

The Value Added Tax Incidence – the Case of the Book Market in CEE Countries*

Arkadiusz BERNAL - Poznan University of Economics and Business, Poland
(arkadiusz.bernal@ue.poznan.pl)

Abstract

Conducting effective economic policy requires understanding of how taxes are shifted. The value added tax rates on books in the Czech Republic, Hungary, Poland and Slovakia in 2003 – 2012 differed much and changed several times, hence it was a good case for exploring the tax incidence. The main objective of the article is to answer the question to whom (consumers, capital, labour) and to what extent the burden of the value added tax on books was shifted. Although the tax is often classified as a consumption tax, the tax on books wasn't shifted to consumers at least within five months after a tax rate change. The research suggests that the tax is shifted to capital and labour. According to the econometric models, an increase of the value added tax rate on books of 1 percentage point leads to a decrease of the return on equity of book publishers between 0,43 and 0,76 percentage point. It suggests that the value added tax on books was partly shifted to capital. Although wages are rigid, employees bear, to some extent, the burden of the value added tax. The regressions allow concluding that an increase of the value added tax rate of 1 percentage point leads to a reduction in the average wage in book publisher companies in the range 0,84% - 0,92%.

1. Introduction

The proliferation of the value added tax over last decades is enormous. At the moment the value added tax is levied in more than 160 countries worldwide (OECD 2014). In many of them it is the main source of their tax revenue, generating in some cases even more than half of it. The value added tax is used not only for fiscal purposes (Alm and El-Ganainy 2013). Public authorities assign other objectives to the tax. They claim that the value added tax perform also allocative and redistributive functions. Conducting effective economic policy requires understanding of how taxes are shifted. If we do not know who ultimately bears a tax burden, fiscal policy can be questioned. The lack of knowledge about who bears the tax burden makes it difficult to recognize a tax as progressive or regressive. The allocative function can be performed successfully only if we are able to state that the benefits from reduced tax rates actually go to those, who in the intention of public authorities should gain them.

VAT, which generally operates on a destination basis, can be treated as a consumption tax in the sense that it is paid in a country where consumption takes place. VAT should not be treated as a consumption tax in terms that only consumers bear the

* I am grateful to my colleagues from the Corporate Finance Department at the Poznan University of Economics and Business, in particular to Professor Jan Sobiech, for the support and the discussion on the preliminary version of the article. I thank Dorota Wiśniewska for her remarks on the econometric models. I also show gratitude to two anonymous reviewers for their helpful comments and suggestions. All errors are mine.

The research was financed by the Polish National Science Centre (Grant No. 2014/13/B/HS4/00215).

tax burden. The tax is not neutral since it influences consumers' situation (Janský 2014). Tax shifting takes place when a direct consequence of an alteration in a tax rate is a change of market equilibrium. That applies either to prices and quantities of goods sold or to factors of production. In the theory of tax incidence the "traditional trichotomy" is discussed (Harberger 2008). Analysing the tax shifting, researchers try to answer the question of whether it is consumers, capital or labour who bear the tax burden. So far empirical research on commodity taxes incidence have concentrated mainly on a tax shifting to consumers. There are only a few empirical studies which refer to the shifting of commodity taxes on factors of production.

Within the European Union the value added tax is coordinated, which means that in all the European Union countries regulations, especially the tax base and tax rates generally are similar. The tax in Europe is not general and uniform, which may influence the welfare level (Bye, Strøm, Åvitsland 2012). The European Union regulations allow special tax treatment to a limited number of goods and services. This exceptional tax treatment – reduced tax rate – refers *inter alia* to books.

Books alike educational services are treated as merit goods. It is assumed that books give some positive externalities, and thus require some support, otherwise people buy too little of them. One presumes that it is more efficient to encourage people to buy these goods in particular rather than giving them enough money in general (Mirrlees *et al.* 2011). Reduced tax rates on books can be considered effective only if consumers benefit from them, which would be possible when there is a strong correlation between tax rates and book prices. To determine whether such a relationship exists, studies on the value added tax incidence on the book market are required.

Book market is good to make research on the tax shifting because tax rates on books in different European Union countries alter much. There is one more reason which makes the book market ideal to research – the market is in general of national character. According to the Federation of European Publishers, in 2012 in Europe publishers' revenues from the sales of books in domestic markets equalled 79,6% of the total revenues. The main explanation is that the vast majority of people read fluently only in their native languages.

The advantage of investigating the value added tax incidence on a book market results from the possibility of determining the pass-through either to consumers or to capital and labour. An analysis of the value added tax shifting to capital and labour is possible due to the fact that book publishing companies have their separate statistical code (NACE code 58.11).

The greater part of the books sold in 2012 in Europe is consumer (trade) books, which is 48,7% of the whole market. Next are academic/professional books – 19,7%, educational (school) books – 19,8% and children's books – 11,8%. There are different distribution channels, but the majority of books are sold by trade (retail, wholesale) and only comparatively few by book clubs and directly.

The main objective of the article is to answer the question to whom (consumers, capital, labour) and to what extent the burden of the value added tax on books is shifted.

The rest of the paper is organized as follows: it starts with the literature review, the description of assumptions and data used in the research; next is the discussion on the tax shifting to consumers, later on to capital and finally to labour. The article ends with the conclusions.

2. Literature Review

Research on tax shifting varies according to a type of analysed tax and research methods applied (Kubátová 1996). In tax shifting studies, often only one direction of the pass-through is taken into account. In case of indirect taxes, research usually focuses on the tax shifting to consumers. Studies on indirect tax shifting to consumers, especially on the value added tax, are conducted on the basis of partial equilibrium models or empirical data which refers to particular market segments.

In case of a perfectly competitive market the tax incidence depends on the price elasticity of demand and supply. In case of monopoly, tax shifting to consumers depends on the shape of the demand curve and the marginal cost curve. A tax burden, which is passed-through to a consumer may exceed tax revenue. If the overshifting takes place, monopoly profit after the imposition of a tax could be higher than before.

In theoretical studies on tax incidence different models of imperfect competition are distinguished like the oligopoly models created by Bertrand and Cournot. These models assume that goods are perfectly substitutable. On the basis of the Bertrand model the conclusion can be drawn that tax shifting follows the same rules as in the model of perfect competition. In the Cournot model the extent to which a tax is shifted to consumers depends on the cost of production function, the slope of the demand curve, and the degree of competition in a sector (Fullerton, Metcalf 2002; Adam *et. al.* 2011). In the models of monopolistic competition, under the assumption of the CES utility function, the value added tax is fully shifted to consumers (Dixit and Stiglitz 1977).

