Income Distribution and Economic Growth: Empirical Results for Slovakia

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Abstract

Relationship between income inequality and economic growth is ambiguous one but most mainstream economists view real income increase as a drag of economic growth as it leads to higher labor cost, lower competitiveness and reduction of employment. In this study we provide an alternative view and show that labor income increase may have also positive effect on growth. Which of these two effects dominates in a particular country depends on institutional and legal environment of that country, its macroeconomic conditions and also its economic policies. We test empirically two distinct economies – a small, very open economy of Slovakia and a large, closed economy of the Euro area. We find that in equilibrium, both economies are wage-led on average in the period 1993 – 2017 and hence it appears to be beneficial to pursue policies that would reduce income inequality.

Keywords: *inequality, wage led growth, profit led growth, Slovakia*

JEL Classification: E12, E25, E60

Introduction

Virtually any statistics that measures income distribution indicates widening gap between incomes of rich and poor in the last three decades (Atkinson, Piketty and Saez, 2011). The labor income has declined steadily in most advanced and emerging countries, because growth rate of labor income has not kept up with productivity growth. Almost all income increases have gone to top income earners. There are many factors that have led to this income polarization – globalization, technological change, financialisation, pro-capital distributional policies to name just the major ones (Stockhammer, 2013). The globalization and higher degree of openness have increased labor supply in advanced countries that has resulted

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in lower pressure on wage rise. Change in technology has necessitated a class of highly educated and skilled professionals who achieve much higher productivity than the rest of a workforce and obtain much higher income. Financialisation – a common word for events like rising indebtedness of households, more volatile asset prices, short-termism of financial institutions, financial deregulation – have weakened bargaining power of labor through at least two channels. First, firms have gained mobility in investing capital home and abroad and thus can put negotiating pressure on labor and second, a close alignment of management and shareholders has created various corporate structures that siphon profit through dividends and fees at the expense of labor income. Bargaining power of labor has been also weakened by pro-capital distributional policies pursued since 1980 that have reduced welfare state in almost all advanced countries.

In this paper we are not elaborating further on the causes of deepening income inequality.[1] Our aim is to analyze how a change of income distribution affects economic activity in a particular country. Before the crisis of 2008 economists did not pay much attention to income distribution and its effects on economic activity. Mainstream economics hold a view that consumption and investment are little, if any, affected and only net export is affected indirectly by income distribution. In this setting wage rise plays only negative role as it leads to higher marginal cost, lower competitiveness and reduction of economic activity. This reasoning follows from a neo-classical model with assumptions of perfect competition, profit maximization, diminishing returns and rational expectations and full information of all agents. There was also a universal belief in efficient market hypothesis stating that market always corrects itself. The crisis has challenged both, neoclassical model and efficient market hypothesis, as they have been unable to foresee the crisis and provide a satisfactory explanation of why it happened. Alternative theories gained more attention, among them a view that income distribution plays an important role in economics and that a rising inequality was one of the major causes of the crisis (Stockhammer, 2012). Lower wage share, the reasoning goes, puts downward pressure on domestic demand as it shifts resources from poorer households with higher marginal propensity to consume (MPC) to richer ones with lower MPC. The ensuing lack of domestic demand is tackled differently in different countries. In some countries, pursuing debt-led growth model, a lack of demand is skirted by a decrease of personal saving and by debt financed consumption (the US, UK, Greece, Portugal, Spain). In others, pursuing export-led growth, lower domestic demand is tackled by an increased reliance on export (Germany, Japan, China, the Netherlands). These

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[1] Income inequality in this paper is represented by the gap between income to capital (profit) and income to labor (wage). Rise in labor income reduces this gap thus lowers the income inequality.

developments led to big imbalances in the global economy and were unsustaina-
ble in the long-run, but international financial deregulation and the use of ob-
scured financial instruments delayed the beginning of the crisis.

Income distribution and its relation to economic activity have become one of
the main topics of empirical as well as theoretical economic research after the
crisis. We mention just few papers. In his bestselling book "Capital in the 21st
century" Piketty (2014) describes development of income and wealth inequali-
ties in the major global economies in the last century (in the last three centuries
in the case of Britain and France). He concludes that current dynamics is not
sustainable in the long-run and threatens the very basis of the capitalist economy.
Ostry, Berg and Tsangarides (2014) study an effect of income inequality and
redistribution on economic activity on a sample of 153 countries since 1960. They
find that increased inequality affects growth negatively and that economic policies
should mitigate inequality through redistribution which they find not to be harm-
ful to growth. Kumhof and Rancière (2010) present a theoretical DSGE model
describing how high leverage and crisis can arise as a result of changes in in-
come distribution caused by shifts in bargaining powers over incomes. Kumhof
et al. (2012) extend the previous model by a foreign sector and explore the link
between increases in income inequality and increases in current account deficits.

In our analysis we use a model developed by Bhaduri and Marglin (1990)
stemming from a post-Keynesian framework of the General Theory emphasizing
effective demand as an important determinant of economic activity. To the con-
trary of a neoclassical framework, marginal costs are assumed to be constant
(implying decreasing unit costs) up to firm's full capacity. Hence it is profitable
for firms to produce at full capacity; therefore "produce as much as can be sold"
becomes an optimal strategy for a firm's production up to its full capacity.[2]
Effective demand becomes real constraint in this setting. Main departure of the
Bhaduri and Marglin model from the General Theory is the assumption of real
wage being exogenous. There are two justifications of this assumption. First, in
an open economy, exogenous variations in the real wage may become feasible
through such policies as adjustment in the exchange rate. Second, changes of the
real wage are determined not only by market forces but to a large extent by the
change in economic policies and in the institutional and legal environment.
Exogeneity of real wage allows us to observe how its variations affect individual
factors of effective demand – consumption, investment and net export (we omit
government consumption as it behaves rather autonomously). The effect of wage
increase can affect output in both ways as it not only increases marginal cost but
also increases purchasing power of employees whose propensity to consume is

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[2] Average total industry capacity utilization in the US and EA after the crisis is around 80%.

assumed to be higher than propensity to consume out of profit. If an increase in real wage (income distribution shifts in favor of labor) leads to higher output growth we say that this economy is wage-led, otherwise we say that it is profit-led.

