

TECHNOLOGICAL ADVANCE, THE LABOUR SHARE OF NATIONAL INCOME AND INCOME INEQUALITY IN THE EU

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Layout of the presentation

The paper presentation is organized as follows:

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6. Conclusions and policy implications

1. Introduction

Introduction

Purpose of the study

The purpose of this study is to test the relationship between the labour share of income and technological advance.

A production function is used to estimate the effect of technological change on the share of labour.

The focus of the study is on EU member states.

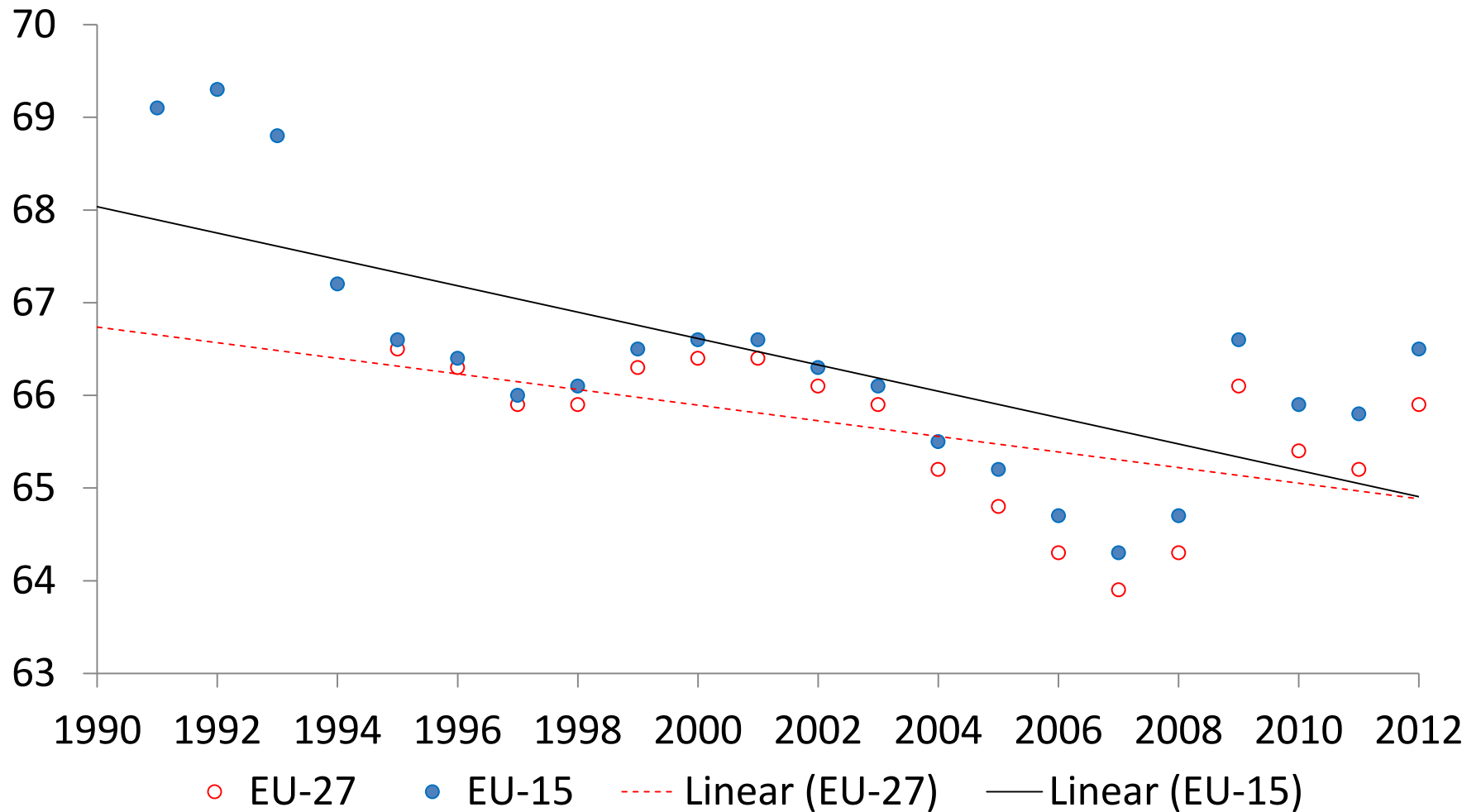
2. Measuring the labour share of income

Measuring the share of labour of income

The share of labour is generally measured as the compensation to employees (including employers' social contributions) plus the returns to labour to self-employed persons, divided by GDP at factor cost.

