thirty years.

Figure 2: *Income Inequality and the Labour Share*



Regarding the labour share, although widely assumed in the literature, the theoretical property of its constancy is strongly refuted by reality. The plots in Figure 2 evidence the falling labour share in the US since the 1960s, and in the UK and Sweden since the mid/late 1970s (as explained in Section IV, the labour share is adjusted for self-employment income).

It is worth noting that while the US labour share attained its highest value (72 per cent) in 1961, the European labour shares recorded their top value of 77 per cent in 1975 (UK) and 1977 (Sweden). Clearly, whereas the labour share in the US has been evolving smoothly around a downward trend, the two labour shares across the Atlantic have been exhibiting profound ups and downs that decelerated their falling trajectories since the mid 1970s.

The disparity between the highest value of the labour share and its end of sample (2008) value is 9 percentage points, pp, in the US (72 per cent–63 per cent), 7 pp in the UK (77 per cent–70 per cent), and 9 pp in Sweden (77 per cent–68 per cent). We should also point out that both European countries experienced an accelerated reduction in their labour shares during the 1990s, i.e. their labour shares were falling by more than 1 percentage point per year. More precisely, the labour share fall in the UK was 7 pp during 1991-97 (slope = -1.2) and in Sweden 8 pp during 1990-95 (slope = -1.6).⁹

Recent literature has identified three interrelated factors as responsible for the decline in the labour shares: globalisation, technological progress, and product and labour market policies. The mechanisms through which compensation and job creation grow at a rate slower than economic growth are, among others, trade shares and terms-of-trade prices, foreign direct investment, offshoring, migration flows, and financial openness (Guscina, 2006; IMF, 2007). In addition, technological progress tends to increase returns to capital and, thus, the capital income share. In turn, in seeking to maintain competitiveness, the product and labour market policies typically undertaken have tended to weaken the bargaining position of labour vis-à-vis the firm (Bentolila and Saint-Paul, 2003; Ellis and Smith, 2007; Bental and Demouguin, 2010).

Viewing the falling labour shares as the ratification of rising profits, it is reasonable to argue that the inequality-employment sensitivity ratio (i.e. the percentage increase in inequality associated with 1 per cent increase in employment) depends, among other things, on how profits are being spent. Milberg and Winkler (2010) argue that when the non-financial corporate sector channels part of the rise in profits to higher dividend payments and share buybacks, a leakage is created in the profits–investment–employment system. A partial, instead of full, recycling of the rise in profits into investment is the result of financialisation which reflects the tilt in the focus of non-financial sector corporate strategies towards short-term maximisation of shareholder value at the expense of long-term growth.

The thesis of this paper is that the falling labour share aggravates inequality and contributes positively to employment. It is worth pointing out

⁹ A slope <1 means that the reduction rate exceeded 1 pp per year over a given period.

that our results contradict the neoclassical paradigm (with its representative agent model) that dismissed the link between income distribution and macroeconomic activity. In addition, since being employed (rather than unemployed) makes it easier to tolerate increasing inequality, finding that the labour share channel links inequality and employment is alarming if income inequality has adverse effects on economic growth. Although the inequality/growth nexus is beyond the scope of this paper, we should note that, unlike the Classical hypothesis, the modern viewpoint of the relationship between inequality and economic development argues that a more equal distribution of income promotes economic growth (Galor and Moav, 2004; Galor, 2011).

III THE LABOUR SHARE FACTOR

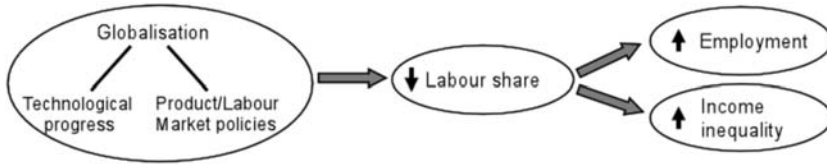
3.1 *The Transmission Channel*

Given that the labour share represents the part of the economic pie that goes to labour, rather than profits, distributional issues at the core of this concept remain intact whether we call it labour income share (wage share) or wage-productivity gap (unit labour cost). We view globalisation as a phenomenon that encapsulates (among other things) the interactive dynamics of technological progress and product/labour market policies in a world of falling labour shares.

Section II highlighted that globalisation leads to higher employment, whilst it is accompanied by a more unequal income distribution. Acknowledging that the boost in employment is one side of the falling-labour-share coin, and its flip side is the worsening of inequality, the globalised income inequality/employment mix can be seen as the footprint of the falling labour share (Figure 3).¹⁰ In what follows, our analytical task is to introduce the inequality-employment sensitivity ratio as a globalisation barometer that measures socio-economic pressure.

It should be noted, however, that the link between a falling labour share and the employment boost shies away from the terms of employment. These are associated with the existence of a national health system, state pension, benefits system, the time it takes to re-establish benefits, strings attached to receive benefits, minimum wage, and lack of progression. We believe that the deterioration of the latter is taken into account when we evaluate the link between the falling labour share and rising inequality.

¹⁰ Note that financialisation represents a leakage in the labour share—employment channel in Figure 3. That is, when profits are not fully recycled into investment, the employment support of falling labour shares is weaker than otherwise.

Figure 3: *Anatomy of the Labour Share Channel*

The thrust of this work is to address the sibling pathways of the globalised income inequality/employment fusion by investigating how the falling labour share (or, equivalently, the widening wage-productivity gap) influenced the employment trajectory and solicited the increasing inequality in the US, UK and Sweden over the past four decades. To achieve this, we use a system comprising labour demand and inequality equations, and show that a decrease in the labour share creates more inequality and leads to higher employment (or lower unemployment).¹¹

It can be argued that these findings indicate that the widening wage-productivity gap has been encouraged by a “carrot and stick” approach – employment being the reward, insecurity of losing the job (due to a deterioration in labour conditions) being the threat. Nevertheless, a debate on the terms of employment and their link to labour demand is beyond the scope of this paper.

3.2 *A Two-Equation Model*

Karanassou and Sala (2010) argued that the neoclassical picture of productivity gains being fully translated into wage rises can only prevail in the absence of dynamics and growth, and showed that the labour share is a driving force of employment. Whilst maintaining the assumption of a unitary elasticity of real wages with respect to productivity in the long run, we demonstrated that productivity growth affects the labour share in the long run due to frictional growth, a phenomenon generated by the interplay of wage dynamics and productivity growth.

In this paper we will further demonstrate that the wage-productivity gap is also an important factor prompting inequality. Following the above analysis, it is essential for the reading of the globalisation barometer to jointly estimate the impacts of the functional distribution of income on labour demand and inequality. Before proceeding with the empirical model in Section IV, we outline below our employment and Gini coefficient relationships.

¹¹ It can be shown that when a labour supply equation is added to the system, the unemployment rate is associated positively with the labour share. To conserve space, the results are available upon request.