In the first part of the analysis (demand side) we assume that productivity is constant which means that wage share changes coincide with wage changes.

In the second part (productivity side) we examine relationship between real wage and productivity.

Then assuming, that demand equals supply in equilibrium, allows us to determine a combined effect of wage changes on output and productivity. Hein and Vogel (2008) estimated the effects of a change in income shares for 6 OECD countries. Onaran and Galanis (2012) determined a type of the demand side regime for all major economies of the world, both advanced and emerging. They estimated an effect of a change in income shares not only in each country separately, but also a combined effect of a simultaneous change in all countries. Combining demand and productivity sides Naastepad (2006) argues how a policy of real wage restraint has failed to raise output and productivity growth in the Netherlands between 1960 and 2000. In our paper we analyze demand and productivity sides of two very different economies – small open economy of Slovakia and a large almost closed economy of Euro area. We also estimate demand regime of Slovakia's trading partners, among them some central European countries that are new EU members and for which, to our knowledge, this type of estimates has not been carried out yet. We compare, and contrast results with old EU member states.

Before we proceed we should mention some limitations of our analysis stemming mostly from dataset restrictions. First, we estimate single equations and neglect possible interactions among estimated variables. Second, our approach does not include any effects of investment and output growth on income distribution. Third, we do not include monetary factors in determination of the components of aggregate demand. We believe that despite these shortcomings our analysis gives valuable insight into relationship between income distribution and economic growth in the countries under investigation.

1. The Model

1.1. Demand Regime

In this section we briefly describe a Post-Keynesian model based on Bhaduri and Marglin (1990) which analyzes the effect of income distribution on effective demand. We assume that the potential rate of output growth depends on the

growth rate of demand through higher capacity utilization and through induced technological progress. Let the total income Y be distributed to labor in the form of wages W and to owners of capital in the form of profits R and that $Y = W + R$. All variables are in real terms. Income distribution is represented by wage share v defined as $v = W / Y$. When wage share increases that means that income inequality is declining. Profit share h defined as $h = R / Y$ is a complement of v so that $v + h = 1$. Aggregate demand Y is the sum of consumption C, investment I and net export $NX = E - M$, where E is export and M import. We omit public consumption as it behaves rather autonomously, but in order to keep identity (1) balanced, we consider it as a subset of consumption. Aggregate demand then is:

$$Y = C(v,\ Y) + I(v,\ Y) + E(v,\ Y_f) - M(Y) \tag{1}$$

This form of aggregate demand is rather general. Most models used in mainstream economics pay small attention to the effect of income distribution on consumption and investment. Only export is affected by real unit labor cost (which is closely related to wage share) in these models since higher labor cost reduces competitiveness of domestically produced goods. Next, we describe each component of aggregate demand in more detail.

Consumption

Consumption is a function of wage and profit incomes and we assume this function to have a standard constant elasticity form:

$$C = W^{c_W} R^{c_R} = v^{c_W} (1-v)^{c_R} Y^{(c_W + c_R)} \tag{2}$$

c_W and c_R are the average propensities to consume out of wage and profit, respectively. Thus a 1 percentage-point increase of wages increases consumption by c_W percentage-points and a 1 percentage-point increase of profit increases consumption by c_R percentage-points. The Kaleckian assumption that $c_W > c_R$ would guarantee that consumption increases when wage share rises.

Investment

We assume that investment depends positively on demand (output) and on the profit share. The first relationship is well-known accelerator effect when higher aggregate demand growth causes higher demand of capital equipment. The positive effect of the profit share on investment can be justified by thinking of h as the expected rate of return on a new investment. We assume the investment function to have the following constant elasticity form:

$$I = h^{\psi_1} Y^{\psi_2} = (1-v)^{\psi_1} Y^{\psi_2} \tag{3}$$

ψ_1 is the elasticity of investment with respect to profit share and ψ_2 the elasticity of investment with respect to demand (output).

Export

Export is assumed to be a positive function of foreign demand Y_f and a foreign real unit labor cost v_f and a negative function of real unit labor cost (wage share[3]) v:

$$E = Y_f^{\varepsilon_0} \left(\frac{v_f}{v} \right)^{-\varepsilon_1} \tag{4}$$

ε_0 is the elasticity of export with respect to foreign demand and ε_1 is the elasticity of export with respect to relative real unit labor cost.

Import

We assume that import does not depend on income distribution and is positive function of domestic demand:

$$M = Y^{\xi} \tag{5}$$

ξ is the elasticity of import with respect to domestic demand.

Substituting (2) – (5) into (1) we get the resulting model of aggregate demand of an open economy with wage share taken as an exogenous variable. There is no feedback from output growth to income distribution, for example via lower unemployment and better bargaining power of employees (Stockhammer, Onaran and Ederer, 2009).

In order to assess the impact of wage share variations on aggregate demand in the short- and long-run we take total differential of *Y* with respect to v:

$$\frac{dY}{dv} \left(1 - \frac{\partial C}{\partial Y} - \frac{\partial I}{\partial Y} + \frac{\partial M}{\partial Y} \right) = \frac{\partial C}{\partial v} + \frac{\partial I}{\partial v} + \frac{\partial E}{\partial v} \tag{6}$$

The expression on the right hand side of the equation (6) represents a short--run effect of the change of wage share on aggregate demand given a certain level of wage. We suppose that $\frac{\partial C}{\partial v} > 0$ and $\frac{\partial I}{\partial v} < 0$, $\frac{\partial E}{\partial v} < 0$. It is not possible to identify the sign of that expression and it needs be determined empirically. If this sign is positive we say that demand regime is wage-led, otherwise we call it profit-led.

