Comparative Economic Research. Central and Eastern Europe
Volume 25, Number 3, 2022
https://doi.org/10.18778/1508-2008.25.20

COPE
Member since 2018
JM13708

A Comparison of the Effects of Capital and Labour Taxes in CEE Countries

Piotr Krajewski https://orcid.org/0000-0002-5377-9578
Ph.D., Associate Professor at the University of Lodz, Faculty of Economics and Sociology, Department of Macroeconomics, e-mail: piotr.krajewski@uni.lodz.pl

Katarzyna Piłat https://orcid.org/0000-0002-9364-8863
Ph.D., Assistant Professor at the University of Lodz, Faculty of Economics and Sociology, Department of Economic Mechanisms, e-mail: katarzyna.pilat@uni.lodz.pl

Abstract

The aim of the article is to quantify and compare the impact of capital and labour tax on the economies of Central and Eastern Europe (CEE). The impulse-response functions presented in the paper show that output reacts differently to changes in the taxation of labour and capital. Although there is some heterogeneity in the magnitude and persistence of tax effects between the analysed CEE countries, the simulations generally indicate that the negative impact of increased capital taxation on GDP is stronger than for labour taxation. More importantly, however, the negative effects of higher taxation on capital are more persistent than in the taxation of labour. This is largely because higher capital taxation strongly reduces savings and the desired stock of capital, which has important long-term macroeconomic consequences.

Keywords: capital tax, labour tax, CEE countries

JEL: E62, H20, H30

creative commons

© by the author, licensee University of Lodz – Lodz University Press, Lodz, Poland.
This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license CC-BY-NC-ND 4.0 (https://creativecommons.org/licenses/by-nc-nd/4.0/)

Received: 6.10.2021. Verified: 2.03.2022. Accepted: 18.05.2022

Introduction

Taxes are an indispensable element in any market economy, enabling the financing of public administration, national defence, justice, police, education, and health care, among others. However, there is another side to the same coin. Increasing taxes, with the remaining conditions unchanged, limits economic activity. The vast majority of studies indicate that an increase in tax rates has a statistically significant, negative impact on GDP (cf. Baxter and King 1993; Mertens and Olea 2018; Owen 2019; Alinaghi and Reed 2021). The negative impact of a tax increase on GDP results from two main factors. Firstly, higher taxes reduce net income, which according to the multiplier model, has a significant impact on aggregate demand and, consequently, production. Secondly, higher tax rates distort entities' decisions due to an increase in the tax wedge.

The first of the above mechanisms affects aggregate demand, regardless of the tax category. In particular, this Keynesian mechanism occurs both with lump-sum taxes and distortionary taxes, i.e. taxes that depend on labour or capital income. However, this is not valid for the supply-side mechanism.

The supply-side mechanism impacts decisions of households and firms, in particular, decisions concerning labour and saving. The supply-side effects of taxes are, therefore, crucially dependent on what kind of taxes are analysed. On the one hand, taxes on wages directly affect the tax wedge in the labour market. On the other hand, taxes on income from capital has a direct impact on the differences between net and gross income from capital. Moreover, lump-sum taxes, despite their impact on current disposable income, according to the Ricardian equivalence (cf. Barro 1974), do not influence households' microeconomic decisions and, consequently, do not have supply-side effects.

Supply-side effects are, therefore, heterogeneous. This phenomenon results from the possible distorting impact of a tax on individual decisions of microeconomic entities and not from the aggregate impact of taxes on disposable income. As a result, studies that consider the supply-side mechanisms of tax impact usually show that the effects of fiscal changes are heterogeneous, and that the results depend on, among others, the country surveyed (see, e.g. Ohanian 1997; Ardagna 2001; Romer and Romer 2010).

The article aims to quantify and compare the impact of labour and capital tax on the economies of Central and Eastern Europe (CEE). Estimations have been made for two kinds of income taxes, i.e. taxes on labour and taxes on capital. The analysis was based on a model that considers the distorting influence of these taxes on the tax wedges and consequently on entities' decisions. Estimates of the supply-side impact of individual taxes were based on a dynamic general stochastic model developed for the three CEE economies: the Czech Republic, Hungary and Poland.

The dynamic general stochastic model makes it possible to examine, compare and interpret the heterogeneity of the impact of particular types of taxes on the analysed economies. However, the simulations assume that the increase in taxation takes place *ceteris paribus*; that is, the other conditions are unchanged. Such an assumption allows for the most precise separation of the effects of individual taxes.