It is difficult to clearly classify the book market, but it seems, if there is no perfect substitutability of goods, that the monopolistic competition is the most relevant model. Thus, according to the neoclassical economy, one could expect that the extent of tax shifting to consumers on the book market is generally close to the full pass-through.

Empirical studies on indirect tax shifting to consumers are not always consistent with neoclassical economy. These studies are generally focused on price changes rather than on quantity changes. An example of empirical research is the analysis of Poterba (1996), which refers to the impact of the sales tax on the prices of clothes in the United States of America. The analysis of the post-war period suggests that the sales tax was fully shifted to consumers, but in the pre-war period only 2/3 of the tax was shifted to consumers. A similar research was conducted by Besley and Rosen (1999). In this case, the subject of the study consisted of 12 types of goods, mainly foodstuff, in 155 cities of the United States of America. According to the authors, there are a variety of sales taxes shifting patterns. For some commodities, they cannot reject the idea that taxes are shifted to consumers on a one-for-one basis and for others, commodity taxes are overshifted. The overshifting of a tax to consumers is also observed by David (2012) in case of the value added tax rate increase of 4 pp. on foodstuff in the Czech Republic.

In the Study on reduced VAT (Copenhagen Economics 2007) the consequences of nine cases of significant changes in the value added tax rate from the European market are analysed. The cases include a decrease in the tax rate on books in Sweden by 19 percentage points. Generalizing the findings of these studies, the conclusion is

drawn that an increase in the tax rate results in a more than proportional change in prices, while a decrease in the tax rate causes a less than proportional decline in prices.

Carbonnier (2007) studies the consequences of a significant changes in the value added tax rate on cars, and on repair services, which took place in France. In the case of cars, tax burden shifted to consumers is estimated at 57% of the full pass-through, while in the case of the repair services the tax burden borne by consumers is 77%. The author associates the range of the tax shifting with the level of competition on the market. In both cases Carbonnier notices that the tax is shifted immediately after the reform, which is consistent *i.a.* with Besley and Rosen (1999).

Benedek *et al.* (2015) estimate the pass-through of VAT to consumers, using a data on prices and VAT rates for 17 Eurozone countries over 1999-2013. They observe different extent of the pass-through for changes in the standard rate (about 100 percent), for reduced rates (30 percent) and for reclassifications it is essentially zero. David (2016) also observes that the average value of shift of the tax burden for reduced tax rates is 14% lower than for the standard rates and that there is a strong negative relationship between the size of change in the nominal tax rate and the shift rate of the tax burden onto consumers.

The author knows three empirical studies which refer to the value added tax shifting to capital and labour. Manente and Zanette (2010) are the authors of the first one. In their paper they test the effects on the Italian economy of the value added tax rate reduction from 10% to 5% in the Italian hotels and restaurants sector. They estimate that the reduction generates a fall in final prices for tourists between 2,67% and 2,97%. Additionally, they ascertain that the tax rate reduction produced in the whole Italian economy a total increase of almost 100.000 jobs (expressed in fulltime equivalents).

Kosonen (2015) studies the impact of the value added tax on prices and quantities of labour intensive services – hairdressing. In the beginning of 2007 the VAT rate for hairdressing services in Finland was reduced from 22% to 8%. The results suggest that hairdressers cut their prices only by half of what a complete pass-through would have implied, and that there was hardly any adjustment in equilibrium quantity due to the reform. Consumers and hairdressers benefited from the small reduction in prices. Hairdressers were able to increase their profits of almost 15%. The change in the tax rate did not increase employment in the sector.

Benzarti and Carloni (2016) study the consequences of the reduction of the value added tax rates on sit-down restaurants' services which took place in July 2009 in France, where the tax rate dropped from 19,6% to 5,5%. They noticed the limited effect of the rate decrease on prices for consumers. The reform mostly benefited capital owners, who received around 50 percent of the tax cut and employees who shared around 20-29 percent of the benefit.

The literature review shows that the tax burden does not have to be borne by those, on whom it was imposed. In the research on the value added tax incidence it has also been observed that it is not only consumers, but also employees and capital owners, who benefit from the tax rate reductions. Previous research encourages to examine the book market incidence.

3. Assumptions and Data

The advantage of making inquiries into the book market is that it is possible to research tax shifting to consumers and in parallel on factors of production. It is feasible to obtain data which refers both to prices of books for consumers and to entities of a particular NACE code which deal with books only – book publishers.

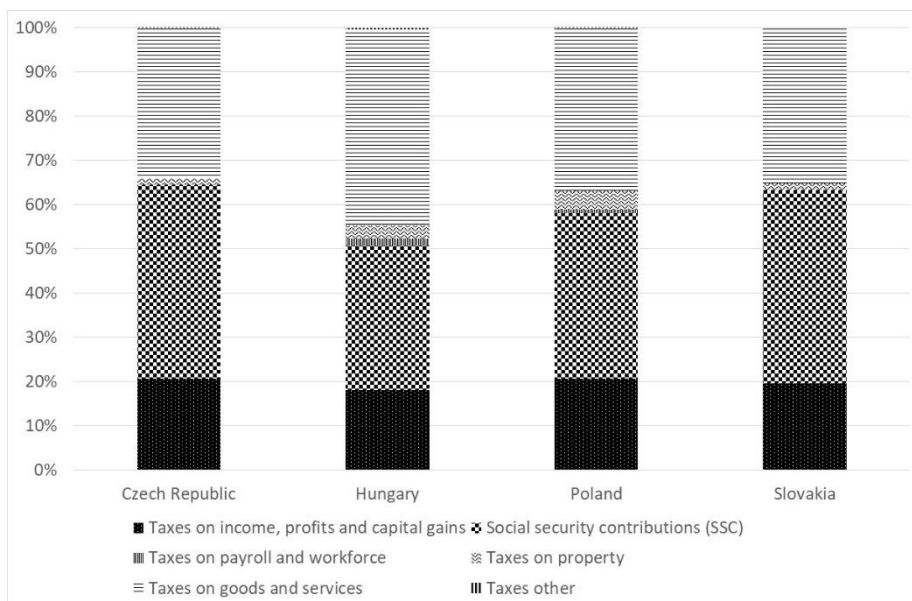
The research focuses on the period between 2003 and 2012. First of all, there was little data on book publishers before the year 2003. Later data at the moment I did the research was not available.