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[3] The exact relationship between wage share and real unit labor cost is explained later in the text.

$H \equiv 1 \Big/ \left(1 - \left(\dfrac{\partial C}{\partial Y} + \dfrac{\partial I}{\partial Y} - \dfrac{\partial M}{\partial Y} \right) \right)$ is a standard multiplier which has to be

positive for stability. The product of the right hand side of (6) with this multiplier gives a long-run effect of the change of wage share on aggregate demand. Substituting (2) – (5) into (6) and writing expression in the form of growth rates $\left(dX \big/ X = \widehat{X} \right)$ gives an equation that is going to be used in our empirical analysis.

$$\hat{Y}\left[1 - \left(c_W + c_R \right) \frac{C}{Y} - \psi_2 \frac{I}{Y} + \xi \frac{M}{Y} \right] = \left[\left(c_W - c_R \frac{\upsilon}{1-\upsilon} \right) \frac{C}{Y} - \psi_1 \frac{\upsilon}{1-\upsilon} \frac{I}{Y} - \varepsilon_1 \frac{E}{Y} \right] \hat{\upsilon} \quad (7)$$

This equation can be written in the following simplified form:

$$\hat{Y} = HA\hat{\upsilon} \qquad (8)$$

where H is the multiplier and A is bracketed expression on the right hand side of (7). Because H is positive, a sign of A determines the character of demand regime. If A is positive (negative) the growth regime is wage-led (profit-led).

1.2. Productivity Regime

Let us denote λ labor productivity (the real output Y divided by total employment) and w real wage (total real wages W divided by number of employees). We assume the following á la Kaldor (1996) relationship between growth rate of labor productivity and growth rates of demand and real wage:

$$\hat{\lambda} = \beta_0 + \beta_1 \hat{Y} + \beta_2 \hat{w} \; ; \; \beta_1 > 0, \; \beta_2 > 0 \qquad (9)$$

The positive effect of demand on productivity, known in the literature as Verdoorn's law, can be justified by several mechanisms (Dray and Thirlwall, 2010). First, a great deal of technological progress is demand driven via accelerated capital accumulation. Expansion of goods market makes it profitable to use more sophisticated machinery, which cuts cost. This not only reduces the price of goods but also the price of machinery, if there are economies of scale in its production. This further encourages the use of machinery in other activities. Secondly, there is an effect of learning by doing, the more output produced, the more adept labor becomes at its production.

The positive effect of real wage on productivity, known as the induced technological progress hypothesis, can be justified by the following channels – first, more expensive labor forces firms to adopt labor productivity enhancing procedures and techniques and second, more expensive labor pushes less efficient firms out of the market, thereby increasing aggregate productivity (Lavoie, 1992).

Equilibrium

Before combining demand and productivity regimes one should realize that labor share υ is a ratio of real wage w and labor productivity λ:

$$\upsilon = \frac{w}{\lambda} \tag{10}$$

In terms of growth rates this relationship can be written:

$$\hat{\upsilon} = \hat{w} - \hat{\lambda} \tag{11}$$

Then the equation (8) takes the form:

$$\hat{Y} = HA(\hat{w} - \hat{\lambda}) \tag{12}$$

Taking into account our original assumption that real wage w (or its growth rate $\hat{w}$) is exogenous then equations (9) and (12) represent a system of two equations with two endogenous variables – growth rates of real output $\hat{Y}$ and labor productivity $\hat{\lambda}$. Except w there is actually one more exogenous variable that drives the system – growth rate of foreign demand $\widehat{Y_f}$ that occurs in the export equation (4).

Taking differential of export E with respect to Y_f and substituting it into (12) we get:

$$\hat{Y} = H\left(A\left(\hat{w} - \hat{\lambda}\right) + \varepsilon_0 \frac{E}{Y}\widehat{Y_f} \right) \tag{13}$$

For a given values of exogenous variables $\hat{w}$ and $\widehat{Y_f}$ the system represented by (9) and (13) can be depicted in ($\hat{\lambda}$, $\hat{Y}$) plane. Productivity regime (PR) is represented by an upward sloping line in the ($\hat{\lambda}$, $\hat{Y}$) plane with the slope of $\frac{1}{\beta_1}$ and demand regime (DR) is pictured as a line with the slope equal to $-HA$; that is if the demand regime is wage-led (profit-led) the line is downward (upward) sloping.

The intersection of PR line with DR line represents equilibrium values of growth rates of labor productivity $\widehat{\lambda_E}$ and real output $\widehat{Y_E}$ in a demand driven growth model (9) and (13). How can an economy, described by this model, return back to its equilibrium if it is disturbed? Suppose that productivity growth is below its equilibrium value at $\widehat{\lambda_1}$ in Figure 1.