The earnings of self-employed persons in compensation for their labour is estimated as $C/H * S$, where C is compensation to hired employees, H number of hired employees and S is number of self-employed persons.

Measuring the labour share of income



Measuring the labour share of income

Given that the labour share is measured by WL/Y , the labour share would remain constant if W increases by the same proportion as the output/labour ratio, Y/L . If W increases at a slower rate than Y/L the labour share would decrease.

The average wage rates (W) in the EU grew at a slower rate than the output/labour ratio (Y/L) for the period 1990 to 2012 (source: Eurostat) and this indicates that in most of the EU-27 explaining, albeit mathematically, the fall in the labour share during this period.

This could possibly be attributed to technological advance leading to a wage/productivity gap.

3. Factors affecting the share of labour

Factors affecting the share of labour...1

Technological advance and the falling labour share

Many authors view technological change as a major determinant of the fall in the share of labour. Such change leads to a given output being produced by fewer workers, and this in turn leads to higher returns to capital owners, who generally have a stronger say than workers in how the income from increased productivity is to be distributed.

This asymmetrical power over the distribution of income is possibly one of the main reasons why the fruits of technological advance are not shared equally between employees and employers.

Factors affecting the share of labour

The Globalisation Process

The globalisation process is considered as another factor leading to the falling share of labour. It has been argued that the emergence of new countries as contributors to technology generation in the world economy can be associated with globalisation through trade, inward FDI, and international migration (Roach, 2009; Athreye and Cantwell, 2007).

This process is associated with the spread of technological advance and also with a deteriorating bargaining power of hired employees.

Factors affecting the share of labour

Emigration

Some authors argue that emigration tends to decrease wage rates, and this is likely to be felt mostly in lower paid workers (Reed and Latorre, 2009; Nickell and Salaheen, 2008).

Structural Changes

Structural economic changes, leading to an increase in the share of services and to a decline in the share of manufacturing may have also contributed to the decline in the labour share of GDP, given that a large proportion of manufacturing employees are unionised, with strong bargaining power against the owners of enterprises (Arpaia et al., 2009; Young, 2004; De Serres et al, 2002).

4. Why worry about the falling share of labour

Why worry about the falling labour share

Undesirable effects

Several undesirable effects of the decline in the labour share have been identified in the literature. These include:

- Inequality
- Reduction of aggregate consumption
- Negative impact on growth
- Loss of social cohesion and civil unrest

Why worry about the falling labour share

Inequality

The main implication of the falling share of labour relates to income inequality between those who offer the services in the form of labour and those whose contribution relates mostly to ownership (Karanassou and Sala, 2013).

As Jacobson and Occhino (2012) argue, labour income is more evenly distributed across households than capital income. The decline in labour share resulted in total income being less evenly distributed and more concentrated at the top of the distribution. Therefore, this contributed to increase income inequality.

Why worry about the falling labour share

Decrease in consumption

The falling labour share may also lead to a decrease in aggregate demand due to, among other things, the possibility that high income households have a lower propensity to consume than lower income households.

Dynan et al. (2004) show that the rich do save more, while Kwak (2014) referring to this possibility, argues that there is a strong argument to be made that a capitalist society needs systematic redistribution to survive.

Why worry about the falling labour share

Impact on growth

The impact on economic growth is not straightforward as this depends on various factors. This effect depends on whether aggregate demand is wage-led or profit-led.

Onaran and Galanis (2012) examine this issue and conclude that the effect differs between countries, as there are two opposing forces involved, namely (i) as the labour costs decrease, profit rates may increase; (ii) but these are counterbalanced by a decrease in the propensity to consume.

Why worry about the falling labour share

Loss of social cohesion

Social cohesion is a major objective of the EU, and yet some 25% of EU citizens are at risk of poverty or social exclusion (Eurostat news release, 184/2013).

The declining share of income may counteract the social-cohesion objective, and possibly lead to social unrest (Curci et al., 2011). It should be recalled that the effect of incomes on satisfaction does not generally depend on their absolute value but on their relative value, so even if labour income increases in absolute terms, a fall in the labour share may lead to social dissatisfaction.

