Assessing Tax Asymmetries and the Incentive to Incorporate[1]

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Abstract

The paper uses a single-period option-based model to analyze the net value of business income under uncertainty, focusing on the effects of tax asymmetries and observing the distinct features of individual and corporate forms of business organization. Its parameters include the income tax structure and corporate leverage. Results are illustrated on applications using 2007 data in the Czech Republic and Slovakia. Various asymmetries are identified and discussed, leading to a hypothesis on the incentive to incorporate, less pronounced under the Czech tax framework, which tends to favour the personal form for a range of businesses.

Keywords: *real options, income tax, incorporation, limited liability, corporate leverage, progressive taxation*

JEL Classification: C15, D81, G32, G38, H21, H30

Introduction

Public Finance faces several, often contradictory, challenges when brought to the task of setting up an efficient tax system.[2] Asymmetries tend to arise, which may either distort economic incentives, or lead to particular principals‘ choices and behavioral patterns.

Among others, an enterpreneur has the choice of operating under different legal bases. As concerns their essential forms, mainstream corporate finance literature (see e.g. Brealey and Myers, 2003) notes that a personal enterprise tends to be cheaper to establish and run (i.e. entails lower transaction costs), and

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[2] An exhaustive review of these issues is provided by Tresch (2002).

sometimes brings additional competitive advantages, such as less stringent disclosure requirements, whilst a corporate enterprise offers the benefits of permanency, easier transferability of ownership, and, most notably, limited liability. Practitioners will attest that particularly in the segment of small and medium-sized companies (SMEs), the dilemma whether to incorporate or not is a major issue, with tax being an earnest consideration.

We strive to apply a rudimentary single-period option-based model and assess the stochastic-earnings based value for these two basic alternative forms of business organization. Application is made under two separate legislations, one representing flat tax, the other a tiered-rate schedule, used in otherwise roughly comformable countries during the same fiscal year, facilitating comparison.

This paper briefly summarizes various lines of published research in the domain of dynamic tax-modelling, but is is unique as far as its application to comparative analysis of business forms is concerned. Jointly with several other papers by the same author (Vlachý, 2007, 2008a and 2008b), spanning different particular issues, it also pioneers such modelling for the Czech and Slovak economies.

1. Problem Analysis

The fundamental characteristic of enterprise is that future incomes related to any irreversible decision are uncertain.[3] This uncertainty can be quantified historically or implicitly, in terms of income volatility over a period of time.

In the real world, enterprise income will be distributed between various categories of stakeholders, such as shareholders, debtholders, employees, and the state. This leads to a complex set of value-redistribution relationships. Of these, at least since the seminal publications of Black and Scholes (1973) and Merton (1973), the shareholder-debtholder put option, representing the value of limited liability, has received much attention, due to ample availability of empirical evidence in developed capital markets.

It is reasonable to assume that the vast majority of past investments are irreversible[4], meeting the terms stipulated and exhaustively reviewed by Dixit and Pindyck (see Brealey and Myers, 2003). The tax obligation can thus be described as a real option,[5] issued by the tax-payer and held by the state, which has initially been pointed out in a 1985 working paper by Majd and Myers (1985).

[3] Typically, the statement relates to investments. However, these may be assumed in capital goods as well as e.g. human capital, which makes any conclusions quite general.

[4] In other words, such investments can be considered to be sunk costs.

[5] The real-option terminology and the analogy to financial options has formerly been suggested by Myers (1997).

The construction can be utilized to pursue miscellaneous lines of research. Vlachý (2007) demonstrates, comparing Czech and Slovak tax schedules up to 2006, that progressive taxation of personal income may result in a substantial penalty incurred by risky (i.e. enterpreneurial) income, with less risky (e.g. occupational) income taken as a benchmark. Vlachý (2008b) follows up by modelling the Czech personal tax schedule after its 2008 reform, and including social security levies as a special type of tax. Focusing on corporate taxation, Vlachý (2008a) analyzes the impacts of a particular thin-capitalization rule introduced by this reform.

Deserving mention, various other micro- and macroeconomical aspects of proportional corporate taxation have been analyzed by various authors, including Hassett and Metcalf (1999), Panteghini (2001), Sureth (2002), Niemann (2004). Implications of progressive taxation on the optimal investment treshold have been modelled by Koskela and Alvarez (2004). An option-based model has also been proposed for fiscal-budgeting purposes by Draaisma and Gordon (1996). The conclusions of such analyses can thus either be used to appraise the implications of different tax policies, or to serve as rule-of-thumb guidance for actual decisions in business or public administration.

In order to obtain and compare numerical results, we have applied the model using Czech and Slovak data as of 2007. In terms of business organization, both environments offer nearly identical terms, based on formerly common legislation stemming from the early nineties. The personal enterprise alternative can effectively be realized through the form of "physical person", or as a "physical persons' association", or as a "public commercial company". Typical for the corporate enterprise option within the segment of SMEs would be a "limited liability company".[6]

As a matter of prime interest for comparative research, the terms of the Czech and Slovak Tax Codes do differ substantially, however. The Slovak Code is based on the flat-tax proposition, introduced by a former Government since 2004, whereas the Czech Code includes elements of progression for individual taxation, such as tiered rates and a minimum mandatory tax, also emphasised by previous Governments.[7]

2. Model Development

We contend that there are two basic ways in which an individual can technically gain access to entrepreneurial incomes. He can run a business as an individual, where the enterprise incomes are earned (and taxed) directly. Alternatively,

[6] In Czech, the respective terms are "fyzická osoba-podnikatel", "sdružení fyzických osob", "veřejná obchodní společnost" and "společnost s ručením omezeným".