F i g u r e   1
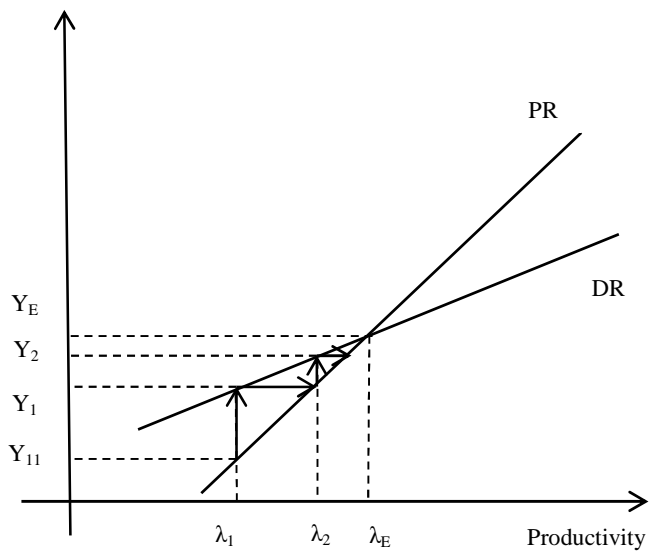
Wage-led

Output
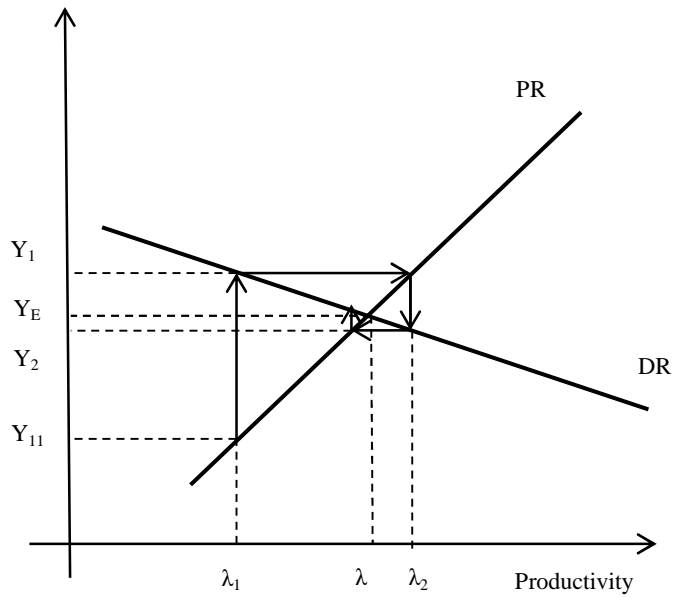
Source: Naastepad (2006); own drawing.

F i g u r e   2

Profit-led

Output

Source: Naastepad (2006); own drawing.

Then the rate of growth of demand $\widehat{Y}_1$ that is allowed for this productivity growth is higher than the growth rate of output $\widehat{Y}_{11}$ corresponding to productivity growth $\widehat{\lambda}_1$. Because factory is motivated to produce and sale more (output is demand driven) it adjusts to $\widehat{Y}_1$. This value of demand growth increases productivity growth, due to Verdoorn effect, to $\widehat{\lambda}_2$. Higher productivity growth, keeping wage growth constant, reduces wage share growth. If demand is wage-led as in Figure 1, the output growth declines to $\widehat{Y}_2$ and the economy is swirling to its equilibrium. If demand is profit-led, as in Figure 2, lower wage share growth increases output growth to $\widehat{Y}_2$ and the economy converges stair-wise to its equilibrium.

Equating growth rates of demand in PR and DR gives the equilibrium values of labor productivity growth and output growth in terms of growth rates of exogenous variables – real wage and foreign demand.

$$\hat{\lambda} = \frac{\beta_0}{\beta_1 HA + 1} \; + \; \frac{\beta_1 HA + \beta_2}{\beta_1 HA + 1}\hat{w} \; + \; \frac{\beta_1 \varepsilon_0 H \dfrac{E}{Y}}{\beta_1 HA + 1}\widehat{Y}_f \tag{14}$$

$$\hat{Y} = -\frac{\beta_0 HA}{\beta_1 HA + 1} \; + \; HA\frac{1 - \beta_2}{\beta_1 HA + 1}\hat{w} \; + \; \frac{\varepsilon_0 H \dfrac{E}{Y}}{\beta_1 HA + 1}\widehat{Y}_f \tag{15}$$

Data and Estimation Methodology

We analyze the effects of a change of income distribution on consumption, investment, export, import and productivity. There are two reservations in our empirical approach that should be addressed. First, real wage, as mentioned above, is assumed to be exogenous, but in reality, it is not. There is undoubtedly feedback from output growth to real wage mediated by employment, for example. Secondly, we estimate each equation separately despite the fact, that consumption, investment and net export are not independent as they add up to output. We permit these methodological shortcomings as they allow the use of simpler econometric techniques that are, due to data limitations, more suitable for the estimation. On the positive side of this approach is the interpretational ease of empirical results.

Unit root test indicates that almost all variables are integrated of the order one hence cointegration would be an appropriate estimation technique. But in majority of cases there is no indication of cointegration, apparently due to the fact, that the time span of most series is too short (1993 – 2016 for the Euro area and the

new EU members). Thus, an unrestricted autoregressive distributed lag (ARDL) model is estimated to infer the best specification. The difference form specification turns out to be the most appropriate in most cases. Long-term elasticities are calculated by adding up the coefficients of the contemporaneous and lagged variable (if they are statistically significant) divided by "1 minus the coefficient of the lagged dependent variable" (if it is statistically significant). We test for serial correlation and wherever it occurs we use either the lagged independent variable (even if it is insignificant) or add AR(1) term.

Annual time series from AMECO database have been used, starting from 1960 for old European Union countries and from 1995 for EU newcomers until 2016 (last two years are forecasts). The detailed definition of aggregates used in estimation can be found in the appendix.

2. Empirical Results

2.1. Demand Regime

Our main focus are empirical results for Slovakia and the Euro area and we analyze them in detail in the next section. The detailed analysis of a demand regime in a particular economy requires empirical estimates of export functions of its main trading partners. Among main trading partners of Slovakia belong three central European countries – the Czech Republic, Poland and Hungary and six old EU members – Germany, Austria, France, Italy, UK and Netherland. Combined export to these 9 countries accounts for 74% of total Slovak export. In addition to our main focus (analysis of Slovakia and the Euro area), we partially analyze also growth regimes of these countries (demand side), which then allows a comparison between new EU members and old ones. First, using estimated elasticities of demand variables with respect to wage share we describe short-run effects of total demand on income redistribution, i.e. we determine which kind of demand regime prevails in each country. Second, using elasticities of demand variables with respect to output we calculate vales which they converge to in the long-run.