The value added of the paper is a two-dimensional analysis of the effects of taxes, i.e. the analysis of the heterogeneity of tax effects among CEE countries and a comparison of labour tax effects and capital tax effects.

The structure of the article is as follows. Firstly, the principles of the theoretical model and fiscal disturbances are presented. Then the effects of an increase in capital and labour tax are shown, respectively. The final section concludes.

The model

The model assumes that households are homogeneous, and that the utility of a household depends on consumption and leisure. The household utility function (u_t) takes the form:

$$u_t = \left(\frac{1}{1-\sigma_c} (C_t^j - \nu_t)^{1-\sigma_c} - \frac{(l_t^j)^{1+\sigma_l}}{1+\sigma_l} \right), \tag{1}$$

where:

C_t^j – consumption of household *j*,

ν_t – the impact of consumption habits on utility,

l_t^j – the labour of household *j*,

σ_c – the inverse of the intertemporal elasticity of consumption,

σ_l – the inverse of labour supply elasticity,

$j \in \langle 0,1 \rangle$.

Household consumption habits depend on the aggregate consumption in the previous period, in contrast to the approach where consumption habits depend on the household's previous individual consumption (cf. Christiano, Eichenbaum, and Evans 2005; Fernandez-Villaverde 2010). Thus, the impact of consumption habits on utility is determined by the equation:

$$\nu_t = a_\nu C_{t-1}\,, \tag{2}$$

where:

$a_\nu \in (0,1)$.

Households maximise the expected value of the discounted utility, so they maximise the following formula:

$$E_t \sum_{t=0}^{\infty} \beta^t u\left(C_t^j - v_t, l_t^j\right), \tag{3}$$

where:

E_t – expected value in period t,

β – discount factor,

$\beta \in (0,1)$.

The model assumes that households hold financial assets in the form of one-year bonds. Thus, given that consumption is taxed, the fiscal constraint on households takes the form of the following budget constraint:

$$P_t^B \frac{B_t^j}{P_t} + C_t^j + I_t^j = \frac{B_{t-1}^j}{P_t} + Y_t^j, \tag{4}$$

where:

P_t^B – bond price,

B_t^j – bonds held by household j,

P_t – the price level of goods and services,

I_t^j – the investments of household j,

Y_t^j – the net income of household j.

The above equation can also be written as:

$$\frac{B_t^j}{R_t P_t} + C_t^j + I_t^j = \frac{B_{t-1}^j}{P_t} + Y_t^j, \tag{5}$$

where:

R_t – nominal gross return on bonds.

The nominal gross return on bonds is defined as follows:

$$R_t = \frac{1}{P_t^B} = 1 + r_t^n, \tag{6}$$

where:

r_t^n – nominal interest rate.

The level of the nominal interest rate results from the monetary policy according to the Taylor rule (1993). Thus, monetary authorities react to deviations in output from its potential level and the deviations of inflation from the inflation target. It is assumed that the higher the level of production and inflation, the higher the interest rate set by the central bank.

The total income of households is composed of the following three types of income:

- capital income,
- labour income,
- budget transfers.

Household capital income is taxed at the tax rate τ_t^k, while income from the capital at the tax rate τ_t^l. As a result, taking into account the different types of taxation, the household's net income is determined by the formula:

$$Y_t^j = \left(1-\tau_t^k\right)\left(r_t^K u_{K,t}^j k_t^j - \Psi\left(u_{K,t}^j\right)k_{t-1}^j\right) + \left(1-\tau_t^l\right)w_t^j l_t^j, \tag{7}$$

where:

τ_t^k – the tax rate on capital,

τ_t^l – the tax rate on labour,

k_t^j – the physical capital held by household *j*,

$u_{K,t}^j$ – the utilisation rate of physical capital,

$\Psi\left(u_{K,t}^j\right)$ – costs resulting from under- or overutilisation of physical capital,

w_t^j – the real wage of household *j*.