3.2.1 Labour Demand

As in Karanassou and Sala (2010), we consider a standard log-linear labour demand equation:

$$n_t = \phi_0 + \phi_1 n_{t-1} - \phi_2 w_t + \phi_3 pr_t + \text{“other”} + \varepsilon_{1t}, \quad (2)$$

where n_t , w_t , pr_t denote employment, real wages, labour productivity (all in logs), ε_{1t} is a strict white noise error term, and the ϕ 's are positive parameters; the autoregressive parameter $\phi_1 < 1$ captures employment adjustment costs, such as costs of hiring and firing, search costs, and training costs. Note that productivity (pr) can be thought of as capturing technological change (as it is common in the literature – see, for example, Blanchard, 2006, p. 17). The “other” explanatory variables refer to real interest rates or real balances, competitiveness, and private consumption (see Section IV). We should also point out that the log difference between real wage and productivity is a key element in the Hatton (2007) unemployment rate Equation (2), which can also be viewed as a dynamic labour demand equation (p. 480). The critical issue, for us, in this otherwise standard framework, is the implicit presence of the wage-productivity gap in labour demand. This has been generally disregarded in the literature, but it is important to see that Equation (2) can be reparameterised as

$$\begin{aligned} n_t = & \phi_0 + \phi_1 n_{t-1} - \phi_2 (w_t - pr_t) + (\phi_3 - \phi_2) pr_t + \text{“other”} + \varepsilon_{1t} \\ & \phi_0 + \phi_1 n_{t-1} - \phi_2 ls_t + (\phi_3 - \phi_2) pr_t + \text{“other”} + \varepsilon_{1t}, \end{aligned} \quad (3)$$

where ls_t stands for the labour share (wage-productivity gap), and higher order lags are ignored for expositional simplicity.

Although the labour demand Equation (2) conforms with the inverse relationship between real wages and employment, advanced by the (new)-classical/Keynesian schools of thought, our analysis focuses on the wage-productivity gap as a driving force of employment, i.e., on the reparameterised version (3). Emphasis is also placed on the effects of the wage share on income inequality, as the distinctive feature of our work is that the functional income distribution represents a major channel linking the labour market with the personal income distribution.

3.2.2 Inequality

We model inequality along the lines of the reduced form inequality equation in Checci and García-Peñalosa (2010). In such context, and similarly to Equation (3), we postulate the following autoregressive distributed lag model for income inequality:

$$gini_t = \beta_0 + \beta_1 gini_{t-1} - \beta_2(w_t - pr_t) + (\beta_3 - \beta_2)pr_t + \beta_4 fp_t + \text{“other”} + \varepsilon_{2t} \quad (4)$$

where $gini_t$ is the Gini coefficient (in logs), fp_t denotes financial corporations profits, and the β 's are positive parameters with $\beta_1 < 1$. The “other” explanatory variables may include taxes, competitiveness, union density, and benefits. Higher order lags are ignored for expositional simplicity, and ε_{2t} is a strict white noise error term. It does not include unemployment as an explanatory variable for reasons we explain below.

The Gini coefficient captures inequality by measuring the allocation of income in (real) monetary terms to the various groups of agents. Therefore, wages, benefits, rewards to capital or labour, and institutions that facilitate such rewards are legitimate candidate variables on the right-hand-side of a Gini regression.

The main difference with respect to the model in Checci and García-Peñalosa (2010) is the non inclusion of the unemployment rate as explanatory variable. Although it is reasonable to expect that higher unemployment will increase inequality, since unemployment hits hardest those with low earnings capacity, even when they have a job (e.g. Björklund, 1991), the direct effect of unemployment on inequality can be satisfactorily addressed by examining the relationship between the various income classes and the existence of unemployment.¹² Given our aggregate perspective, adding unemployment as an explanatory variable risks blurring the picture of analysis.

It has been argued that higher corporate profits as a share of national income lead not only to higher investment but to the “financialisation” of the industry as well, i.e. the engagement of non-financial businesses in financial markets (Stockhammer, 2004; Milberg and Schöller, 2009; Milberg and Winkler, 2010, among others). Recognising the link between financialisation and financial profits (e.g. via fees), the finding that the profits of the financial sector have a positive impact on the Gini coefficient implies that financialisation has a “direct” adverse effect on inequality. For an in-depth analysis of an intricate cobweb of institutional policy options that distort competition and accelerate economic concentration, and the systemic exploitation of inequality via novel and toxic forms of securitisation see Hatgioannides and Karanassou (2011). The authors further attest to the severe destabilising consequence of policies favouring the top 1 per cent of the income distribution, manifested by falling labour shares and the accompanying increase in profits, a phenomenon that fuelled the epidemic of mounting consumer debt.

¹² Blinder and Esaki (1978) introduced the approach of regressing the share of the quintile in the distribution of income on the overall unemployment rate, using US data, and their study has been followed, among others, by Nolan (1988), Björklund (1991), and Mocan (1999).

IV EMPIRICAL ANALYSIS

4.1 *Data and Variable Definitions*

Table 1 presents the variables in the selected specifications of the labour demand and inequality equations.¹³ As in Karanassou and Sala (2010), we follow the European Commission methodology in their Ameco database and compute the adjusted labour share as

$$\begin{aligned}
 LS &= \frac{\text{total compensation/dependent employment}}{\text{GDP at factor costs/total employment}} \\
 &= \frac{\text{total compensation}}{\text{GDP at factor costs}} \frac{\text{total employment}}{\text{dependent employment}}
 \end{aligned}$$

In this way, total labour compensation includes both dependent and self-employment compensation, and GDP excludes taxes and subsidies, which are not a component of generated income and need to be excluded from the calculation of the labour income share. Once the labour share is computed, we retrieve the average wage per employee (including self-employment) as $W = \frac{LS*Y}{N}$, where N is total employment and Y is the standard measure of GDP at market prices. Note that w , n , y , and ls (defined in Table 1) are the log counterparts of W , N , Y and LS . It follows that the labour share, $ls = w - pr$, can also be interpreted as the wage-productivity gap. Information on these variables is obtained from the OECD Economic Outlook.

Regarding income inequality, time series data for the US are supplied by the Census Bureau and correspond to ratios for family household income (www.census.gov/hhes/www/income/data/historical/inequality).¹⁴ For the UK, we use household incomes that are equivalised, net of direct taxes, and are calculated after housing costs have been deducted. The source is the Institute for Fiscal Studies through Joyce *et al.*, 2010, (www.ifs.org.uk/comms/comm116.pdf). For Sweden, coefficients are supplied by Statistics Sweden and correspond to equivalence-adjusted family income net of taxes. This inequality measure is obtained from the Household Finances Survey based on Statistics Sweden's Longitudinal Individuals Database, LINDA. (A detailed description of this dataset is provided at <http://linda.nek.uu.se/2000wp19.pdf>).

¹³Although we have worked with extended datasets for the three economies considered, here we only report the variables entering the selected estimated equations.

¹⁴It is important to point out that our choice of the time series data used in our work is restricted by their availability. In the US, income for family households has a longer time span than the one for total households, which can be obtained only since 1967. Also note that both household series are available for money income rather than equivalised income. For the UK and Sweden we are bound, by the respective data sources, to work with the two series discussed below.

Table 1: *Definitions of Variables*

<i>Is</i>	labour share (= $w - pr$)	<i>ud</i>	trade union density (percentage)
<i>w</i>	real compensation per employee	τ^d	direct taxes (percentage of GDP)
<i>pr</i>	labour productivity (= $y - n$)	τ^i	indirect taxes (percentage of GDP)
<i>y</i>	GDP at market prices	<i>rb</i>	real balances
<i>n</i>	employment	<i>r</i>	real interest rates (percentage)
<i>gini</i>	gini coefficient	<i>comp</i>	competitiveness
<i>fp</i>	$\frac{\text{profits of financial corporations}}{\text{total profits of corporations}}$	<i>c</i>	private consumption (percentage of GDP)
<i>gs</i>	$\frac{\text{gross operating surplus of financial corporations}}{\text{total gross operating surplus}}$		
<i>ns</i>	$\frac{\text{net operating surplus of financial corporations}}{\text{total net operating surplus}}$	<i>d</i> ⁰⁰	dummy (value 1 in 2000)

Note: Variables are in logs unless otherwise indicated.