Consumption

The estimated consumption function is of the form given in equation (2). Consumption is regressed on adjusted wage[4] and its complement – profit. For econometric reason the variables enter estimation in logarithmic form. Table 1 reports the estimation results – propensities to consume out of profit and wage,

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[4] Adjusted wage is a product of adjusted wage share and real GDP. Adjusted wage share is a ratio of compensation of employees to nominal GDP multiplied by a ratio of total employment to number of employees.

respectively, and marginal effects of income redistribution on consumption to GDP ratio.[5]

T a b l e 1

The Marginal Effect of a 1 Percentage Point Increase in the Wage Share on C/Y

	SK	CZ	PL	HU	DE	AT	FR	IT	NL	UK	EA
Cr	0.25**	0.12	0.29***	0.19**	0.12**	0.18***	0.19***	0.21***	0.15***	0.21***	0.14
Cw	0.66***	0.58***	0.65***	0.83***	0.85***	0.74***	0.77***	0.81***	0.72***	0.85***	0.87***
C/Y	0.46	0.44	0.22	0.49	0.54	0.28	0.27	0.4	0.27	0.33	0.56

Source: Own calculations.

The assumption that guarantees the effect of redistribution of income on consumption is empirically verified. Propensities to consume out of profit are markedly lower then propensities to consume out of wage in all countries. To convert propensities (i.e. elasticities) to marginal effects[6] we use sample averages of the corresponding variables. Thus, for example, consumption propensities of 0.19 and 0.83 respectively, for Hungary gives consumption differential of 0.49. This means that a redistribution of 1 p.p. of GDP from profit to wages would induce additional consumption of 0.49 p.p. of GDP. The elasticities for other countries are similar in magnitude which means that in all countries a redistribution of income from profit to wages would lead to consumption increase.

Investment

Investment function (3) is estimated by regressing investment on adjusted wage share and demand. Table 2 reports estimates of elasticities of investment with respect to profit and marginal effects of a redistribution of 1 p.p. of GDP from profit to wages on an investment to GDP ratio.

T a b l e 2

The Marginal Effect of a 1 Percentage Point Increase in the Wage Share on I/Y

	SK	CZ	PL	HU	DE	AT	FR	IT	NL	UK	EA
$\Psi 1$	0.07***	0.43	0.8	0.75*	0.46**	0.13	0.16*	0.29*	0.23*	0.28**	0.36*
I/Y	−0.03	−0.23	−0.39	−0.4	−0.27	−0.1	−0.11	−0.16	−0.16	−0.17	−0.21

Source: Own calculations.

All elasticities have expected sign which means that redistribution from profits to wages would induce reduction in investment and consequently GDP.

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[5] Stars above numbers in tables indicate a significance level: *** significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

[6] This is the conversion from elasticities to marginal effects: $\dfrac{dC}{dW} = c_W \dfrac{C}{W} - c_R \dfrac{C}{R}$.

Export

Export is regressed on foreign demand and domestic real unit labor cost, which actually coincides with adjusted wage share. In this section we keep RULC of a country's trading partners constant. Foreign demand is proxied by GDP of the EU reduced by country's own GDP.

Table 3 reports elasticities of export with respect to domestic RULC and marginal effects of a 1 p.p. increase of RULC (an increase of wage share) on export to GDP ratio.

T a b l e 3

The Marginal Effect of a 1 Percentage Point Increase in the Wage Share on E/Y

	SK	CZ	PL	HU	DE	AT	FR	IT	NL	UK	EA
ε1	−1.25**	−1.11*	−1.42***	−1.14*	−1.25***	−0.62**	−1.42***	−0.70**	−0.51**	−0.57***	−1.52**
E/Y	−2.4	−1.19	−0.85	−1.17	−0.55	−0.33	−0.4	−0.21	−0.39	−0.18	−0.34

Source: Own calculations.

Export is quite sensitive to an increase of RULC (lower competitiveness) in most countries, as elasticities are bigger than 1 (in absolute terms). This is especially true for all new EU member states where a 1 p.p. increase of RULC decreases ratio of export to GDP by more than 1 p.p. This is because all these economies are very open and export plays a dominant role there. While elasticities for Germany, France and the Euro area are also bigger than 1, the effect of an increase of RULC on export to GDP ratio in these economies is mitigated by relatively lower value of export to GDP ratio.

Total Effects in the Short-run

Table 4 puts together partial results presented above. The first line represents an effect of 1 p.p. increase of wage share on domestic demand. With the exception of Poland, the positive effect of higher consumption dominates the negative effect of lower investment. Thus, domestic sector in these economies is wage-led; redistribution from profit to wage increases domestic demand (not so in Poland).

T a b l e 4

The Marginal Effect of a 1 Percentage Point Increase in the Wage Share on the Total Demand

	SK	CZ	PL	HU	DE	AT	FR	IT	NL	UK	EA
(C + I)/Y	0.43	0.2	−0.16	0.09	0.27	0.18	0.16	0.23	0.11	0.16	0.35
(C + I + E)/Y	−1.97	−0.98	−1.02	−1.09	−0.28	−0.15	−0.24	0.02	−0.28	−0.02	0.01

Source: Own calculations.

However, adding the effect of export, the character of demand regime changes in almost all countries, their total demand becomes profit-led, with the exceptions of Italy and the Euro area. This is especially true for three central European economies where the impact of 1 p.p. increase in wage share reduces total demand by more the 1 p.p.