Thus, like the works of Greenwood, Hercowitz, and Huffmann (1988) and King and Rebelo (2000), the model considers the possibility of underutilisation or overutilisation of capital. It is assumed that the degree of capital utilisation affects the efficiency of its use. The model also assumes that changes in investment involve additional costs (cf. Angeloni, Coenen, and Smets 2003; Christiano, Eichenbaum, and Evans 2005). As a result, the growth function of the investment is determined by the following formula:

$$k_t = \left(1-\delta\right)k_{t-1} + \left(1 - S\left(\frac{I_t}{I_{t-1}}\right)\right)I_t, \tag{8}$$

where:

$$S'\left(\frac{I_t}{I_{t-1}}\right)<0 \text{ for } \frac{I_t}{I_{t-1}}\in(0,1), \tag{9}$$

$$S'\left(\frac{I_t}{I_{t-1}}\right)>0 \text{ for } \frac{I_t}{I_{t-1}}>1, \tag{10}$$

$$S(1)=0. \tag{11}$$

As a result, we get the following optimisation conditions for the capital value (Q_t), the level of investment and the utilisation rate:

$$\Psi'\left(u_{K,t}\right)=r_t^K, \tag{12}$$

$$Q_t S'\left(\frac{I_t}{I_{t-1}}\right)\frac{I_t}{I_{t-1}}+\beta E_t\left(Q_{t+1}\left(\frac{C_{t+1}^j-\nu_{t+1}}{C_t^j-\nu_t}\right)^{-\sigma_c} S'\left(\frac{I_{t+1}}{I_t}\right)\frac{I_{t+1}}{I_t}\right)=1, \tag{13}$$

$$Q_t=E_t\left(\beta\left(\frac{C_{t+1}^j-\nu_{t+1}}{C_t^j-\nu_t}\right)^{-\sigma_c}\left(Q_{t+1}(1-\delta)+(1-\tau_t)\left(u_{K,t}r_t^K-\Psi'\left(u_{K,t}\right)\right)\right)\right). \tag{14}$$

The model assumes that the labour market is not perfectly competitive but monopolistically competitive. Thus, the labour provided by individual households differs, giving households some monopolistic power in the labour market. The production is influenced by the evolution of the aggregate employment index, which depends on the working time of individual households, as defined by the following Dixit-Stiglitz function (Dixit and Stiglitz 1977):

$$L_t=\left(\int_0^1\left(l_t^j\right)^{\frac{1}{1+\lambda_{w,t}}}dj\right)^{1+\lambda_{w,t}}, \tag{15}$$

where:

L_t – the aggregate labour index,

$\lambda_{w,t}>0$.

The nominal wage rate W_t is therefore defined as:

$$W_t = \left(\int_0^1 \left(W_t^j \right)^{-\frac{1}{\lambda_{w,t}}} dj \right)^{-\lambda_{w,t}}, \tag{16}$$

where:

$\lambda_{w,t}$ – the markup on the labour market.

It means that the labour demand of each individual household is determined by the following equation:

$$l_t^j = \left(\frac{W_t^j}{W_t} \right)^{-\left(\frac{1+\lambda_{w,t}}{\lambda_{w,t}} \right)} L_t. \tag{17}$$

According to the Calvo (1983) scheme, only part of the wages is optimised in each period. The probability that a household will set a utility-maximising wage rate over a given period is fixed and does not depend on when it previously adjusted its wage level. On the other hand, wages that are not optimised over a given period are indexed according to the evolution of inflation.

Taking into account that in each period some households index the wage rate and some make optimisation decisions, the following formula determining the nominal wage level in the economy is obtained:

$$W_t = \left(\xi_w W_{IND,t}^{-\frac{1}{\lambda_{w,t}}} + \left(1 - \xi_w \right) W_{OPT,t}^{-\frac{1}{\lambda_{w,t}}} \right)^{-\lambda_{w,t}}, \tag{18}$$

where:

ξ_w – the probability that the household will not optimise wages during a given period,

$W_{IND,t}$ – the indexed wage rate,

$W_{OPT,t}$ – the wage rate of households that make optimisation decisions,

$\xi_w \in (0,1)$.

Aggregate demand consists of consumption, investment and government purchases. Therefore, the equation of aggregate demand, taking into account that part of the expenditure is related to the cost of under- or over-utilisation of capital, takes the form:

$$Y_t = C_t + I_t + \Psi\left(u_{K,t}\right)k_{t-1} + G_t, \tag{19}$$

where:

G_t – government purchases.

The final good is produced based on a continuum of intermediate goods indexed i∈<0,1>:

$$Y_t = \left(\int_0^1 y_t(i)^{\frac{1}{1+\lambda_{p,t}}} di\right)^{1+\lambda_{p,t}}, \tag{20}$$

where:

$\lambda_{p,t}$ – markup.