Sources: OECD (*Economic Outlook, Employment and Labour Market Statistics*), US Census Bureau, US Bureau of Economic Analysis, UK Office for National Statistics, Institute for Fiscal Studies (London, UK), Statistics Sweden.

We capture the role played by financial profits in shaping the upward trend in income inequality by using different variables in each country, depending on data availability. Given that the US Census Bureau supplies data for both corporate financial and non-financial profits, we construct the variable *fp* as the ratio of financial profits over total profits. For the UK, the variable used as a proxy of financial profits is the ratio of financial corporations gross operating surplus over total gross operating surplus, *gs*, while in Sweden the same ratio was constructed in terms of net operating surplus, *ns*.¹⁵

The other variables used are union density (*ud*); direct and indirect taxes (τ^d , τ^i) as a percentage of GDP; real interest rates (*r*), defined as the difference between the nominal interest rate and the inflation rate (i.e. the rate of change in the GDP deflator); real money balances (*rb*), defined as a broad measure of money supply over the GDP deflator; a standard measure of competitiveness (*comp*), defined as the ratio of import prices over the GDP deflator (in logs); and private household consumption (*c*) as percentage of GDP. Information on these variables is taken from the OECD.

¹⁵US data on profits are net since they include inventory valuation and capital consumption adjustments. For the UK, the Office for National Statistics does not supply the net operating surplus. While both gross and net surpluses are available in Sweden, we do not find any significant differences in the Gini equation estimates when using either of the two. However, the limitation in Sweden is that these variables are available from 1993 onwards. This implies that *ns* enters the equation as a dummy taking value 0 from 1978 to 1992, which is equivalent to say that in the earlier part of the sample this ratio had no role in shaping inequality in Sweden.

4.2 *Estimation Results*

Our econometric methodology is based on the autoregressive distributed lag (ARDL) approach (or bounds testing approach) which has been shown to yield consistent short- and long-run estimates and has desirable properties even in the face of unit roots (see Pesaran, 1997; Pesaran and Shin, 1999; Pesaran, Shin and Smith, 2001). Since an ARDL equation can be reparameterised in error-correction form and its long-run solution can be interpreted as the cointegrating vector of its variables, the ARDL procedure can be viewed as an alternative to the standard integration/cointegration techniques.

The empirical labour demand and income inequality equations are augmented versions of the stylised model (3)-(4). Our selected specifications attempt to optimise the fit for each country, and their dynamics are determined by the optimal lag-length algorithm of the Schwarz information criterion. All equations are dynamically stable and pass the standard diagnostic tests (for linearity, no serial correlation, homoskedasticity, normality, and structural stability) at conventional significance levels. As shown in Figures 4a, 5a, and 6a the fitted trajectories of employment and Gini coefficients track closely the actual ones. To take into account the potential endogeneity and cross equation correlation, we estimate the employment/inequality model with 3SLS.¹⁶ Table 2 presents the estimated systems of equations for the US, UK, and Sweden. We should note that although the labour demand and Gini regressions share a common structure among the three economies, they also have idiosyncratic terms as indicated by the general-to-specific element of our estimation procedure.

The labour demand side of the empirical models has the following characteristics. The autoregressive estimates measure employment persistence (due to labour adjustment costs) and are similar in all three economies, ranging from 0.83 to 0.87. The significant parameter of the labour share conforms with the requirements of a typical labour demand equation, since its wage component has the expected negative effect, and the productivity component can be seen as embodying the positive influence of capital stock and technical progress (Manning, 1993, among others).

Ranking the countries according to the elasticity of employment with respect to the wage-productivity gap, we have that the elasticity is substantially larger in the US than in the two European countries. In particular, the long-run labour share elasticity in the US is almost twice as large as those in the UK:

US	Sweden	UK
-2.15,	-1.33,	-1.12.

Another feature that

¹⁶ The 3SLS results do not differ substantially from the OLS ones which are available upon request.

differentiates labour demand conditions in the US from those in Europe is that, in addition to the wage effect via the labour share, wages have a further direct negative impact on employment. This means that the wage elasticity of labour demand in the US is more than double than that in the UK and Sweden. Furthermore, the influence of the monetary conditions on employment is captured through real balances in the US, and real interest rates in the UK and Sweden. Finally, while there is no demand-side influence in the US, our estimations identify private consumption in the UK and competitiveness in Sweden as relevant employment determinants.

The income inequality side of the empirical models has the following features. The wage-productivity gap is a significant determinant of inequality in all three economies. It is interesting to observe that the Gini equations differ substantially in their degree of inertia and persistence in both the Anglo-Saxon countries is quite high (0.78 in the US, 0.70 in the UK) compared to a value of 0.32 in Sweden, the country with the lowest level of income inequality. As a result, the long-run elasticity of the Gini ratio with respect to the labour share is higher in the Anglo-Saxon countries than in Sweden: a 1 per cent fall in the labour share increases inequality by 1.82 per cent in the US, 1.7 per cent in the UK, and 1.15 per cent in Sweden.

Another feature common in the Gini regressions is the upward pressure of the profits of financial corporations on income inequality. Note, however, that although the *fp* and *gs* variables are significant at conventional levels in the US and UK, the financial sector variable *ns* is significant at the 25 per cent level in Sweden (though we believe this is probably due to the lack of data availability prior to 1993).

Finally, the income inequality estimations include some idiosyncratic control variables. From the group of standard institutional variables, direct taxes (τ^d) are significant in the US (with the expected negative sign), indirect taxes (τ^i) in the UK (with the expected positive sign), and union density (*ud*) in Sweden (with the expected negative sign). From the group of foreign-market related variables, competitiveness (*comp*) worsens inequality in the US (a big economy with a large current account deficit) and reduces inequality in Sweden (a small economy with a current account surplus).