We should emphasize here that these outcomes are made under the assumption that RULC increases only in one country and stays constant in country's trading partners. In reality this is not the case as countries usually compete with each other to increase their market share. The effects of parallel increases of RULC in country's trading partners are estimated for Slovakia and the Euro area in the next chapter.

Total Effect in the Long-run – Multiplier Effect

In this section we calculate the multiplier effects of the change of excess private demand on the long-run value of aggregate demand. These calculations should be taken with caution for two reasons (see Stockhammer, Onaran and Ederer, 2009). First, as the long-run value of aggregate demand is an equilibrium concept, the exogeneity assumptions of real wage and wage distribution are rather restrictive. Second, the value of multiplier is very sensitive to the estimates of elasticities of components of demand with respect to output that are listed in Table 5.

T a b l e 5

Elasticities of C, I and M with respect to Y and the Multiplier

	SK	CZ	PL	HU	DE	AT	FR	IT	NL	UK	EA
Cr + Cw	0.91	0.69	0.94	1.02	0.97	0.92	0.96	1.02	0.87	1.07	1.01
Ψ_2	0.59***	1.05***	0.41	1.14***	1.60***	1.54***	1.52***	1.43***	1.63***	0.81	1.88***
ξ	1.84***	2.63***	2.21***	1.84***	1.01***	1.94***	1.92***	2.01***	1.63***	1.75***	2.72***
H	0.5	0.57	0.85	0.76	2.62	1.22	1.91	2.06	1.00	1.63	1.03

Source: Own calculations.

Long-run elasticities of consumption – $(c_W + c_R)$ are close to a plausible, in the literature frequently cited value of 1, in all countries. Elasticities of investment – ψ_2 are rather small for Slovakia and Poland, and are above the benchmark value of 1 in other countries. Elasticities of import – ξ, oscillate about the value of 2. Marginal effects of a change of output on consumption, investment and import are evaluated at the sample averages of particular variables (see footnote 6). Total multiplier H is then calculated according to equation 7. Multipliers of all countries, except Central European ones, are bigger than 1, which is in line with estimates in other literature. Closer look at the reason why multipliers of Central European countries are smaller than 1 discloses that marginal effect of

import is the main culprit. Although elasticities of imports in Central European countries do not differ from elasticities of other countries, negative marginal effect of import that reduces value of multiplier is caused by much higher ratio of import relative to GDP in these countries. Higher demand induces almost as high increase of import which eventually reduces the impact on an equilibrium value of output.

Table 6 reports a long-run effect of a 1 percentage point increase in the wage share on the total demand which is a product of short-run effect from Table 4 and a multiplier from Table 5 for each country. Although a character of demand regime does not change because all multipliers are positive, the long-run value either increases or decreases depending weather multiplier is bigger or smaller than 1.

T a b l e 6

The Long-run Effect of a 1 Percentage Point Increase in the Wage Share on the Total Demand

	SK	CZ	PL	HU	DE	AT	FR	IT	NL	UK	EA
(TD/Y)*H	−0.98	−0.56	−0.87	−0.83	−0.73	−0.18	−0.46	0.04	−0.28	−0.03	0.01

Source: Own calculations.

Thus, for example, a 1 percentage point increase in the wage share in the Czech economy reduces equilibrium income by 0.56 p.p. of GDP and in the Euro area the same increase of wage share increases income by 0.01 p.p., in the long--run. The Czech economy is profit-led while Euro area is wage-led.

3. Demand and Productivity Regimes for Slovakia and the Euro Area

3.1. Demand Regime

In this paragraph we focus on two economies – Slovakia and the Euro area, analyze their demand and productivity regimes and evaluate how the growth rates of output and productivity depend on wage and foreign output in equilibrium. The demand regime in these two countries is summarized in Table 7.

T a b l e 7

The Marginal Effect of a 1 Percentage Point Increase in Rulc

	C/Y	I/Y	E/Y	TD	H	(TD/Y)*H
SK	0.46	−0.03	−2.4	−1.97	0.5	−0.98
EA	0.56	−0.21	−0.34	0.01	1.03	0.01

Source: Own calculations.

If wage share in Slovakia increases by 1 percentage point then C/GDP increase by 0.46 p.p., I/GDP decreases by 0.03 p.p. and Ex/GDP decreases by 2.4 p.p. Hence total demand decreases by 1.97 p.p. in the short-run and 0.98 p.p. in the long-run (multiplier is smaller than 1). So Slovak domestic demand is wage-led but its total demand is profit-led. Both Euro area demand regimes – domestic and total are wage-led, 1 percentage point increase of wage share increases total demand by 0.01 p.p. in the short-run and, also in the long-run because multiplier is very close to 1.

We can see that export plays a major role in determining a character of the demand regime in Slovakia (also in other small open economies). This dominance is magnified by the assumption that RULC increases only in one country and stays unchanged in country's trading partners. Now we want to evaluate how is an impact of an increase in unit labor cost in domestic country mitigated by an impact of simultaneous increases of labor costs of its trading partners. We carry out this estimation for Slovakia and the Euro area. To do so, we need to include trading partners of these countries. For Slovakia these are – Germany, Czech Republic, Poland, Hungary, Austria, France, Italy, UK and Netherland. Combined export to these countries accounts for 74% of total Slovak export. For the Euro area we include China, USA, UK, Japan, Switzerland, Poland and Czech Republic. Combined export to these countries accounts for 61% of total Euro area export.