The necessary condition of cost minimisation shows that the demand for intermediate goods is determined by the following formula:

$$y_t(i) = \left(\frac{p_t(i)}{P_t}\right)^{-\frac{1+\lambda_{p,t}}{\lambda_{p,t}}} Y_t. \tag{21}$$

Intermediate goods are produced by companies that operate in a monopolistically competitive market, using the following technology:

$$y_t(i) = z_t\left(u_{K,t}k_t(i)\right)^{\theta} L_t(i)^{1-\theta} - FC, \tag{22}$$

where:

$k_t(i)$ – the capital used to produce the intermediate good *i*,

$L_t(i)$ – employment used in the production of the intermediate good *i*,

$\theta \in (0,1)$.

The condition of cost minimisation shows that:

$$\frac{W_t L_t(i)}{r_t^k u_{K,t} k_t(i)} = \frac{1-\theta}{\theta}. \tag{23}$$

The employment to capital ratio is the same for each intermediate good and, consequently, for the whole economy. As a result:

$$\frac{k_t}{L_t} = \frac{k_t(i)}{L_t(i)}. \tag{24}$$

The model assumes that prices, like wages, are set according to the Calvo (1983) scheme. Thus, only some firms set profit-optimising prices, and the rest adjust prices based on past inflation. The overall price level is therefore determined by the formula:

$$P_t = \left(\xi_p P_{IND,t}^{-\frac{1}{\lambda_{p,t}}} + \left(1-\xi_p\right) P_{OPT,t}^{-\frac{1}{\lambda_{p,t}}} \right)^{-\lambda_{p,t}}, \tag{25}$$

where:

ξ_w – the probability that the company will not optimise its price level during a given period,

$P_{IND,t}$ – the price set by the indexing companies.

$P_{OPT,t}$ – the price set by companies that make optimisation decisions based on profit maximisation.

The model parameters were estimated for each analysed country based on Bayesian estimation (cf. Adolfson et al. 2007; Ruge-Murcia 2007; Ferroni 2010) and calibration. The sample used in estimations covers the period 2000–2020. The Eurostat data was used in estimation.

Characteristics of fiscal impulses

In the model, fiscal policy affects the economy through the following variables:

- government purchases,
- capital tax rate,
- labour tax rate.

The purpose of the model is to analyse the effects of changes in capital and labour taxes in the analysed countries. The development of each of the analysed tax rates is determined by autoregressive processes:

$$\tau_t^k = \left(1-\rho_\tau\right)\overline{\tau}_k + \rho_\tau \tau_{t-1}^k + \zeta_{k,t}, \tag{26}$$

$$\tau_t^l = \left(1-\rho_\tau\right)\overline{\tau}_l + \rho_\tau \tau_{t-1}^l + \zeta_{l,t}, \tag{27}$$

where:

$\overline{\tau}_{k,}\overline{\tau}_l, > 0$,

$\rho_{\tau} \in (0,1)$,

$\zeta_{k,t} \sim N\left(0,\sigma_k^{\,2}\right)$,

$\zeta_{l,t} \sim N\left(0,\sigma_l^{\,2}\right)$.

The parameters $\overline{\tau}_{k,}\overline{\tau}_{l},>$ indicate the average level of taxation of capital and labour, respectively. The parameter ρ_{τ} indicates the persistence of fiscal disturbances.

The effects of changes in particular tax rates were estimated on the basis of simulations of distortions caused by an increase by one percentage point in the tax rate on capital and labour, respectively.

In the analysed dynamic model, changes in individual tax rates translate into the level of capital and the level of wages set by households, as well as the level of household consumption. As a result of feedback loopholes between the equations that determine the dynamics of the model, changes in taxes not only influence aggregate demand, wage levels and capital value, but they also affect other macroeconomic variables in the analysed economies.

The following subsections show the macroeconomics effects of increased taxes on capital and labour in the CEE countries.

The effects of an increase in capital taxes

The increase in capital tax rate impacts macroeconomic variables via a decrease in net capital income. A higher capital income tax rate increases the difference between the cost of capital for companies and the income that capital brings to its owners. With higher taxes on the income from the capital, the rate of return before tax on the additional investment must be higher in order to obtain a certain rate of return after tax.

The impact of an increase in the taxation of income from capital in the Czech Republic, Hungary and Poland on GDP in the analysed countries is shown in Figure 1.

Impulse-response analysis shows that an increase in capital tax rate by 1 percentage point reduces GDP by 0.4%–0.5% directly after the fiscal disturbance. The strongest negative impact of higher taxation is observed in Hungary and relatively weakest in Poland.