Table 2: Labour Demand (n_t) – Inequality ($gini_t$) Systems, 3SLS

US, 1962-2008										
n_t	=	cnt	n_{t-1}	ls_t	w_t	rb_t	Δrb_t	Δrb_{t-1}		
		2.72	0.87	-0.28	-0.17	0.12	-0.19	0.18		
		[0.011]	[0.000]	[0.032]	[0.014]	[0.010]	[0.001]	[0.005]		
	$H_0:$	$\hat{c}(w) = -\hat{c}(pr):$	Wald test [$\chi^2(1)$] = 6.29; <i>S.E. of regression</i> = 0.010							
			[0.012]							
$gini_t$	=	cnt	$gini_{t-1}$	ls_{t-1}	fp_{t-1}	τ_t^d	$comp_{t-1}$			
		1.54	0.78	-0.40	0.07	-0.60	0.02			
		[0.003]	[0.000]	[0.003]	[0.118]	[0.015]	[0.040]			
	$H_0:$	$\hat{c}(w) = -\hat{c}(pr):$	Wald test [$\chi^2(1)$] = 0.18; <i>S.E. of regression</i> = 0.014							
			[0.669]							
Instruments: $cnt, n_{t-1}, gini_{t-1}, ls_{t-1}, ls_{t-2}, w_{t-1}, rb_t, rb_{t-1}, rb_{t-2}, \tau_t^d, \tau_{t-1}^d, fp_{t-1}, comp_{t-1}$										
UK, 1965-2008										
n_t	=	cnt	n_{t-1}	Δn_{t-1}	ls_t	Δpr_{t-1}	r_t	c_t		
		3.59	0.83	0.55	-0.19	0.28	-0.12	0.28		
		[0.000]	[0.000]	[0.000]	[0.007]	[0.002]	[0.020]	[0.000]		
	$H_0:$	$\hat{c}(w) = -\hat{c}(pr):$	Wald test [$\chi^2(1)$] = 3.24; <i>S.E. of regression</i> = 0.008							
			[0.072]							
$gini_t$	=	cnt	$gini_{t-1}$	$\Delta gini_{t-2}$	$\Delta gini_{t-3}$	ls_t	Δls_{t-1}	w_t	gs_{t-1}	τ_{t-1}^i
		0.51	0.70	0.20	0.46	-0.51	0.65	0.07	0.82	1.69
		[0.576]	[0.000]	[0.007]	[0.000]	[0.004]	[0.001]	[0.003]	[0.000]	[0.000]
	$H_0:$	$\hat{c}(w) = -\hat{c}(pr):$	Wald test [$\chi^2(1)$] = 9.83; <i>S.E. of regression</i> = 0.014							
			[0.002]							
Instruments: $cnt, n_{t-1}, n_{t-2}, gini_{t-1}, gini_{t-2}, gini_{t-3}, gini_{t-4}, pr_{t-1}, pr_{t-2}, r_t, c_t, ls_{t-1}, ls_{t-2}, \tau_t^i, gs_{t-1}$										
Sweden, 1978-2008										
n_t	=	cnt	n_{t-1}	Δn_{t-1}	ls_t	r_t	Δr_{t-1}	$comp_t$		
		3.18	0.85	0.63	-0.20	-0.35	-0.31	0.06		
		[0.000]	[0.000]	[0.000]	[0.001]	[0.002]	[0.000]	[0.002]		
	$H_0:$	$\hat{c}(w) = -\hat{c}(pr):$	Wald test [$\chi^2(1)$] = 0.26; <i>S.E. of regression</i> = 0.011							
			[0.613]							
$gini_t$	=	cnt	$gini_{t-1}$	ls_t	Δls_t	Δw_t	ns_{t-1}	ud_t	$comp_{t-1}$	d^{00}
		3.88	0.32	-0.78	-1.57	2.74	0.17	-0.02	-0.35	0.11
		[0.008]	[0.062]	[0.019]	[0.059]	[0.013]	[0.253]	[0.000]	[0.014]	[0.006]
	$H_0:$	$\hat{c}(w) = -\hat{c}(pr):$	Wald test [$\chi^2(1)$] = 1.11; <i>S.E. of regression</i> = 0.040							
			[0.292]							
Instruments: $cnt, n_{t-1}, n_{t-2}, gini_{t-1}, ls_{t-1}, r_t, r_{t-1}, r_{t-2}, comp_t, comp_{t-1}, w_{t-1}, w_{t-2}, ns_t, d^{00}$										

Notes: Δ denotes the difference operator; p-values in brackets; $\hat{c}(w)$ and $\hat{c}(pr)$ are the estimated coefficients on real wages and labour productivity.

V LABOUR SHARE CONTRIBUTIONS

In the previous section we assessed the statistical significance of the labour share factor in the labour demand and Gini coefficient system of equations. Here we examine its economic significance by measuring how it contributed to employment and income inequality over specific periods in our sample. One of the salient features of our dynamic modelling approach is that we regard a change in an exogenous variable at a point in time as an impulse, i.e. a one-off “shock” to the dependent variable. Defining the shock as a change in an exogenous variable, rather than as a change in the residuals of a behavioural equation,¹⁷ has a clear advantage: it gives rise to (dynamic) contributions, a measure that shows how the endogenous variable of a dynamic equation responds to the actual changes in an exogenous variable over a sample interval. For a pedagogical illustration of the concept of dynamic ‘contributions’ and an analytic exposition of the inequality-employment sensitivity ratios derived in the static and AR1 cases see the Appendix.

5.1. *Evaluating the Inequality-Employment Ratio*

To evaluate the contributions of the labour share to the inequality and employment trajectories of each country we carry out counterfactual simulations by fixing the labour share, in the system estimations of Table 2, at its value at the start of a particular time interval. It is important to point out that by fixing the labour share at a specific value over a given time period, we effectively “lock in” the distance between wages and productivity by adjusting accordingly the wage component, while allowing the productivity series (and thus employment) to move “freely” in the equation system. Therefore, the contribution of the labour share to the employment trajectory is measured without the risk of being contaminated by spillovers.

In the US, the labour share fell from 66.4 per cent in 1992 to 64 per cent in 2000 and to 63 per cent by 2008 (see Figure 4b). We measure the effect of these wage gaps on the Gini coefficient and employment time paths over the 1992-00 and 2000-08 periods by keeping the labour share constant at its 1992 and 2000 values, respectively, and simulating the estimated system. The solid and dotted lines in Figures 4c-f plot the actual and simulated trajectories of the Gini coefficient and employment; the disparity between the actual and simulated series measures the dynamic contributions of the wage gap to the variable under examination.

¹⁷ Blanchard (2009, p. 220) correctly points out that The use of “shocks” is fraught with philosophical, but also with practical, difficulties: Technological shocks, animal spirits, changes in perceived uncertainty, etc. all have deeper causes, which themselves have even deeper causes, and so on.

In particular, Figure 4c deals with the question Had the labour share remained at 66.4 per cent, i.e. at its 1992 value, what would have been the value of the Gini coefficient in 2000? The distance between the solid and dotted lines in Figure 4b measures the cumulation of “shocks” experienced in each year; by 2000 the magnitude of the labour share shocks was -2.4 percentage points. In turn, the distance between the solid and dotted lines in Figure 4c measures the dynamic contributions of the labour share to the Gini coefficient time path. We thus find an elasticity of the Gini coefficient with respect to the labour share equal to $-2.17 \left(\frac{\Delta gini}{\Delta ls} = \frac{-.915 + .837}{4.196 - 4.16} \right)$, i.e. a one per cent fall in the labour share worsened inequality by 2.17 per cent in the US over the 1992-00 period. Or, alternatively, for each percentage point fall in the labour share the Gini coefficient increased by 1.33 percentage points.¹⁸

Nevertheless, as shown in Figure 4d, the inequality increase was accompanied by a rise in employment. Note that an extra 14.245 million (136.901-122.656) jobs were created in response to the widening wage-productivity gap, which implies that the elasticity of employment with respect to the labour share is $-3.06 \left(\frac{\Delta n}{\Delta ls} = \frac{18.625 - 18.735}{4.196 - 4.16} \right)$. The overall sensitivity (elasticity) ratio is $\left(\frac{\Delta gini}{\Delta n} \right) = 0.71$, i.e. a 1 per cent increase in employment is created at the expense of 0.71 per cent deterioration of inequality.