Export function defined by the equation (4) is estimated by regressing export on foreign demand, on the difference of domestic and foreign RULC and on the nominal effective exchange rate. Foreign demand and foreign RULC are the weighted averages of trading partners' GDP and RULC, respectively. Parallel increases of RULC in a domestic economy and in its trading partners' economies can make domestic economy more or less competitive, depending on the ratio of domestic and foreign wage shares. Table 8 reports marginal effects of a 1 percentage point simultaneous increase of wage shares (RULC) on total demand and its components relative to GDP in the short-run and, also in the long-run (last column).

T a b l e 8

The Marginal Effect of a 1 Percentage Point Parallel Increase in Rulc

	C/Y	I/Y	E/Y	TD	H	(TD/Y)*H
SK	0.46	–0.03	–0.49	–0.06	0.5	–0.03
EA	0.56	–0.21	0.03	0.38	1.03	0.39

Source: Own calculations.

Slovak export still decreases when RULC increases in domestic and foreign countries but by much less than before. Now a simultaneous 1 percentage point increase of RULC decreases total demand by 0.06 p.p. in the short-run and by

0.03 p.p. in the long-run. Slovak total demand is only slightly profit-led. But the number is so close to zero that we should say that Slovak demand regime is neutral to an increase of wage share when the same increase occurs simultaneously in its trading partners. Wage-led regime of the Euro area is strengthened by simultaneous increases of RULC, a 1 percentage point parallel increase of wage shares increases Euro area total demand by 0.38 p.p. in the short- and by 0.39 p.p. in the long-run.

3.2. Productivity Regime

Productivity function defined by the equation (9) is estimated by regressing growth rate of labor productivity on growth rates of demand-driven output and real wage. The estimation results for Slovakia and the Euro area are reported in Table 9.

T a b l e 9

The Marginal Effect of a 1% Increase in GDP and Real Wage on Productivity

	β_1 (GDP)	β_2 (w)
SK	0.64***	0.21*
EA	0.31***	0.63***

Source: Own calculations.

All estimated coefficients are statistically significant, and all are, with accordance of our assumptions, positive. The estimated Verdoorn's coefficients β_1 entailing an impact of demand-driven output growth on labor productivity growth are close to the value of 0.5, obtained in most econometric studies of this subject. The induced technological progress coefficient β_2 for Slovakia indicates that a 1 p.p. increase in growth rate of real wage increases labor productivity growth by 0.21 p.p. while in the case of the Euro area it is 0.63 p.p.

However, the coefficients from Table 9 can't be reliably used to compute the equilibrium because there is a problem of simultaneity. GDP as one of the explanatory variables is correlated with the dependent variable – productivity and hence these estimates may be biased. The next section deals with this problem.

Equilibrium

Real wage in our setting is an exogenous variable determined as the outcome of negotiations between firms and labor unions, institutional arrangements of an economy and government policies. We investigate what happens to output and productivity growth when the real wage growth increases by 1 p.p. The key variable in the model is wage share. The effect of real wage growth on wage share is not definite because real wage affects also productivity. Although higher wage

growth increases wage share, higher labor productivity reduces it because one unit of labor now generates more units of output which reduces unit labor cost, i.e. wage share. To assess the effect of wage growth (and also the effect of foreign demand growth – the other exogenous variable that enters the model through export) on output and productivity growths in an economy, we need to put together its productivity and demand regimes. The model is represented by the equations (9) and (13) and the algebraic solution of equilibrium values of labor productivity and output growths is given by the equations (14) and (15). However, as mentioned above, calculated values may be biased. But because no endogenous variables appear as independent variables in these reduced form equations, each reduced form equation can be estimated by OLS. These estimates are consistent and unbiased and approximate long-run multipliers (elasticities) of productivity and GDP with respect to real wage and foreign demand, respectively. Table 10 presents the results for two economies – Slovakia and the euro area.

T a b l e 10

The Equilibrium

	prod/w	prod/Y^f	GDP/w	GDP/Y^f
SK	0.55***	0.54***	0.56***	0.77***
EA	0.71***	0.11*	1.73***	0.13

Source: Own calculations.

In an equilibrium a 1 p.p. increase of growth rate of real wage in Slovakia increases labor productivity growth by 0.55 p.p. and growth rate of output by 0.56 p.p., while an increase of foreign demand by a 1 p.p. increases productivity by 0.54 p.p. and output by 0.77 p.p. In the Euro area, a 1 p.p. increase of wage growth rate increases labor productivity by 0.71 p.p. and GDP growth rate by 1.73 p.p., while 1 p.p. increase of growth rate of foreign demand increases productivity growth rate by 0.11 p.p. and output growth by 0.13 p.p. Comparing these two economies, changes in real wage in the Slovak economy have similar effect as changes in foreign demand. In a large and relatively closed economy of the Euro area, changes in real wage outweigh changes in foreign demand whose impact is very small.

The Crisis of 2009

The financial and economic crisis triggered by the fall of Lehman Brothers on September 2008 has spread to Europe in 2009 and caused economic decline in almost all European countries. Slovak economy was particularly hard hit and although it has recovered since then the recovery period seems to be characterized by different dynamics from the one before the crisis. The year 2009 seems

to be a structural break in the Slovak economic development whose dynamics has significantly slowed down. This can be demonstrated in Table 11 that shows the average growth rate of key macroeconomic variables of the Slovak economy before and after the crisis.

T a b l e 11

Average Growth Rate

	GDP	Prod	Foreign dem.	Real wage
1993 – 2008	5.12	4.53	2.7	3.74
2009 – 2016	1.64	1.5	0.34	1.63
Difference	–3.5	–3.0	–2.4	–2.1

Source: Own calculations.

Growth rate of real wage decreased on average by 2.1 p.p. between periods before and after 2009, while the growth rate of foreign demand dropped by 2.4 p.p. Table 12 presents the model estimates of changes to growth rates of GDP and productivity caused by a decline of growth rates of real wage and foreign demand of the magnitudes mentioned above.