There is a strong persistency of the negative effects of a higher capital tax rate on output in all analysed countries. The highest persistency was observed in the Czech Republic; however, in all analysed countries, after four years (16 quarters), the decline in GDP is still significant, much higher than 0.2%.

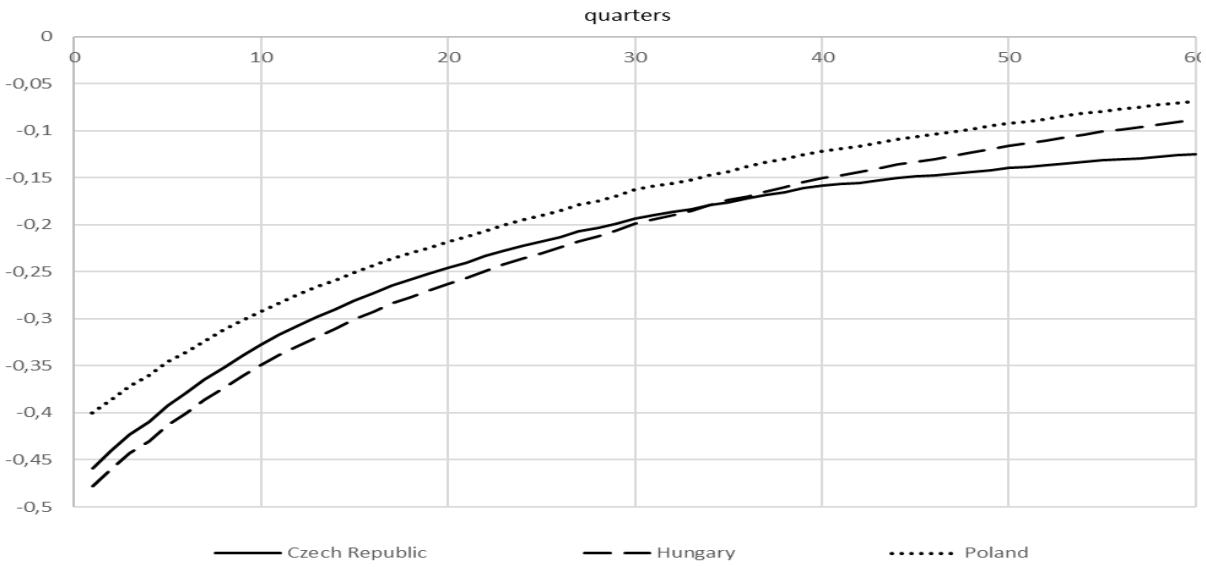

Figure 1. Impact of a 1 percentage point increase in the capital tax rate on GDP in CEE countries

Source: own study.

The high persistency of the distortion that stems from the increase in capital income taxation is because the effects of the distortion mainly affect the amount of physical capital, which is very slowly being brought back to the baseline.

As a result of the increase in capital income taxation, unsurprisingly, there are mainly adjustments in the amount of physical capital. In order to restore balance, the desired amount of physical capital is changed in such a way that the marginal product of capital is increased to the initial value determined by household consumption preferences (cf. McGrattan 1994; Ferroni 2010). The simulation shows that as a result of increased taxation of income from capital, the level of capital in all analysed CEE countries falls by more than 3%.

Changes in the evolution of capital taxation also affect the level of employment. In the analysed model, there are four channels of the impact of capital taxation on labour:

- a reduction in the amount of physical capital results in a reduction in the marginal product of labour (workers are less productive with fewer machines and equipment), which reduces demand for labour at a given wage rate,
- higher capital taxation encourages the choice of labour-intensive production techniques, according to the substitution effect.

Thus, from the theoretical point of view, the impact of an increase in taxation of income from capital on employment is not clear.

Impulse response analysis for the CEE countries shows that for the Polish economy, in the first three years after a fiscal disturbance concerning capital taxation, factors

limiting employment prevail. For Hungary and the Czech Republic, factors that limit employment prevail even longer – almost four years.

Not surprisingly, an increase in capital taxation, which causes a decrease in the desired capital level, significantly reduces investments and savings in all analysed CEE countries. However, capital recovers starting from about the fourth year after the fiscal shock. Nevertheless, the process is slow, and, as a result, capital remains below the initial level for many periods.