In a similar fashion, the contributions of the labour share to the Gini coefficient and employment are calculated for the US during the 2000s and are portrayed in Figures 4e-f, while Figures 5 and 6 plot the labour share contributions in the UK and Sweden. Figures 5a and 6a depict the evolution of the labour share in the UK and Sweden during the periods under examination. In the UK the labour share fell from 74.5 per cent in 1990 to 69 per cent in 1997, then increased to 72.3 per cent by 2001 and finally fell to 69.7 per cent by 2008. In Sweden the labour share dropped by 8.5 percentage points (from 74.2 per cent to 62.7 per cent) during the recession of the first half of the nineties, increased to 69.4 per cent by 2001, and then fell slightly to 68.1 per cent by 2008. The labour share elasticities $\left(\frac{\Delta gini}{\Delta ls}, \frac{\Delta n}{\Delta ls} \right)$ and the implied inequality/employment sensitivity ratio $\left(\frac{\Delta gini}{\Delta n} \right)$ for the three countries during the respective simulation periods are summarised in Table 3.

The following points are worth noting. First, although inequality and employment in the US were highly elastic with respect to the falling labour share in the 1990s, almost four times more elastic than those in the European countries, their sensitivity ratio was lower than that in the UK and Sweden:

¹⁸ That is, $\left(\frac{\Delta Gini}{\Delta LS} = \frac{0.401 - 0.433}{0.644 - 0.64} \right) = 1.33$, where Gini and LS are the level values of the respective variables.

Figure 4: *Dynamic Contributions in the US*

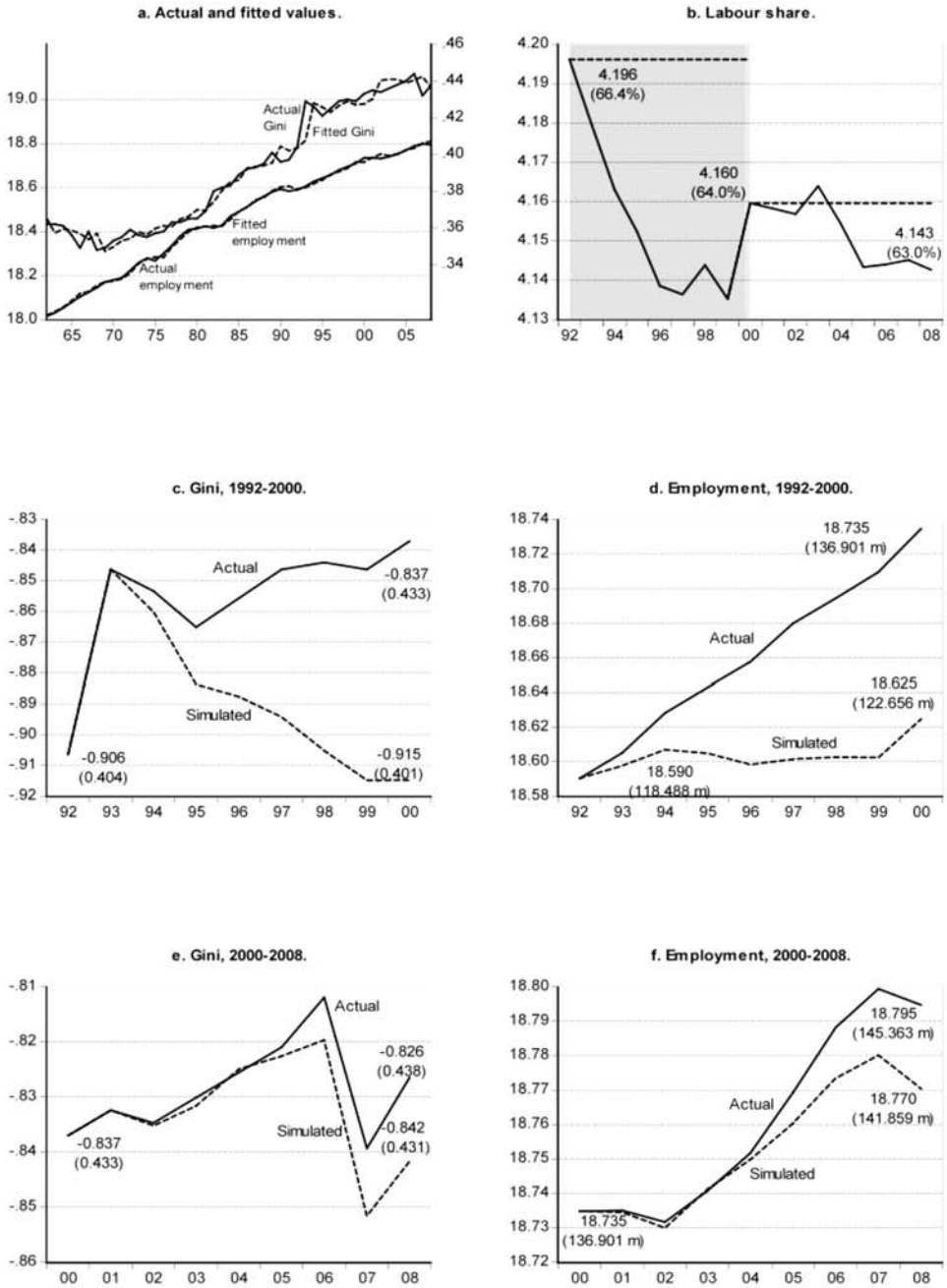


Table 3: *Labour Share Elasticities of Inequality and Employment*

	US		UK			Sweden		
	1992- 2000	2000- 2008	1990- 1997	1997- 2001	2001- 2008	1990- 1995	1995- 2001	2001- 2008
%								
$\Delta gini/\Delta ls$	-2.17	-0.94	-0.55	-0.51	-1.08	-0.54	-0.67	-2.55
$\Delta n/\Delta ls$	-3.06	-1.47	-0.73	-0.57	-0.83	-0.66	-0.96	-2.35
$\Delta gini/\Delta n$	0.71	0.64	0.75	0.89	1.30	0.82	0.69	1.09

the cost of a 1 per cent boost in employment in the US was a 0.71 per cent increase in inequality – the European cost was 0.75 per cent in the UK and 82 per cent in Sweden.

Second, in the UK a one per cent increase in employment has been achieved at the expense of higher percentage increases in inequality throughout the years. This was due to the approximate doubling of the labour share elasticity of inequality ($\frac{\Delta gini}{\Delta ls}$) from the 1990-1997 period to the 2001-2008 one, implying that the same percentage fall in the labour share in the 1990s led to twice as much the rise in inequality in the 2000s. Over the 2001-2008 period the sensitivity ratio was the highest in the sample with a 1 per cent employment increase being obtained at the cost of 1.3 per cent deterioration in inequality. In contrast, the US displayed a sensitivity ratio of 0.64 in the noughties, reflecting the lowest inequality cost in the sample associated with a 1 per cent rise in employment due to the falling labour share.

Third, similar to the US in the 1990s, Sweden experienced the highest inequality and employment elasticities with respect to the labour share during the 2000s. The main difference, however, is that Sweden exhibits an elastic sensitivity ratio of 1.09 in the 2000s compared with the lower ($\frac{\Delta gini}{\Delta n}$) = 0.71 in the US during the 1990s.