To analyse value added tax shifting it is necessary to observe taxpayers' and households' reactions to tax changes. In a majority of European countries tax rates on books were constant or changed within 2 percentage points. We focused on four Central and Eastern European Countries: the Czech Republic, Hungary, Poland and Slovakia. All these countries have similar recent histories. They are post-communist countries which were not part of the former Soviet Union. They joined the European Union at the same moment. In all four countries the average GDP per capita is at a similar level.

At first VAT was introduced in Hungary in 1988. In the Czech Republic, Poland and Slovakia VAT appeared 5 years later, *i.e.* in 1993. Standard tax rates at the time of introduction of the tax were similar. They were equal to 25% in Hungary, 23% in the Czech Republic, 22% in Poland and 23% in Slovakia. In subsequent years, the importance of revenue from the value added tax changed a little, in particular as a result of changes in the level of the standard tax rates. In 2003-2012 the biggest changes in the standard tax rate were in Hungary, where since January 2006 the tax rate decreased from 25% to 20% and returned to 25% since July 2009. Then in January 2012 the highest standard tax rate within the European Union - 27% came into force. In the other countries, changes in the standard tax rates during the period of analysis were much lower. In the Czech Republic they ranged within 3 pp. and in Poland and Slovakia only within 1 pp.

The structure of tax revenues in the examined countries in the considered years was relatively similar. Only Hungary differed slightly from the other states. In Hungary, revenues from goods and services including VAT and excises, were relatively high, while revenues from social security contributions were relatively low compared to the other countries. The structure of tax revenues in respective countries in 2012 is shown in Figure 1.

Figure 1 The Structure of Tax Revenues in CEE Countries in 2012



Source: Compiled by the author from the OECD database.

Among the four countries analysed only in Hungary there is a fixed book price rule. It means that the price may not be varied by individual sellers of books. Fixed book price generally means that retailers do not sell books below a fixed price unless they are sold some time after publishing.

Tax rates in the four analysed countries were at different levels and changed in the meantime. In Hungary 2003 – 2006 there were two tax rates for books. The lower tax rate was for textbooks.

Table 1 Tax Rates on Books in the Czech Republic, Hungary, Poland and Slovakia in 2003 – 2012

country/year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
The Czech Republic	5%	5%	5%	5%	5%	9%	9%	10%	10%	14%
Hungary	0;12%	5;15%	5;15%	5;15%	5%	5%	5%	5%	5%	5%
Poland	0%	0%	0%	0%	0%	0%	0%	0%	5%	5%
Slovakia	14%	19%	19%	19%	19%	10%	10%	10%	10%	10%

Source: Compiled by the author from the legal acts.

The discussion on the tax shifting to capital and labour concentrates on book publishers because it is difficult to distinguish book traders among traders. There are many retailers who sell books as well as other goods and it is impossible to separate those different kinds of activities. The data on book publishers in general comes from the Amadeus database, which belongs to Bureau Van Dijk. The Amadeus database

contains information on public and private companies in Europe. Book publishing companies were selected on the basis of NACE Rev. 2 number – 5811 (primary codes only). In some cases, for example when the data about the number of employees for one year was missing, the author supplemented the data using the EMIS (Emerging Markets Information Services) database.

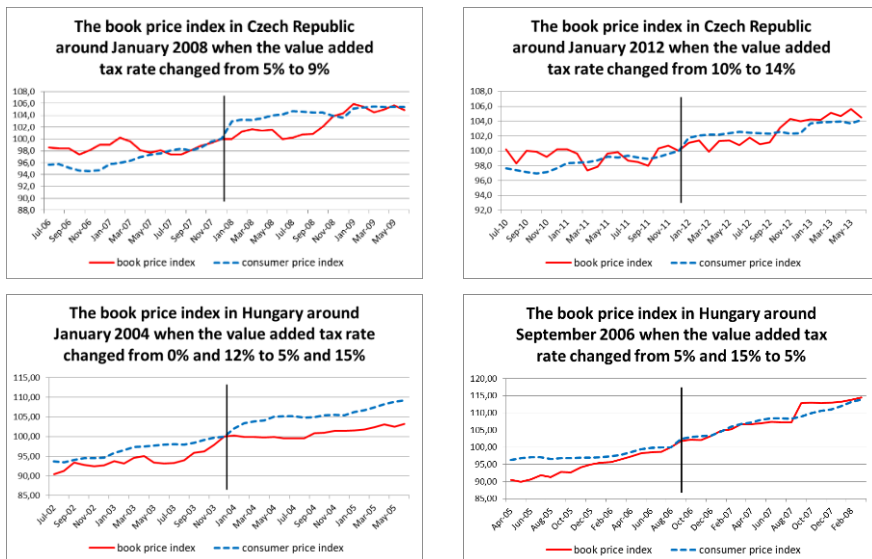
4. Shifting Tax to Consumers

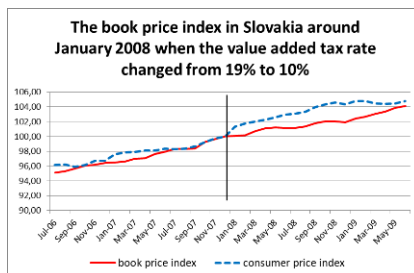
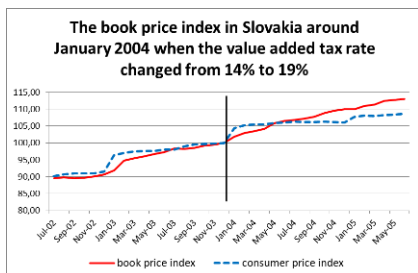
The value added tax is considered as a consumption tax, but it does not have to mean that it is consumers who bear the tax burden. The best moment to determine the value added tax shifting to consumers is a moment when the tax rate changes. Observing changes of book prices against the background of a consumer price index allows drawing preliminary conclusions on the tax shifting to consumers.

Below there are seven graphs which show how the book price indexes altered 36 months around the value added tax rate change on books in Central and Eastern European Countries. The book price indexes on the graphs are marked with a red continuous line, the consumer price indexes are marked with a blue dotted line. The vertical lines refer to the moments when the value added tax rate on books changed. The indexes at the moments of the tax changes are equal to 100, for both books and all consumer goods.