The reaction of consumption is interesting. In all analysed countries, immediately after the increase in capital taxation, consumption increases. This is because, in a period of high capital income taxation, households are not interested in maintaining capital which generates a low return after taxation; they replace part of the capital with consumption. As a result, investment declines and household consumption expenditure increases. However, this is a temporary process. About a year after the increase in capital taxation, consumption falls below the baseline level.

This happens for two reasons. Firstly, the higher capital taxation is temporary, and while it decreases to the baseline level, it is less and less worthwhile replacing investment in capital with consumption. Secondly, due to the cumulative effect of lower savings and investment on physical capital, the changes in capital are lagged and more persistent, which translates into a more persistent decrease in production. And a decrease in output means that households are poorer and limit their consumption.

The effects of an increase in labour taxes

Taxing labour income results in employees receiving pay that is lower than the labour costs incurred by the employer. As a result of the increase in taxes levied on wages, the difference between the cost of work for the employer and the wage received by the employee increases. At the same time, higher taxation of labour reduces households' net income. Lower household net incomes translates into a decrease in their demand for goods and services.

The impact of the tax wedge on employment depends on the wage elasticity of labour supply and the wage elasticity of labour demand. The higher the elasticity of labour demand and labour supply to the wage rate, the stronger the negative impact of increased taxes on wages on employment in a given economy.

The impact of an increase in the taxation of wages on GDP, estimated on the basis of a model developed for the CEE countries, is shown in Figure 2.

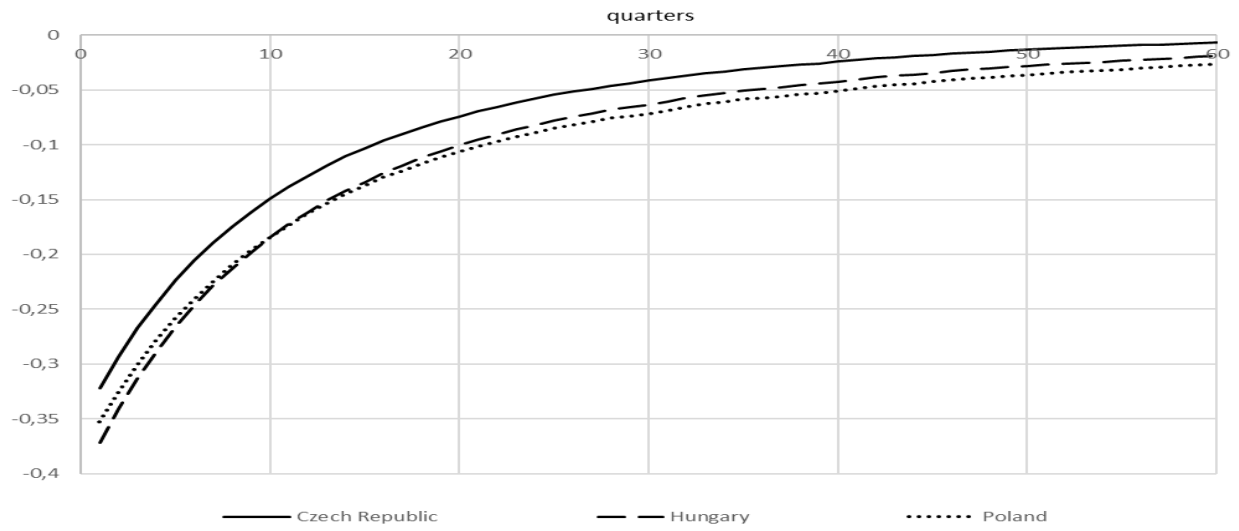

Figure 2. Impact of a 1 percentage point increase in the labour tax rate on GDP in CEE countries

Source: own study.

The impulse-response functions show that an increase in labour taxation has a negative impact on economic activity in all analysed CEE countries. In the initial period, GDP is reduced by about 0.32% in the Czech Republic, 0.35% in Poland, and 0.37% in Hungary. However, as the increase in labour tax rate is temporary, GDP gradually returns to its pre-fiscal stimulus level. After four years, the negative effects of higher taxation are weakest in Hungary – after 16 quarters, the decrease in GDP in its economy is lower than 0.1%

Similarly, as with capital tax, the responses of employment, physical capital, consumption and savings have also been examined.

Not surprisingly, the increase in labour tax rate negatively impacts employment – a higher tax wedge has the effect of reducing both labour demand and labour supply. The negative impact of a higher labour tax rate on labour supply results from the fact that the model examines temporary changes in taxation. Therefore, the intertemporal substitution of work and leisure occurs. On the other hand, with temporary tax changes, the income effect of a lower net wage is relatively less important. As a result, according to the presented estimates, in the case of temporary changes in labour taxation in all analysed CEE economies, the substitution effect is stronger than the income effect, which means that the labour supply curve is upward sloping.