5. Econometric test of the effect of technology

Econometric test of the effect of technology

The labour share and the output labour ratio

The paper notes that, mathematically, the labour share, expressed as WL/Y , where W is the wage rate, L is persons employed and Y is GDP, would remain constant if W increases by the same proportion as the output/labour ratio, Y/L . The paper shows that in most EU members states, W rose at a slower rate than the Y/L ratio, and thus explaining numerically the fall in the labour share during this period.

This possibly indicates, but does not prove, that the effect of technology may have increased output faster than labour, leading to a wage/productivity gap and therefore to a decrease in the labour share.

Econometric test of the effect of technology

The underlying production function

The paper adopts a more rigorous approach to assess the effect of technology of the labour share of income than by simply looking at the WL/Y ration. This is done by estimating a labour demand equation derived from a CES production function to show that technological progress did in fact negatively affect the labour share of income, across EU countries, as follows:

$$Y_i = e^{rc} [bL_i^{-\rho} + (1-b) K_i^{-\rho}]^{-\nu/\rho}$$

where Y_i represents value-added produced by the inputs, namely labour (L_i) and capital (K_i) for each country. The expression e^{rc} captures shifts in the production function, due to technological change.

Econometric test of the effect of technology

The underlying production function

It should be noted here that the effect of technology is unbiased in that it affects labour and capital equally. There is considerable debate on the matter relating to biased and unbiased technological progress, but allowing for this would have introduced unnecessary complications in the estimation procedure.

The question arises therefore as to whether technology also affects the share of capital. Given the stronger decision power of capital owners, when compared to labour, it is likely that the gains from technology will be mostly enjoyed by capital.

Econometric test of the effect of technology

Deriving a labour demand equation

From the production function a labour demand equation can be derived by specifying the marginal productivity condition, and assuming, as is standardly done in economic theory, that the marginal product of labour is equal to the wage rate. The resultant labour demand equation is:

$$\ln \mathbf{L}_i = \alpha_0 + \alpha_1 \ln \mathbf{W}_i + \alpha_2 \ln \mathbf{Y}_i + \alpha_3 \mathbf{C}_i$$

For a derivation of this equation see Briguglio and Vella (2014), where the meanings of the α coefficients are also explained. In brief, α_1 which is an estimate of the elasticity of substitution is expected to be negative, α_2 which relates to returns to scale is expected to be positive and α_3 which relates to the effect of technological advance on labour demand is expected to be negative.

Econometric test of the effect of technology

Deriving a labour share equation:

The labour demand equation can be further rearranged as follows:

$$\ln(\mathbf{LW/Y})_i = \alpha_0 + 1 + \alpha_1 \ln \mathbf{W}_i + \alpha_2 - 1 \ln \mathbf{Y}_i + \alpha_3 \mathbf{C}_i$$

where LW/Y is the share of labour.

The equation predicts that the share of labour is influenced by wage rates, output and technology. The main object of the exercise is to estimate the value of α_3 which is the coefficient on C (technological change) and to assess whether the coefficient takes a negative value..

Econometric test of the effect of technology

The data and the estimation method

The data on L , W and Y is derived from the Eurostat database and is explained in detail in Vella and Briguglio (2014).

The variable representing technology (C) is sourced from sub-index 9a of the Global Competitiveness Indicators (Technological Adoption). The period covered is 2008-2012 (5 years) .

A panel data approach (random effects) is used, so that there are 108 observations over the four year period.

Econometric test of the effect of technology

The results

The resultant estimates of the coefficients of equation labour demand equation are:

$$\ln L_{it} = 2.938 - 0.768 \ln W_{it} + 0.968 \ln Y_{it} - 0.133 C_{it}$$

(21.48) (-37.66) (58.59) (-5.54)

N=130 R²=0.98

As explained before the equation can be rearranged so that the labour share of income is the subject of the equation:

$$\ln(LW/Y)_{it} = 2.938 + 0.232 \ln W_{it} - 0.032 \ln Y_{it} - 0.133 C_{it}$$

As expected the coefficient on C is negative and statistically significant, indicate that technology negatively affects the income share of labour.

Econometric test of the effect of technology

Diagnostic tests

The estimated parameters are in line with a priori expectations and have plausible magnitudes. The t-values (in italic) indicate that the estimates are statistically different from zero at the 95% level. The correlation coefficient is on the high side.