At the first glimpse, assuming that the tax is shifted within a few months after a tax rate change, one could conclude that in general the value added tax on books was not shifted to consumers. Only in the case of Slovakia in January 2008, when a decrease of the tax rate from 19% to 10% took place, prices of books fell comparing to the prices of all consumption goods. Also in the case of Poland the prices of books increased after an increase of the tax rate from 0% to 5%.

Figure 2 Book Prices Around the Moments of Tax Rate Changes in CEE Countries





To support the conclusions which are drawn from the figures above regressions were made. The method which is described below is analogous to that used by Carbonnier (2007) and allows one to answer the question to what extent and when the tax is shifted to consumers.

Assuming that p is the gross price of a good and τ is the value added tax rate of a particular good, then the net price of the goods can be described as $\frac{p}{1+\tau}$, while the value added tax as $\frac{\tau p}{1+\tau}$. In this case the change of the gross price (to a consumer) induced by the change in the tax rate can be expressed as $\frac{dp}{d\tau}$, while the change in the net price (to a manufacturer) induced by the change in the tax rate as $\frac{d(\frac{p}{1+\tau})}{d\tau} = \frac{dp}{d\tau}(1+\tau) - p$. Thus, if the change in the value of the tax induced by the tax rate change is described as $\frac{d(\frac{\tau p}{1+\tau})}{d\tau} = \frac{d\tau p(1+\tau) - \tau p}{(1+\tau)^2} = \frac{(p + \tau \frac{dp}{d\tau})(1+\tau) - \tau p}{(1+\tau)^2}$, then one can easily determine the additional tax burden borne by a consumer as a share of the change in the gross price (to the consumer) in the change in the value of the tax induced by the change in the tax rate, which formally can be written as:

$$S = \frac{dp}{d\tau} \frac{(1+\tau)^2}{(p + \tau \frac{dp}{d\tau})(1+\tau) - \tau p} = \frac{dp}{d\tau} \frac{(1+\tau)^2}{p + \tau \frac{dp}{d\tau} + \tau^2 \frac{dp}{d\tau} - \tau p} = \frac{dp}{d\tau} \frac{(1+\tau)^2}{p + \tau(1+\tau) \frac{dp}{d\tau}} = \frac{(1+\tau) dp}{p} \frac{(1+\tau)}{1 + \tau \frac{(1+\tau) dp}{p}} \quad (1)$$

The parameter s can be regarded as the result of the function $f: x \rightarrow x \frac{1+\tau}{1+\tau x}$, where $x = \frac{(1+\tau) dp}{p} \frac{dp}{d\tau}$. Making some simplifying assumptions it can be concluded that $x =$

$\frac{(1+\tau)}{p} \frac{dp}{d\tau}$ is an approximation of the consumer's share in the additional tax burden, which appears as a result of an increase in the tax rate on a particular good.

The parameters can be estimated with the usage of econometric methods. The first step is to calculate the x , which is an approximation of the parameter s . For this purpose $\Delta_t(X)$ shall be determined by the formula $\Delta_t(X) = \frac{X_t - X_{t-1}}{X_{t-1}}$. Then $\Delta_t(X)$ can be used in the regression model as the explanatory variable, where the dependent variable is the change in the gross price. Other variables may include a consumer price index and other variables the size of which is related to the change in the gross price of books such as newspapers and periodicals; miscellaneous printed matter, stationery, and drawing materials. If the price adjustment to the new tax rate was noticeable during five following periods, then the regression equation would be:

$$\Delta_t(p_{dep}) = \sum_{i=1}^5 \alpha_i \Delta_{t+1-i} (1 + \tau) + \beta \Delta_t(p_{overall}) + \gamma \Delta_t(p_{newspapers}) + \eta \Delta_t(p_{printed\ matter}) + \epsilon_t. \quad (2)$$

In the equation coefficient α_i is of a particular importance, because it (or the sum of the coefficients) can be regarded as the approximation of how much of the tax is shifted to a consumer.

Using the approach described above with respect to changes of the value added tax rates on books in four analysed countries OLS regressions were made. Data for 36 months around the tax changes was used.

The models allow drawing conclusions analogous to those from the figures. In a majority of models, the independent variables, which refer to the tax shifting, are not significant. Only in the case of the Czech Republic in 2012 one variable ($\Delta_{t+1-3}(1 + \tau)$) can be considered as statistically significant at the level of 10%, but the coefficient next to it (α_3) is -0,51, which suggests that the higher tax rate results in the lower gross price, is counterintuitive. The figures above suggested that in Slovakia in 2008 and in Poland in 2011 a tax shifting to consumers took place. The models do not confirm the presumptions. In both cases none of the variables in the models turned out to be significant.

On the basis of all models, the conclusion could be drawn, that the value added tax on books was not shifted to consumers.

5. Shifting Tax to Capital

The tax base of the value added tax can be treated as a remuneration to factors of production, in particular capital and labour (Schenk, Oldman 2007). The higher the remuneration of capital and labour is, the higher value added tax has to be paid. The relationship between the tax base and the payments to factors of production encourages considering a tax shifting to capital and labour. The value added tax changes equilibrium in the market of production factors. Analysing the tax shifting, i.e. the new equilibrium in the capital market and the labour market after a significant change in the tax rate, similar methods as in the case of the tax shifting to consumers can be applied. In this case, however, the focus is not on the price of goods, but on the level of a rate of return on capital for the capital market and on the level of wages for the labour market.

From the point of view of an owner of a company, the most important ratio is return on equity. We calculate ROE by dividing earnings before interest and taxes by shareholder funds. This approach in calculating ROE allows excluding changes in corporate income tax rates.

If the value added tax on books is shifted to an owner of book publishers one can expect that after an increase (decrease) of the tax rate, the return on equity decreases (increases).

To compare the returns on equity before and after the tax rate on books changed, the paired sample t-test was conducted. Ratios used in the test referred to the same book publishers in two years. Also the nonparametric Mann-Whitney test, known as Wilcoxon rank sum test, was conducted.