The wage elasticity of labour supply is usually lower than the wage elasticity of labour demand. The elasticity of labour demand to the wage rate results from the substitution of labour for capital and the impact of higher labour costs on the profitability of production. The weaker the impact of labour costs on the profitability of production and the worse the substitution of physical capital for labour, the lower the wage elasticity of labour demand.

The model shows that the decrease in employment in all analysed CEE countries is relatively lower than the increase in taxation (it amounts to about 0.3%). It means that the elasticity of labour demand and supply to the net wage rate is relatively low.

Interestingly, the impulse-response functions show that as a result of increased labour taxation, employment and physical capital are reduced. This is due to the fact that with lower employment, the marginal capital product decreases. At the same time, it means that in the analysed CEE countries, the substitution between work and physical capital is relatively small.

Although the analysed fiscal change directly concerns wages, the changes in physical capital are greater than changes in labour in all analysed countries. In order to smooth consumption fluctuations, households significantly reduce their savings, which has a negative impact on investment and physical capital. That is, physical capital is partly converted into consumption in order to minimise the fluctuation of consumption. It consequently leads to fluctuations in capital that are even stronger than fluctuations in labour.

Conclusion

The effects of labour and capital tax increase in Central and Eastern European countries were analysed in the article. The impulse-response functions presented show that output reacts to changes in the taxation of labour and capital. Although there is some heterogeneity in the magnitude and persistence of tax effects between the analysed countries, the simulations generally show that the negative impact of increased capital taxation on GDP is stronger than for labour taxation. More importantly, however, the negative effects of higher taxation on capital are more persistent than on the taxation of labour.

In each analysed country, the negative impact on output is much more persistent when there is an increase in capital tax than an increase in labour tax. This is largely because higher capital taxation strongly reduces savings and the desired stock of capital, which has important long-term macroeconomic consequences. Indeed, the build-up of physical capital is much slower than a return to employment. As a result, approximately three or four years after a fiscal disturbance, the negative effects of higher labour taxation on output are diminishing in all analysed CEE counties, while the negative impact of capital taxation on GDP tends to remain relatively high.

The simulations assume that the increase in taxation takes place *ceteris paribus*, i.e. other conditions remain unchanged. Such an assumption allows for the most precise separation of the effects of individual taxes. At the same time, however, in real economies, tax increases usually serve a variety of purposes, including redistribution and allocation purposes. Above all, however, tax increases are usually intended to finance additional

government spending. Therefore, the effects of increases in individual taxes followed by a corresponding increase in government spending that occurs simultaneously is an interesting area for further research.

References

Adolfson, M., Laseen, S., Linde, J., Villani, M. (2007), *Bayesian estimation of an open economy DSGE model with incomplete pass-through*, "Journal of International Economics", 72 (2), pp. 481–511, https://doi.org/10.1016/j.jinteco.2007.01.003

Alinaghi, N., Reed, W.R. (2021), *Taxes and Economic Growth in OECD Countries: A Meta-analysis*, "Public Finance Review", 49 (10), pp. 3–40, https://doi.org/10.1177/1091142120961775

Angeloni, I., Coenen, G., Smets, F. (2003), *Persistence, the transmission mechanism and robust monetary policy*, "Scottish Journal of Political Economy", 50 (5), pp. 527–549, https://doi.org/10.1111/j.0036-9292.2003.05005006.x

Ardagna, S. (2001), *Fiscal Policy Composition, Public Debt, and Economic Activity*, "Public Choice", 109, pp, 301–325, https://doi.org/10.1023/A:1013021004195

Barro, R. (1974), *Are Government Bonds Net Wealth?*, "Journal of Political Economy", 82 (6), pp. 1095–117, https://doi.org/10.1086/260266

Baxter, M., King, R.G. (1993), *Fiscal Policy in General Equilibrium*, "The American Economic Review", 83 (3), pp. 315–334, https://www.jstor.org/stable/2117521 (accessed: 1.09.2021).