Finally, observe, that out of the eight time intervals we examine, there are only two periods during which the labour share is increasing: 1997-2001, the first labour term in the post-Thatcher UK, and the 1995-2001 recovery period in Sweden. In the case of rising labour shares, the higher the sensitivity ratio ($\frac{\Delta gini}{\Delta n}$), the higher the economic benefits. According to Table 3, a 1 per cent decrease in employment was accompanied by 0.89 per cent less inequality in the UK and 0.69 per cent less inequality in Sweden. So in the second half of the 1990s the UK performed better than Sweden, since it achieved a larger reduction in inequality for the same employment loss.

Figure 5: *Dynamic Contributions in the UK*

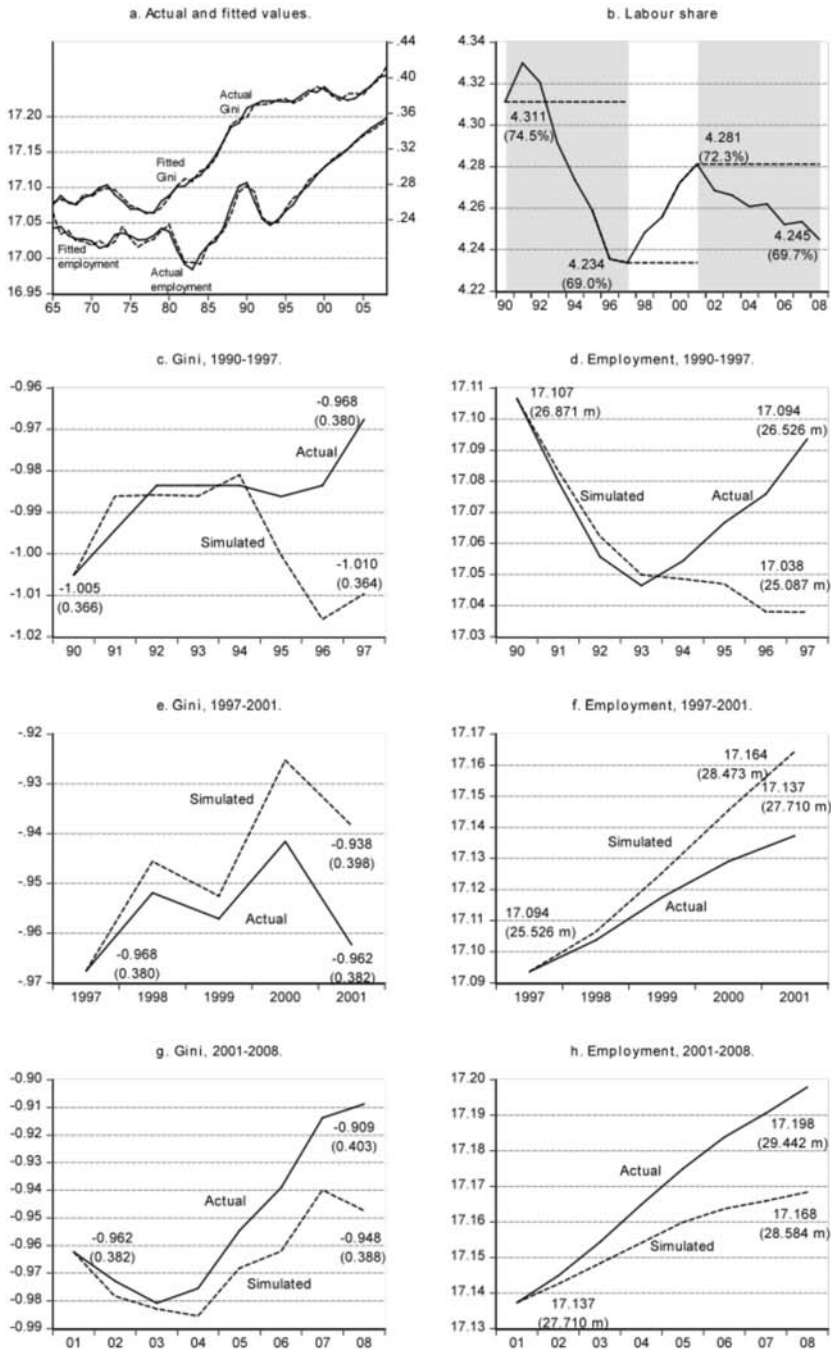
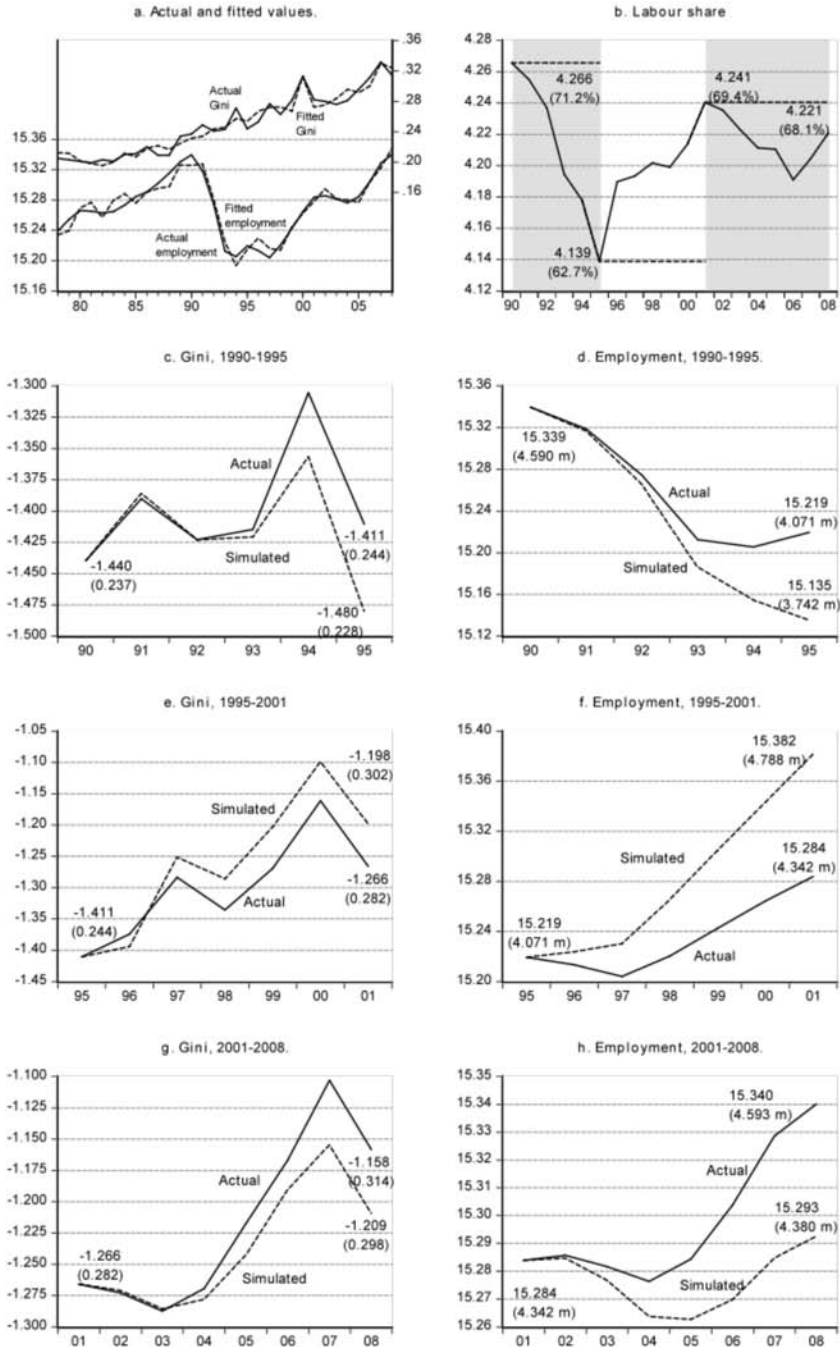


Figure 6: *Dynamic Contributions in Sweden*



VI CONCLUSIONS

In this paper we examined how the falling labour share (or, equivalently, the widening wage-productivity gap) influenced the employment trajectory and solicited the increasing inequality in the US, UK and Sweden over the past four decades. We argued for the joint estimation of the effects of the functional distribution of income on labour demand and personal inequality and, using annual data, we estimated a two-equation system with the aim to optimise the fit in each country.