The estimated coefficient on the technological change variable is in accordance with theoretical expectations. The result shows that technology progress across countries leads to a reduction in labour demanded, *ceteris paribus*.

6. Conclusion and policy implications

Conclusions and policy implications

Should technology be dismantled?

One should not imply from this finding that policies aimed at dismantling technological advance and banning labour-saving devices would solve the problem, as this will result in a loss of productivity and will be counter-productive.

As Bernanke (2007) argues, policy approaches that would inhibit the dynamism and flexibility of the labour market would do more harm than good as technological advance is a critical source of overall economic growth and of improvements in the overall standard of living.

Conclusions and policy implications

The ethical aspects of the results

Bernanke (2007) referring to the ethical aspect of the falling wage share argues that there are three principles relating to income, namely:

1. economic opportunity should be as widely distributed and as equal as possible;
2. economic outcomes need not be equal but should be linked to the contributions each person makes to the economy; and
3. that people should receive some insurance against the most adverse economic outcomes, especially those arising from events largely outside the person's control.

Conclusions and policy implications

The ethical aspects of the results

With regard to the third principle some form of policy intervention would seem to be necessary as left to its own devices, the capitalist system – which has often led to asymmetrical power over the share of income between owners and employees, has ushered in the globalisation process and has generated technological advance – could result in a continuing secular falling share of labour income.

The paper identifies three major type of policy interventions in this regard namely (i) fiscal policy; (ii) active labour market policies and (iii) hours of work policy.

Conclusions and policy implications

Fiscal Policy

Given the inequality factor associated with the decreasing labour share, some authors suggest some form of progressive income tax to redress this problem. Atkinson et al. (2009) and Piketty (2014) for example make a case for progressive income tax to redistribute income to labour earnings and from capital earnings which have grown at an unprecedented rate since the 1970s.

Income tax progressivity, however, has various downsides in that it could discourage effort, as well as innovation, which are the drivers of technological advance. In addition this could stimulate outflow of capital in search of lower rates of taxation.

Conclusions and policy implications

Active labour market policies

One of the factors leading to lower earnings relate to skill mismatches which arise with the changing structure of the economy, often driven by technological advance. An important objective of active labour market policies (ALMP) is to reduce market frictions by improving skills, labour mobility, and knowledge about job seekers and job vacancies.

Some authors (e.g. Bernanke, 2007) suggest that the best way to reduce disparities in income is to put in place policies that reduce mismatches in the labour market through educational programmes and training and retraining schemes.

Conclusions and policy implications

Reduction of working hours

As explained above, labour replacing technology could lead to GDP growing faster than wage rates, and this could in turn lead to chronically high unemployment rates. Some economists (e.g. Coote and Franklin, 2013) consider that a shorter working week, without a reduction in pay, could reduce this tendency. In addition, according to the same authors, a shorter working week would lead to a healthier, more fulfilling and sustainable way of life.

A similar argument is also put forward by Kallis et al (2013) who conclude that while the results of reducing working hours are uncertain, this may be a risk worth taking.

Conclusions and policy implications

Reduction in working hours

Reduction of weekly hours of work would of course lead to higher costs for firms, who would have to employ more persons to produce the same level of output, everything else remaining constant.

On the other hand, if the reduced working hours do not produce a lower level of output this measure would be counter-productive in that it will not increase labour demand.

Conclusions and policy implications

The best policy is not easy to attain

The best policy would of course be that which reduces income inequality while not holding back economic growth, technological advancement, and employment generation.

However many policies involve trade-offs, as already explained. Devising policies that attain the objectives just listed simultaneously would not therefore be an easy task.

Conclusions and policy implications

But a combination of measures could help

A combination of measures aimed at promoting technological advance without necessarily reducing the labour share could be implemented.

For example, the production cost increase arising from the reduction of a statutory working weekly could be mitigated by policies that are aimed at reducing sick-leave abuse.

An increase in the progressiveness of income taxes for the purpose of income redistribution could act as a drag on the economy but these could be counterbalanced by non-tax policies that encourage entrepreneurship and risk taking.

Conclusions and policy implications

A well-balanced package of policies

This is of course easier said than done, but doing nothing could mean a secular fall in the labour share with dire economic and social consequences.

Thank you for your attention

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