Calvo, G.A. (1983), *Staggered Prices in a Utility-Maximizing Framework*, "Journal of Monetary Economics", 12 (3), pp. 383–398, https://doi.org/10.1016/0304-3932(83)90060-0

Christiano, L.J., Eichenbaum, M., Evans, Ch. (2005), *Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy*, "Journal of Political Economy", 113 (1), pp. 1–45, https://doi.org/10.1086/426038

Dixit, A.K., Stiglitz, J.E. (1977), *Monopolistic Competition and Optimum Product Diversity*, "The American Economic Review", 67 (3), pp. 279–308, https://www.aeaweb.org/aer/top20/67.3.297-308.pdf (accessed: 1.09.2021).

Fernandez-Villaverde, J. (2010), *The econometrics of DSGE model*, "NBER Working Paper Series", No. 14677, National Bureau of Economic Research, Cambridge, https://doi.org/10.3386/w14677

Ferroni, F. (2010), *Did Tax Policies Mitigate US Business Cycles?*, "Banque de France Working Paper", No. 296, https://doi.org/10.2139/ssrn.1693811

Greenwood, J., Hercowitz, Z., Huffmann, G.W. (1988), *Investment, Capacity Utilization and the Real Business Cycle*, "American Economic Review", 78 (3), pp. 402–417, https://www.jstor.org/stable/1809141 (accessed: 1.09.2021).

King, R.G., Rebelo, S.T. (2000), *Resuscitating Real Business Cycles*, "NBER Working Papers", No. 7534, National Bureau of Economic Research, Cambridge, https://doi.org/10.3386/w7534

McGrattan, E.R. (1994), *The macroeconomic effects of distortionary taxation*, "Journal of Monetary Economics", 33 (3), pp. 573–601, https://doi.org/10.1016/0304-3932(94)90044-2

Mertens, K., Olea, J.L. (2018), *Marginal Tax Rates and Income: New Time Series Evidence*, "Quarterly Journal of Economics", 133 (4), pp. 1803–1884, https://doi.org/10.1093/qje/qjy008

Ohanian, L. (1997), *The Macroeconomic Effects of War Finance in the United States: World War II and the Korean War*, "The American Economic Review", 87 (1), pp. 23–40, https://www.jstor.org/stable/2950852 (accessed: 1.09.2021).

Owen, Z. (2019), *Tax Cuts for Whom? Heterogenous Effects of Income Tax Changes on Growth and Employment*, "Journal of Political Economy", 127 (3), pp. 1437–1472, https://doi.org/10.1086/701424

Romer, Ch., Romer, D. (2010), *The Macroeconomic Effects of Tax Change: Estimates Based on a New Measure of Fiscal Shocks*, "The American Economic Review", 100 (3), pp. 763–801, https://doi.org/10.1257/aer.100.3.763

Ruge-Murcia, F.J. (2007), *Methods to estimate dynamic stochastic general equilibrium models*, "Journal of Economic Dynamics and Control", 31 (8), pp. 2599–2636, https://doi.org/10.1016/j.jedc.2006.09.005

Taylor, J. (1993), *Discretion versus policy rules in practice*, "Carnegie-Rochester Conference on Public Policy", 39, pp. 195–214, https://doi.org/10.1016/0167-2231(93)90009-L

Porównanie skutków podatków nakładanych na kapitał i pracę w krajach Europy Środkowo-Wschodniej

Cel artykułu stanowi porównanie oddziaływania podatków nakładanych na dochody z pracy i kapitału na gospodarki krajów Europy Środkowo-Wschodniej. Otrzymane funkcje reakcji na impulsy fiskalne pokazują, że podatki nakładane na dochody z kapitału wpływają na PKB w odmienny sposób niż podatki nakładane na dochody z pracy. Mimo że występuje pewna heterogeniczność pomiędzy analizowanymi krajami w sile i czasie trwania efektów zmian podatkowych, to wykonane symulacje generalnie ukazują, że negatywny wpływ zwiększenia stóp podatkowych na gospodarkę jest w przypadku podatków kapitałowych silniejszy niż w przypadku podatków nakładanych na wynagrodzenia. Co ważniejsze, negatywne skutki wyższego opodatkowania dochodów z kapitału mają charakter bardziej długotrwały niż w przypadku wzrostu opodatkowania dochodów z wynagrodzeń. Wynika to z faktu, że wyższe opodatkowanie kapitału silnie ogranicza poziom inwestycji i poziom pożądanego zasobu kapitału trwałego, co generuje długoterminowe negatywne skutki dla kształtowania się produkcji w analizowanych krajach.

Słowa kluczowe: podatki kapitałowe, podatki nakładane na dochody z pracy, kraje Europy Środkowo-Wschodniej