In cases of tax rate changes the hypothesis H_0 , showed below, was tested. The returns on equity of the two following years were compared. μ_L refers to the average return on equity when the value added tax rate on books was lower and μ_H refers to the average ROE when the tax rate was higher.

$$H_0: \mu_H - \mu_L \leq 0 \quad (3)$$

$$H_1: \mu_H - \mu_L > 0$$

Table 2 The Average and Median Return on Equity of Book Publishers in the Czech Republic, Hungary, Poland and Slovakia in the Years Before and After the Value Added Tax Rate on Books Changed

Country	No. of book publish.	Year before a tax		Year after a tax		Average ROE		Median ROE		p-value
		rate change (a tax rate)	rate change (a tax rate)	rate change (a tax rate)	rate change (a tax rate)	Before a tax rate change	After a tax rate change	Before a tax rate change	After a tax rate change	
Increases										
The Czech Republic	63	2011 (10%)	2012 (14%)	15.3%	13.8%	0.2748	8.8%	8.1%	0.3171	
Poland	158	2010 (0%)	2011 (5%)	16.2%	9.9%	0.0095	16.1%	6.8%	0.0113	
The Czech Republic	63	2007 (5%)	2008 (9%)	22.2%	15.4%	0.0220	16.7%	14.4%	0.1223	
Hungary	38	2003 (0; 12%)	2004 (5; 15%)	27.2%	22.8%	0.1104	31.6%	23.9%	0.1266	
Slovakia	2	2003 (14%)	2004 (19%)	8.2%	-7.8%	~	8.2%	-7.8%	~	
Decreases										
Slovakia	12	2007 (19%)	2008 (10%)	3.16%	3.82%	0.4463	0.09%	3.29%	0.4770	
Hungary	127	2006 (5; 15%)	2007 (5%)	21.6%	18.6%	-	19.9%	17.1%	-	

Source: Compiled by the author from the Amadeus database.

In almost all cases showed above, the rates of return for owners after the changes of the tax rate altered in the expected direction. Conclusions for medians are quite similar to the ones for averages. Only in Hungary (2006) adjustments of book publishers to the change of the tax rate are not consistent with expectations. In this case the change of the tax rate took place in the middle of the year (on the 1st of September 2006) and it did not refer to all kinds of books – the tax rate on textbooks did not change. In Hungary (2006) owners of book publishers did not benefit from the lower tax rate on books in a short period, also because the surplus was invested in companies. An increase of assets and shareholder funds in 2007 in comparison to 2006 was statistically significant.

The comparison of ROE is not sufficient to conclude that the tax shifting to capital took place, but it encourages further research. To draw a conclusion that an increase of the value added tax rate on books led to a decrease of the return on equity (and vice versa) econometric models were built. There are many factors which may influence the level of ROE of book publishers. Trying to explain what impacts the level of ROE, the author concentrates on the macroeconomic ratios, including the value added tax rate on books. In order to avoid the discussion on the influence of many microeconomic issues, earnings before interest and taxes of all companies and shareholders' funds of all companies from a particular country in a particular year were added. One ratio for each country in any year was obtained. This method helped to avoid problems with comparing companies of different scale of activity or excluding the influence of companies with extremely high or extremely low rates.

Different factors influence the level of ROE. The level of the rate of return depends *i.a.* on the quality of management in a company and on external circumstances which cannot be affected by a single company. We assume that the average quality of management is comparatively similar in each country. Thus the differences between ratios among countries could be generally explained as resulting from external circumstances. The question is what kind of variables could influence the average rate of return. We distinguish five of them: the value added tax rate, the economic growth rate, the openness index, the general government revenue as a percentage of GDP and the time variable.

The model could be described as follows:

$$ROE_{it} = \alpha_0 + \beta_1 T_{it} + \beta_2 GDP_{it} + \beta_3 OI_{it} + \beta_4 G_{it} + \beta_5 t + \varepsilon_{it} \quad (4)$$

where ROE_{it} denotes the average return on equity of book publishers in country i in year t ; T_{it} is the value added tax rate in country i in year t , GDP_{it} denotes the yearly changes of GDP in country i in year t , OI_{it} denotes the openness index in country i in year t , G_{it} refers to the general government revenue as a percentage of GDP in country i in year t , and t is the time variable.

From the article's point of view, the first and the most important external explanatory variable, which may differ across countries, is the value added tax rate. It is expected that the lower the tax rate is, the higher the rate of return is. Such relation would suggest that book publishers bear the value added tax burden.

Changes of GDP reflect a situation in the overall economy. The higher a growth of GDP is, the higher rates of return entrepreneurs can expect. It is reasonable to

suppose that the rule applies also to book publishers. The data about changes of GDP comes from Eurostat.

The openness index is calculated as the country's sum of exports and imports divided by the gross domestic product. The higher the index is the lower rates of return one can expect. Although a book market is in general of national character, books may be printed abroad or foreign capital may be invested in book publishing companies, which would increase a competition in the sector, and lead to a lower return on capital. The data about the openness index comes from the World Bank.

The general government revenue as a percentage of GDP suggests a scale of redistribution. The data comes from Eurostat. From one point of view the bigger the redistribution is the lower the rates of return are, because people are less wealthy and can afford lower consumption and, thus, fewer books. From the other point of view, the bigger the redistribution is the higher the rates of return are, because public authorities may spend money supporting reading *e.g.* buying books for libraries or textbooks for children.

Table 3 Regressions Explaining ROE of Book Publishers

Dependent variable	Pooled panel regression OLS (1)	Panel regression WLS (2)	Panel regression RE (3)	Panel regression RE (4)	Panel regression RE (5)
α_0	0.02453 (0.08914)	0.04564 (0.08174)	0.18372*** (0.01884)	0.24037*** (0.02383)	0.27956*** (0.03543)
T_{it}	-0.42747** (0.19604)	-0.44682** (0.19359)	-0.75725*** (0.18905)	-0.48648** (0.18503)	-0.57210*** (0.19033)
GDP_{it}	0.00245 (0.00265)	0.00226 (0.00252)	0.00503* (0.00268)		
OI_{it}	-0.07144* (0.03569)	-0.07163* (0.03585)			-0.08221** (0.03411)
G_{it}	0.00661*** (0.00210)	0.00619*** (0.00190)			
t	-0.00674* (0.00337)	-0.00737** (0.00338)		-0.01093*** (0.00247)	

Notes: Standard errors are in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

The research refers to the countries at the similar level of development, which switched from centrally planned economy to market economy. One can expect that the more developed countries are the lower the risk premium owners of companies achieve. The time variable reflects that rule. Book publishing could also be treated as an obsolescent sector. If it is true, the time variable could be useful.

Because the returns on equity relate to ten years in four countries, at the beginning a pooled panel analysis OLS was applied – column (1) in table 3. The regression shows that ROE of book publishers depends *i.a.* on the value added tax rates. An increase of the value added tax rate of 1 percentage point leads to a decrease of return on equity of book publishers of 0,43 percentage point. The variable is significant at the level of 5%.