Having validated, in statistical terms, the labour share as a major driving force of inequality and employment, we confirmed the economic significance of our results via counterfactual simulations and evaluated the contributions of the wage-productivity gap to the evolution of the two series. The corresponding inequality-employment sensitivity ratio is, in effect, a barometer of the socio-economic pressure arising from the two-sided role of the falling labour share: our barometer signposts the increase in inequality with respect to the employment increase.

According to our findings, as labour shares were falling during the 1990s, the inequality-employment sensitivity ratio in the US was lower than that in the UK and Sweden: a 1 per cent increase in employment was supported at the expense of higher inequality by 0.71 per cent in the US, 0.75 per cent in the UK, and 0.82 per cent in Sweden. In the two simulation periods during which labour shares were rising, i.e. 1997-2001 in the UK and 1995-2001 in Sweden, the UK achieved a larger reduction in inequality than Sweden (0.89 per cent compared to 0.69 per cent) for the same percentage loss in employment. This picture of the two European countries is in striking contrast to that in the 2000s. In particular, we found that the inequality-employment sensitivity ratio was much more elastic in the UK and Sweden than in the US in the 2000s. That is, as the labour shares were falling, the cost of 1 per cent boost in employment was an increase in inequality of 0.64 per cent in the US, 1.30 per cent in the UK, and 1.09 per cent in Sweden.

As wages are lagging behind productivity, the barometer of labour share elasticities gives the degree of worsening inequality vis-à-vis job creation. Acknowledging the crucial impact of the labour share on the inequality and employment time paths, the evolution of the wage-productivity gap deserves the attention of policy makers. Although an investigation of which macro-labour factors are driving the labour share was beyond the scope of this paper, we endeavour to address this substantive theme in future work. It should also be worth examining to what extent the various income groups benefit/lose from falling labour shares.

The empirical evidence that the falling labour share leads to higher Gini coefficients, while supporting employment, suggests that the attention of developed democratic societies was diverted away from the issue of increasing income inequality through “sweetening” its impact. Or, as George Monbiot opined, “Governments ensure that we are thrown enough scraps to keep us quiet, while the ultra-rich get on with the serious business of looting the global economy and crushing attempts to hold them to account”. (*The Guardian, To us, it’s an obscure shift of tax law. To the City, it’s the heist of the century*, 8 February 2011.) However, as the Occupy movements intensified their protests during 2011, it became apparent that in an environment of increasing inequality, especially in the precarious post-2008 era, countries with high or rising unemployment rates risk being at the verge of explosive socio-economic conditions.

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APPENDIX
DYNAMIC CONTRIBUTIONS

A.1 *Conceptual Underpinnings*

The most pedagogical illustration of the concept of dynamic contributions can be given in the context of a simple AR(1) model:

$$y_t = \alpha y_{t-1} + \beta(1 - \alpha)x_t, \text{ where } |\alpha| < 1. \tag{5}$$

The impulse response function (IRF) of the stochastic process (5) to a one-off unit change in the exogenous variable is

IRF _{<i>t</i>} :	time	<i>t</i>	<i>t</i> + 1	<i>t</i> + 2	...	<i>t</i> + 10	...	(6)
	responses	$\beta(1 - \alpha)$	$\beta(1 - \alpha)\alpha$	$\beta(1 - \alpha)\alpha^2$...	$\beta(1 - \alpha)\alpha^{10}$...	

Note that a one-time unit shock will have an immediate unit $\times \beta(1 - \alpha)$ impact on the endogenous variable, while the future effects of the shock decline in a geometric fashion. We can summarise the sensitivity of *y* with respect to variable *x* as:

long-run sensitivity =	short-run sensitivity +	persistence,	(7)
β	$\beta(1 - \alpha)$	$\beta\alpha$	

where persistence is defined as the sum of future responses (i.e. the responses in the aftermath of the shock), short-run sensitivity refers to the contemporaneous response, and the long-run sensitivity is given by the sum of all responses.

On the basis of the above analysis, we measure the *contributions* of the exogenous variable *x* to the evolution of the dependent variable *y* over a specific time interval of *T* periods, say *t* + 1 to *t* + *T*, by sequentially adding up the IRFs of the respective shocks during the specific period. We define the shock at each point in time as the change in the *x* series from period *t* to *t* + *i*: $\nabla_i x_{t+i} = x_{t+i} - x_t$, where ∇_i denotes the backward difference of *i* periods, *i* = 1, 2, ..., *T*. The IRFs of the dependent variable to these shocks are

$\left[\begin{array}{l} \text{IRF}_1: \\ \text{IRF}_2: \\ \dots \\ \text{IRF}_T: \end{array} \right.$	$\begin{array}{cccc} t + 1 & t + 2 & \dots & t + T \end{array}$	$\left. \begin{array}{c} R_{11} \quad R_{12} \quad \dots \quad R_{1T} \\ - \quad R_{22} \quad \dots \quad R_{2T} \\ - \quad - \quad \dots \quad \dots \\ - \quad - \quad \dots \quad R_{TT} \end{array} \right]$	(8)
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where IRF_i denotes the response function of the endogenous variable to the i th shock, and R_{ij} is the response to shock i in time $t + j$. Note that the diagonal elements in matrix (8) denote the respective contemporaneous y -responses to the i th shock, whereas the elements above the diagonal denote the y -responses in period $t + j$ to the shocks which occurred in past periods. Therefore, the $(t + j)$ -period *contribution* can be obtained as the sum of all responses in this period.

In other words, the *contributions* of the exogenous variable x to the trajectory of the endogenous variable for the given interval are given by the following time series:

$$\begin{matrix}
 t + 1 & t + 2 & t + 3 & \dots & t + T \\
 R_{11}, & \sum_{i=1}^2 R_{i2}, & \sum_{i=1}^3 R_{i3}, & \dots & \sum_{i=1}^T R_{iT},
 \end{matrix} \tag{9}$$

which is equivalent to the disparity between the actual (fitted) and simulated values at period $t + i, i = 1, \dots, T$.

In the context of a model where the labour share is the driving force of employment and income inequality, we illuminate the analytics of the contributions measure through a simple static case and an autoregressive AR(1) process.