T a b l e 12

Estimated Growth Rate

	w	Y^f	Total
prod	–1.2	–1.3	–2.5
GDP	–1.2	–1.8	–3.0

Source: Own calculations.

According to the model the total 2.5 p.p. reduction of growth rates of labor productivity has been caused almost equally by the drop of growth rate of foreign demand (1.3 p.p.) and by decline of real wage growth (1.2 p.p.). The total reduction of 3 p.p. of GDP growth has been generated by lower foreign demand (1.8 p.p.) and to a lesser extent by the drop of real wage (1.2 p.p.). Table 11 shows that actual reductions of the growth rate of labor productivity and GDP have been 3 p.p. and 3.5 p.p., respectively (against the model estimated values of –2.5 p.p. and –3.0 p.p.).

Conclusion

Current economic situation in most countries is characterized by declining wage share accompanied by lower economic activity. This paper explores a relationship between these two phenomena, fully in two economies – small open

economy of Slovakia and large economy of the Euro area and partially in countries that are major trading partners of Slovakia – Germany, Czech Republic, Poland, Hungary, Austria, France, Italy, UK and Netherland.

Wages play a dual role in market economies; they are a cost of production as well as a source of demand. Higher wage increases cost of production and might have a negative impact on it while at the same time increases purchasing power of the majority of population that has a positive effect on demand and production. Which of these two factors dominates in a particular country depends on its historic, cultural, economic and institutional characteristics. A country is wage-led if increased wage share leads to higher output and is profit-led otherwise. Our empirical estimates put forward the following findings. Domestic private demand in all economies under the study, except for Poland, is wage-led; higher consumption gain induced by wage share increase exceeds investment loss. Thus, policies leading to wage share increases are beneficial for enhancing domestic demand in these countries. A character of demand regime changes in most countries when export is included. Total demand i.e. domestic demand plus export becomes profit-led almost in all countries, except Italy and the Euro area. For large economies, like the Euro area, export forms only a small part of aggregate demand and therefore positive effects of decline of wage share on export do not suffice to offset negative effects on domestic demand. This does not hold for other countries in our study. When export is included aggregate demand of these countries becomes profit-led. This is mainly true for Central European countries with large foreign trade. Profit-led countries may be enticed to pursue export-led policies of lowering labor cost in order to vitalize their economic activity.

But the estimates determining a country's demand regime character have been carried out under the assumption that wage share is changed just in the domestic economy and stays unchanged in trading partners' economies. If, however, countries start to pursue export-led policies of cutting export prices through cutting costs of production, the effect of lowering labor cost in one country is likely to be mitigated by the same policies applied in trading partners' countries. We estimated the effect of simultaneous changes of labor cost for Slovakia and the Euro area and our calculations confirm this conjecture in both countries. The simultaneous decrease of labor cost lessens positive effect of export. Slovak economy remains profit-led even in case its trading partners emulate export-led policies of lowering labor cost, but the overall effect of labor cost reduction on economic activity is much lower. The demand regime in Slovakia becomes "less profit-led" while that of the Euro area becomes "more wage-led".

Even profit-led country (say Slovakia) can benefit from pro-labor policies if similar policies are implemented by its wage-led trading partner (say the Euro

area) via multiplier effect. Negative short-run impact of simultaneous wage share increases on Slovak aggregate demand can be surpassed by positive impact on Euro area economic activity and so higher foreign demand in the longer-run.[7]

Estimates on the supply-side effects of an increase of wage share have been carried out for Slovakia and the Euro area. They show that wage increase has positive effect on labor productivity in both economies. The estimates also verify the Verdoorn's effect entailing a positive impact of demand-driven output growth on labor productivity growth. But these estimates might be biased.

In equilibrium, a simultaneous long-run effect of exogenous shocks on both output and productivity is estimated. The Slovak economy becomes wage-led due to inclusion of a positive impact of a wage increase on productivity. Both shocks – real wage and foreign demand have almost equal impact on productivity and output growth. In the case of the Euro area it is the growth of real wage that is behind productivity and output growth, the effect of foreign demand is minimal.

Our analysis indicates that both economies under consideration are wage-led on average in the period 1993 – 2017 and hence it appears to be beneficial to pursue policies that would reduce income inequality.

The model has been applied to estimate structural changes in growth rates of key Slovak macroeconomic variables before and after the 2009 crises. The actual average reduction of 3 p.p. of labor productivity and 3.5 p.p. of output growth rates have been approximated by model outcomes of 2.5 p.p. and 3 p.p. reductions, respectively.

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[7] These types of estimates were not conducted in this paper because this would require to examine demand regimes of the Euro area trading partners.

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A p p e n d i x

Data Definitions and Data Source

C   Final Consumption Expenditure (Bil.2010.EUR-SKK), obtained directly from AMECO

I   Gross Fixed Capital Formation (Bil.2010.EUR-SKK), obtained directly from AMECO

E   Exports of Goods & Services (Bil.2010.EUR-SKK), obtained directly from AMECO

M   Imports of Goods & Services (Bil.2010.EUR-SKK), obtained directly from AMECO

Y   GDP at constant (Bil.2010.EUR-SKK) Factor Cost, calculated as a ratio of GDP at Current Factor Cost (Bil.SKK-EUR) and GDP Price Deflator (NAC, 2010 = 100)

v   Adjusted wage share, total economy, defined as compensation per employee divided by GDP at current factor cost per person employed, obtained directly from AMECO

H   Adjusted profit share calculated as 1 minus adjusted wage share

w   real wage, defined as compensation per employee divided by private final consumption price deflator, obtained directly from AMECO

λ real labor productivity, defined as GDP at constant prices per person employed, obtained directly from AMECO

Y^f Foreign demand, calculated as a weighted average of GDP at constant prices of a country's trading partners