The general government revenue as a percentage of GDP is a significant variable at the level of 1%. The higher the government revenue is the higher the returns of book publishers are. The coefficient next to the time variable is negative, which

means that returns of owners fall each year. They are independent of the changes of GDP and the consumer price index, because the subsequent factors are insignificant.

In the next step the hypothesis whether individual unit (country) effects exist was tested. The lack of individual effects would suggest that a pooled panel analysis is sufficient. Because the p-value in the test was low, a panel data analysis with fixed effects was used. The Wald test for heteroscedasticity in fixed-effects model shows that it is necessary to reject the null hypothesis that units have a common residual variance. The result implies that the model requires to be corrected. Ultimately weighted least squares panel data estimations are used. Weights based on per-unit error variances. This regression in table 3 is presented as (2). The results of the second model are very similar to those from the first one. It is confirmed that the tax burden is partly borne by owners of book publishers.

The number of observations is limited, hence in one regression with random effects only two explanatory variables are possible. The statistic of Breusch-Pagan test for the model with two dependent variables: the VAT rate and the changes of GDP allows drawing the conclusion that the model with random effects could be better than the pooled panel regression (1). In the model (3) the value added tax rate on books turns out to be significant at the level of 1%. In that case the coefficient is -0,76, which means that the tax rate increase of 1 percentage point leads to the decrease of ROE of 0,76 percentage points. In the model (3) the coefficient next to the changes of GDP was negative and significant, but only at the level of 10%. In the model (4) the tax rate is a significant variable, although the p-value in the regression (4) equals 0,0124. In that case the coefficient is -0,49. In the model (4) the coefficient next to the time variable is negative and significant at the level of 1%, which is consistent with the model (1) and (2). In the model (5) the coefficient next to the tax rate equals -0,57 and is significant at the level of 1%. From the Hausman tests one can conclude that the models with random effects do not give better results than the models with fixed effects.

It is necessary to stress that, regardless of the approach, in each model the value added tax rate turned out to be a significant variable at least at the level of 5%. In any model the coefficient of the value added tax rate is negative. It suggests that the tax was partly shifted to capital.

6. Shifting Tax to Labour

The analysis of the value added tax shifting to labour in the research is similar to the inquiry into capital tax shifting, but instead of ROE the average wage of the book publishers' employees is explored. If the value added tax on books is shifted to employees of book publishers one can expect that after an increase (decrease) of the tax rate, the wages of employees decrease (increase). It is necessary to remember that wages are comparatively rigid, hence it is better to compare them in real than in nominal terms. To evaluate differences in both years, wages in the year after a tax rate change were first discounted to the previous year with the average change of wages rate in a particular country in a particular year. In the analysis wages were calculated in a local currency to exclude the influence of the exchange rate differences.

To compare the wages of employees before and after the tax rate on books changed, the paired sample t-test and the nonparametric Mann-Whitney test were

conducted. Wages used in the tests referred to the same book publishers in two years. The wages in the second year, after the tax rate change, were discounted with the average wage increase rate in a particular country in a particular year.

The hypothesis H_0 , showed below, was tested. The wages of book publishers' employees of the two following years were compared. μ_L refers to the average wage when the value added tax rate on books was lower and μ_H refers to the average real wage when the tax rate was higher. The table 4 shows the results.

$$\begin{aligned} H_0: \mu_H - \mu_L &\leq 0 \\ H_1: \mu_H - \mu_L &> 0 \end{aligned} \quad (5)$$

In some cases, when the sample was too small, it was not possible to conduct the t-test and the Mann-Whitney test. In all those examples the average real wage after a tax rate increase was lower than before, although it is not possible to conclude whether the changes are statistically significant.

Results of the t-test allows concluding that while the tax rate increases wages decrease at a statistically significant level of 5% or 10%. In the case of the tax rate decreases the conclusion is not obvious. In Slovakia (2008) wages in real terms increased, but the change was not statistically significant and in Hungary (2007) wages in real terms decreased. In Hungary (2007) wages increased in nominal terms (average from 4083 to 4363) with the p-value 0,1357. In the case of median wages conclusions are less clear. Although in most examples the median wages change in the predicted direction, none of these changes is statistically significant. Furthermore, in the Czech Republic (2012) and Slovakia (2008) the median wages altered in the unexpected direction.

Table 4 The Average and Median Yearly Wages of Employees for Book Publishers in the Czech Republic, Hungary, Poland and Slovakia in the Years Before and After the Value Added Tax Rate on Books Changed, in Real Terms and Local Currency

Country	No. of book publish.	Year before a tax rate change (a tax rate)		Year after a tax rate change (a tax rate)		Average wage		Median wage		p-value	p-value	
		rate change	tax rate	rate change	tax rate	Before a tax rate change	After a tax rate change	Before a tax rate change	After a tax rate change			
Increases												
The Czech Republic	57	2011 (10%)	378.3	2012 (14%)	348.7	0.0444	310.3	335.1	-			
Poland	20	2010 (0%)	109.1	2011 (5%)	99.8	0.0449	107.4	88.5	0.2164			
The Czech Republic	47	2007 (5%)	367.8	2008 (9%)	333.4	0.0634	350.5	313.7	0.3102			
Hungary	8	2003 (0; 12%)	3 774	2004 (5; 15%)	3 320	0.0288	3 191	3 116	~			
Slovakia	2	2003(14%)	312.8	2004 (19%)	260.9	~	312.8	260.9	~			
Decreases												
Slovakia	8	2007 (19%)	318.1	2008 (10%)	337.3	0.1788	281.6	280.0	-			
Hungary	18	2006 (5; 15%)	4 083	2007 (5%)	4 040	-	3 430	3 624	0.4372			

Source: Compiled by the author from the Amadeus database.

According to the tests described above, it is not possible to conclude unambiguously that an increase in the value added tax rate on books led to a decrease in the wages of book publishers' employees (and vice versa). To determine more clearly whether the value added tax was shifted to labour, econometric models were built. The dependent variable was the logarithm of the average wage of book publishers' employees.

During the research period many book publishers were active from time to time. They engaged employees for short periods (a month or a few months only). The average wages for such companies were extremely low and it was the reason for excluding those book publishers. Only the book publishers for which the data for the whole period 2003-2012 was available were taken into account in the research. Calculating the average cost of employees the data for 18 companies was used, 5 of them come from the Czech Republic, 3 from Hungary, 8 from Poland and 2 from Slovakia.