A.2 Static Case

Let y (employment) depend on x (labour share):

$$y_t = \beta x_t, \tag{10}$$

where (as shown in Section IV) $\beta < 0$. Fixing $x_t = x_0$ for $t = 1, \dots, T$, the shock series and the size over the specific period are given by Equations (18)-(19):

$$shock_t \equiv \nabla_t x_t = x_t - x_0, \quad size = \nabla_T x_T - x_0.$$

The responses in matrix (8) are

$$\left[\begin{matrix}
 & t = 1 & t = 2 & t = 3 & \dots & t = T \\
 IRF_1 : & \beta(x_1 - x_0) & 0 & 0 & \dots & 0 \\
 IRF_2 : & - & \beta(x_2 - x_0) & 0 & \dots & 0 \\
 \dots & - & - & \beta(x_3 - x_0) & \dots & 0 \\
 & - & - & - & \dots & \dots \\
 IRF_T : & - & - & - & \dots & \beta(x_T - x_0)
 \end{matrix} \right] \tag{11}$$

Over the specific period, we measure the contribution of the x shocks to y as the disparity between its actual (fitted) and simulated values at period T :

$$y_T - \beta x_0 = \beta x_T - \beta x_0 = \beta(x_T - x_0) = \beta(\text{size}). \quad (12)$$

Alternatively, the contributions at the end of the period are obtained by applying Equation (9) to matrix (11), i.e. adding up all responses in its last column:

$$\sum_{i=1}^T R_{iT} = 0 + 0 + 0 \dots + \beta(x_T - x_0).$$

We then define the sensitivity of y to the change in x over the whole period as:

$$\frac{y_T - \beta x_0}{\text{size}} = \frac{\beta(x_T - x_0)}{\text{size}} = \beta. \quad (13)$$

Similarly, let us consider that (the Gini coefficient) also depends on (the labour share):

$$z_t = \gamma x_t. \quad (14)$$

Along the above lines, we measure the contribution of x to z and the sensitivity of z with respect to x as:

$$z_T - \gamma x_0 = \gamma x_T - \gamma x_0 = \gamma(x_T - x_0) = \gamma(\text{size}) \quad (15)$$

$$\frac{z_T - \gamma x_0}{\text{size}} = \gamma. \quad (16)$$

Therefore, the sensitivity ratio of inequality (z) and employment (y) as a result of the change in the labour share (x) over the specific period is

$$\frac{dz}{dy} = \frac{\gamma}{\beta}. \quad (17)$$

Note that in the absence of dynamics the sensitivity ratio does not depend on the size of the change in the labour share.

A.3 *ARI Case*

Let y (say, employment) depend on x (say, the labour share) and suppose that y follows the AR(1) stochastic process (5), i.e. $y_t = \alpha y_{t-1} + \beta(1 - \alpha)x_t$, where (in the light of our results in Section IV) $\beta < 0$. We fix $x_t = x_0$ for $t = 1, \dots, T$. Thus, we can express the shock series as

$$\text{shock}_t \equiv \nabla_t x_t = x_t - x_0, \quad (18)$$

and the size over the specific period is

$$size = \nabla_T x_T = x_T - x_0. \tag{19}$$

In this case the responses of y to the changes in x (shocks) are

$$\begin{bmatrix} & t = 1 & t = 2 & \dots & t = T \\ \text{IRF}_1 & \beta(1 - \alpha)(x_1 - x_0) & \beta(1 - \alpha)\alpha\nabla_1 x_1 & \dots & \beta(1 - \alpha)\alpha^{T-1}\nabla_1 x_1 \\ \text{IRF}_2 & - & -\beta(1 - \alpha)\nabla_2 x_2 & \dots & \beta(1 - \alpha)\alpha^{T-2}\nabla_2 x_2 \\ \dots & - & - & \dots & \dots \\ \text{IRF}_T & - & - & \dots & \beta(1 - \alpha)(x_T - x_0) \end{bmatrix}, \tag{20}$$

and the contribution of x to the evolution of y over the $[1, T]$ interval is measured by the sum of all responses in the last column of the above matrix (see also Equation (9)):

$$\beta(1 - \alpha) \sum_{t=1}^{T-1} \alpha^{T-t} \nabla_t x_t + \beta(1 - \alpha)(x_T - x_0) = (\text{fictional impact on } y) + \beta(1 - \alpha)(size). \tag{21}$$

In turn, unlike the white noise case, the sensitivity of y to the change in x over the whole period depends on the size of the shock:

$$\frac{(\text{fictional impact on } y) + \beta(1 - \alpha)(size)}{size} = \frac{\beta(1 - \alpha) \sum_{t=1}^T \alpha^{T-t} \nabla_t x_t}{(x_T - x_0)}. \tag{22}$$

Note that the frictional impact is nullified in the long run, since the matrix (20) becomes redundant. A long-run analysis of the AR(1) model shows that all temporary shocks dissipate with time, while a permanent shock (say, a decrease in the labour share) causes employment to increase by β times the size of the permanent shock. However, in a finite time period the sensitivity (elasticity) of y with respect to x depends on the size of the shock. In short,

- if $\alpha = 0$ then the elasticity (sensitivity) of employment (y) with respect to the labour share (x) is zero;
- if $\alpha > 0$ then the elasticity of y with respect to x is a weighted average of each period's shocks ($\nabla_t x_t$) as a percentage of the size of the shock, i.e. the overall change in x in the given period ($x_T - x_0$).

Along the same lines, if we let z (the Gini coefficient) to follow an AR(1) process

$$z_t = \phi z_{t-1} + \gamma(1 - \phi)x_t, \quad |\alpha| < 1, \tag{23}$$

the contributions are

$$\begin{aligned} \gamma(1 - \phi) \sum_{t=1}^{T-1} \phi^{T-t} \nabla_t x_t + \gamma(1 - \phi)(x_T - x_0) &= (\text{fictional impact on } z) \\ &+ \gamma(1 - \phi)(size), \end{aligned} \tag{24}$$

and the elasticity of z with respect to x is

$$\frac{(\text{fictional impact on } z) + \gamma(1 - \phi)(size)}{size} = \frac{\gamma(1 - \phi) \sum_{t=1}^T \phi^{T-t} \nabla_t x_t}{(x_T - x_0)}. \tag{25}$$

A similar reasoning applies to the above equation as for the y sensitivity in Equation (22).

Finally, the inequality cost for the employment boost due to the fall in the labour share depends on the size of the shock, i.e the change in x from period $t = 0$ to $t = T$:

$$\frac{dz}{dy} = \frac{\gamma(1 - \phi) \sum_{i=1}^{T-1} \phi^{T-i} \nabla_i x_i + \gamma(1 - \phi)(x_T - x_0)}{\beta(1 - \alpha) \sum_{i=1}^{T-1} \alpha^{T-i} \nabla_i x_i + \beta(1 - \alpha)(x_T - x_0)} = \frac{\gamma(1 - \phi) \sum_{i=1}^T \phi^{T-i} x_i}{\beta(1 - \alpha) \sum_{i=1}^T \alpha^{T-i} x_i}. \tag{26}$$

Note that in a dynamic model the sensitivity ratio of inequality and employment (dz/dy) does not depend on the size of the shock when $\phi = \alpha$. Naturally,

- the smaller the difference between (i) the autoregressive parameters (ϕ, α) and (ii) the labour share elasticities (γ, β) of the two equations, the smaller the influence of the size of the shock on the sensitivity ratio.