To compute the average wage for book publishers' employees, the costs of employees of the mentioned companies and also a number of employees of those companies from a particular country in a particular year were added. Dividing the total costs of employees by the number of employees for each country in every year the average wage was obtained. All average wages were calculated in euro at the rate for the last day of a year.

Trying to explain what impacts the average level of wages of book publishers' employees, the author concentrates on a few factors with the value added tax rate on books among them. This variable is the most important because it indicates whether the value added tax on books is shifted to employees. If the burden of the value added tax on books is borne by employees, the tax rate should appear in econometric models as a significant variable with a negative coefficient. The tax rate was not logarithmed, because in 2003-2010 in Poland the tax rate on books was 0%.

The next two explanatory variables refer also to the macroeconomic situation in the countries, which is identical for all companies in one country. The first one is the average wage in the economy of a specific country. The data comes from Eurostat. The higher the wages in the economy of a particular country are, the higher the wages of book publishers' employees are expected. The average wage in the economy is important, because it reflects changes in the remuneration of labour. It enables to concentrate on the relation between the value added tax rate and the average wage of book publishers' employees without distinguishing between nominal and real terms.

Another important indicator of the level of wages is the unemployment rate. The unemployment rate was provided by International Monetary Fund. The higher the unemployment rate is the lower the wages of book publishers' employees one can expect.

The only ratio applied in the models, which could be calculated for a specific company, is a return on sales (ROS). To calculate ROS, earnings before interest and taxes of all companies and revenues of all companies from a particular country in a particular year were added and one ratio for one country in one year was obtained.

The model is described as follows:

$$\ln w_{it} = \alpha_0 + \beta_1 T_{it} + \beta_2 \ln W_{it} + \beta_3 UR_{it} + \beta_4 ROS_{it} + \varepsilon_{it}$$

where w_{it} – is the average wage of book publishers' employees in country i in period t , T_{it} is the value added tax rate in country i in period t , W_{it} – is the average wage

in the economy of country i in period t , UR_{it} is the unemployment rate in country i in period t , ROS_{it} – is the average return on sales of book publishers in country i in period t . Wages are calculated in euro.

Table 5 Regressions Explaining the Average Wage in Book Publishers (dependent variable: $\ln w_{it}$)

Dependent variable	Pooled panel regression OLS (1)	Panel regression FE (2)	Panel regression RE (3)	Panel regression RE (4)	Panel regression RE (5)
α_0	-1.73258 (1.46933)	-0.36157 (1.12909)	0.93334 (0.94245)	7.53144*** (0.24215)	7.53809*** (0.207748)
T_{it}	-1.83191** (0.71663)	-2.08807** (0.77965)	-2.57550*** (0.74831)	-2.36885** (1.14862)	-2.24866** (1.10899)
$\ln w_{it}$	1.25320*** (0.20771)	1.13815*** (0.15771)	0.98972*** (0.14087)		
UR_{it}	0.05989*** (0.01024)	0.02132* (0.01105)		-0.00558 (0.01506)	
ROS_{it}	4.05150*** (1.15187)	0.90713 (1.28943)			-1.21632 (1.8004)

Source: Standard errors are in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

At the beginning of the analysis the pooled panel regression OLS (denoted in table 5 as model (1)) was set. The value added tax rate in this model is significant, with a negative coefficient -1,83 next to it, but the Durbin-Watson statistic equals 1,29, which may suggest autocorrelation. After testing differences between means in each country, a panel regression with fixed effects was justified. It is presented as model (2). In the model the coefficient next to the tax rate is -2,09. The Durbin-Watson statistic is 1,39, which indicates that the autocorrelation test is inconclusive. The Breusch-Pagan test provides the basis for the panel regression with random effects, which is shown in column (3), (4) and (5). On the basis of the Hausman test one can draw the conclusion that the panel model with random effects is better than the panel model with fixed effects.

According to the models, wages of book publishers' employees change in the same direction and at a similar rate as in the economy. A 1% increase of wages in the economy leads to an increase of wages in the book publisher companies between 0,98% and 1,25% (depending on the model). The variable is significant in each model at the level of 1%. It is important to include changes in the average wage in the economy because they reflect many factors which may influence the level of remuneration of book publishers' employees and helps to concentrate on the impact of the tax rate.

An increase of the unemployment rate of 1 percentage point leads to an increase of the wages of book publishers' employees of 0,06% (1) or 0,02% (2). The positive coefficient next to the unemployment rate is the effect of the correlation between the unemployment rate and the average wage in the economy. In the model (4) where the average wage in the economy does not appear, the coefficient next to the unemployment rate is negative but insignificant.

The coefficient next to the tax rate in the model (1) which equals -1, 83 means that an increase of the tax rate of 1 percentage point leads to a decrease of wages of

book publishers' employees of 0,84%. Similar conclusions could be drawn from the models (2) – (5) although the decrease ranges between 0,88% and 0,92%.

In the models (1) and (2), presented in table 5, problems with autocorrelation occurred. In that case it is reasonable to use a first difference equation. In table 6 two regressions are showed. The first one is analogous to the first model from table 5, but refers to differences. In the second model only two significant variables appeared. In both models the tax rate is a significant variable at the 1% level. The coefficients, which are next to the tax rate, confirm that the tax is shifted to book publishers' employees.

Table 6 Regressions Explaining Changes of Wages in Book Publishers (dependent variable: $\Delta \ln w_{it}$)

<i>Dependent variable</i>	<i>Pooled panel regression</i>	<i>Pooled panel regression</i>
	<i>OLS</i> <i>(1)</i>	<i>OLS</i> <i>(2)</i>
ΔT_{it}	-1.28897*** (0.17918)	-1.16739*** (0.19602)
$\Delta \ln W_{it}$	0.93826*** (0.13098)	0.980207*** (0.10093)
ΔUR_{it}	-0.01120 (0.01186)	
ΔROS_{it}	-0.63720 (1.28422)	

Source: Standard errors are in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

All models presented above suggest that the employees of the book publisher companies bear the tax burden of the value added tax which was imposed on books. The models showed in table 5 allow concluding that an increase of the value added tax rate on books of 1 percentage point leads to a reduction in the average wage in book publisher companies in the range between 0,84% and 0,92%.

7. Conclusions

Although the value added tax is often classified as a consumption tax, it is not obvious whether it is consumers who bear the tax burden. To identify the value added tax incidence in the book market in 2003 – 2012 in CEEC, an analysis of a tax shifting has been conducted. The research suggests that the tax, at least in the short term, is not shifted to consumers, but rather to capital and labour.

The literature on the tax incidence suggests that a tax shifting to consumers takes place immediately after a tax rate change. As showed above, the value added tax on books was not shifted to consumers within five months after a tax rate change. The possible justification for the absence of consumer price changes comes rather out of neoclassical economics. Tax rates on books were generally reduced, and in some cases it was the matter of reclassification (Hungary 2006, Poland 2011, Slovakia 2004 and 2007), which according to Benedek *et al.* (2015) and David (2016) limits the extent of the pass-through to consumers. The other likely reason is that prices of books are written on them and that makes them comparatively rigid. It could also prevent the tax from being shifted to consumers.

Because the burden of the value added tax is not shifted to consumers, at least in the short term, it is borne by owners and employees of book publishers. In the case of the tax shifting to consumers it is comparatively easy to define the extent of the tax shifting, because the tax rate refers to the whole sales. The proportions between revenues and capital invested by the owners or between revenues and costs of employees are not permanent. That limits the possibility of defining precisely the extent of the tax burden shifted to capital and to labour, but it is feasible however to state how the tax influences an owner's rate of return and a remuneration of employees.

According to the econometric models, an increase in the value added tax rate on books of 1 percentage point leads to a decrease of the return on equity of book publishers between 0,43 and 0,76 percentage point. It suggests that the value added tax on books was partly shifted to capital.

Although wages are rigid, employees bear to some extent the burden of the value added tax. The regressions allow concluding that an increase in the value added tax rate of 1 percentage point leads to a reduction in the average wage in book publisher companies in the range between 0,84% and 0,92% depending on the model used. Shifting the tax to employees is possible because of different reasons. In the research, the costs of employees are analysed in real rather than nominal terms. Wages consist of a variable part and book publishers engage employees on the basis of casual work contracts.

The observed value added tax incidence allows us to raise the question of the effectiveness of tax policy aimed at supporting readership. The described consequences of the tax rate changes suggest that reduced tax rates do not have to mean lower book prices for consumers and thus they could be judged as ineffective. However, it is worth noticing, that reduced tax rates may affect a scope of publishers' offer, since a lower tax rate on books makes it easier to maintain on the market for small, weak but independent publishers.

The presented research may also have implications for understanding the allocative and distribution functions of taxes. In many studies, it is assumed that the whole burden of the value added tax is borne by consumers (Kubátová 1996). The example of the tax incidence on the book market shows that this assumption could be detached from reality. When researching an impact of taxes on income distribution, it would be important to remember that capital and labour also bear the burden of the value added tax.

The number of empirical research on the value added tax shifting simultaneously to consumers, employees and firm owners is relatively small. Further research would allow filling this gap and would increase knowledge of the value added tax incidence. Developing research within this area would help to understand the phenomenon better and to draw more general conclusions.

REFERENCES

- Adam S, Philips D, Smith S, Bettendorp L, Boeters S, Kox H, Straathof B, Stuut K, and consortium authors at CAPP, CASE, IFO, ETLA, IHS (2011): A Retrospective Evaluation of Elements of the EU VAT System. Final Report TAXUD/2010/DE/328, IFS/CPB/European Commission (DG TAXUD), 1-616.
- Alm J, El-Ganainy A (2013): Value-Added Taxation and Consumption. *International Tax and Public Finance*, 20(1):105–128.
- Benedek D, De Mooij R, Keen M, Wingender P (2015): Estimating VAT Pass Through. *IMF Working Paper*, No 15/214.
- Benzarti Y, Carloni D (2016): Who Really Benefits from Consumption Tax Cuts? Evidence from a Large VAT Reform in France, available at SSRN: <https://ssrn.com/abstract=2629380>.
- Besley TJ, Rosen HS (1999): Sales Taxes and Prices: An Empirical Analysis. *National Tax Journal*, 52(2):157–178.
- Bye B, Strøm B, Åvitsland T (2012): Welfare Effects of VAT Reforms: A General Equilibrium Analysis. *International Tax and Public Finance*, 19(3):368–392.
- Carbonnier C (2007): Who Pays Sales Taxes? Evidence from French VAT Reforms 1987–1999. *Journal of Public Economics*, 91(5-6):1219-29.
- Copenhagen Economics (2007) Study on reduced VAT applied to goods and services in the Member States of the European Union. *Final report*, 6503 DG TAXUD, 1-103.
- David P (2016): The Effects of Increased VAT Rates Applied in the EU Member States in 2014. *Society and Economy*, 38(3):331–340.
- Dixit K, Stiglitz JE (1977): Monopolistic Competition and Optimum Product Diversity. *American Economic Review*. 67(3):297-308.
- Fullerton D, Metcalf GE (2002): Tax Incidence. In: A.J. Auerbach, M. Feldstein (eds): *Handbook of public economics*. Elsevier, 4:1787-1872.
- Harberger AC (2008): The Incidence of the Corporation Income Tax Revisited. *National Tax Journal*, 61(2)303-12.
- Janský P (2014): Consumer Demand System Estimation and Value Added Tax Reforms in the Czech Republic. *Finance a Úvěr - Czech Journal of Economics and Finance*, 64(3): 246-273.
- Kosonen T (2015): More and Cheaper Haircuts After VAT Cut? On the Efficiency and Incidence of Service Sector Consumption Taxes. *Journal of Public Economics*, 131:87–100.
- Kubátová K (1996): Teoretické a Praktické Otázky Měření Incidence Daní ze Spotřeby. (Theoretical and Practical Issues of Measuring the Incidence of Taxation on Consumption.) *Finance a úvěr*, 46(6): 335–346.
- Manente M, Zanette M (2010): Macroeconomic Effects of a VAT Reduction in the Italian Hotels & Restaurants Industry. *Economic Systems Research*, 22(4):407–425.
- Mirrlees J, Adam S, Besley T, Blundell R, Bond S, Chote R, Gammie M, Johnson P, Myles G, Poterba JM (2011): *Tax by Design*. Oxford University Press.
- OECD (2014): *Consumption Tax Trends 2014*. OECD Publishing.
- Poterba JM (1996): Retail Price Reactions to Changes in State and Local Sales Taxes. *National Tax Journal*, 49(2):165-76.
- Schenk A, Oldman O (2007): *Value Added Tax. A Comparative Approach*. Cambridge University Press.