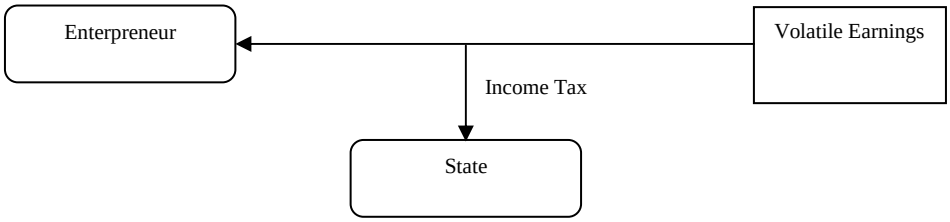
[7] Ironically, in both countries recent General Elections have brought to power administrations, which strive hard to reverse these earlier policies.

he can invest through owning a stake in a company. The cash flows and their distribution can then be illustrated as per Figure 1.

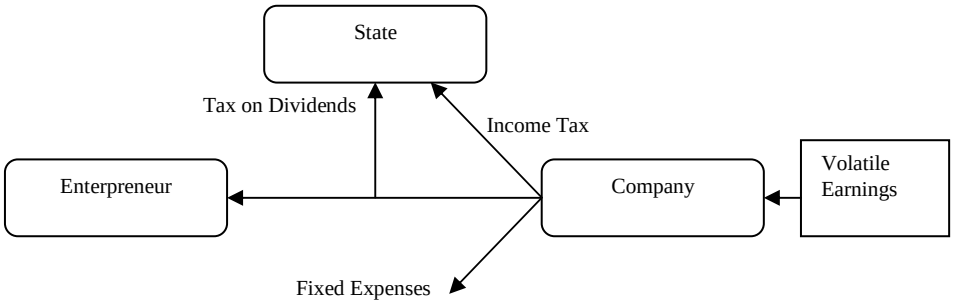
Figure 1

Cash-Flow Distribution Models

A. Personal Enterprise



B. Corporate Enterprise



Source: Author.

In both cases we assume that the sole form of taxation is an Income Tax due annually, which can be levied both at the corporate and individual level. For convenience only, representation will be made as if no other individuals participated in the enterprise; in fact, this may as well represent a particular partnership/shareholding stake.[8] We focus primarily on the typical SME situation where the management – shareholding positions tend not to be separated, which dispenses with the agency problem.

The value of the business, i.e. the fundamental criterion for enterpreneurial decisions, is a function of expected business income, which is subject to a business risk expressed by income volatility. Business income may flow directly to the enterpreneur's account, where it is distributed between his personal income

[8] Such an approach is legitimate provided the partners are of equal standing, i.e. they do not differ in terms of their stakes' seniority.

and the income due to the state. It can, alternatively, accrue on the account of a firm, which proceeds to pay its fixed obligations, such as debt, lease and tennancy instalments, salaries, depreciations and amortizations.[9] The balance then belongs partly to the state, partly to the investor, who may be further obliged to declare the dividends.

There is an implicit assumption that any free cash flows would be immediately distributed in the form of dividends. Whilst it may be unrealistic in practice, as pointed out by Lintner (1956) and subsequent literature, we argue that it has only marginal, if any, impact on the overall conclusions, provided there is a relatively low time value of money and a constraint on outright hoarding, perhaps stimulated by the existence of a tax shelter. Essentially, these terms would be met by the model being used in a low-inflation environment and the investors refraining from keeping available funds, unneeded for investment, in the company. It should be further noted that reinvested retained earnings would still be taken into account through the parameter X, which does include operating leverage.

Three dynamic parameters are included in the model:

- Current business income (R);
- Expected annual income growth (r);
- Annual income volatility (σ).

Structurally, the model differs for the the corporate and individual enterprise alternatives. The corporate model includes:

- Present value of a fixed annual expense commitment (X);
- Corporate income-tax rate (τ_C);

Note that a relative parameter λ[10] is implied as $\lambda = X/R$.

- The personal model, on the other hand, features (where applicable):
- Marginal personal income tax rates (τ_i; $i = \{1; \ldots n\}$);
- Individual rate ceilings (B_i; $i = \{1; \ldots n - 1\}$);
- Tax-exempt earnings allowance (B_0);
- Tax credit (C);
- Witholding-tax rate on dividends (τ_D);
- Minimum mandatory tax base ($T_{\min}$).

Generally, option values $V = f(R, r, \sigma, S, t)$ can be solved analytically or numerically.[11] For the valuation of the respective options, we have used an analogy of the closed-form solution derived by Merton (1973) which has been shown by

[9] Similar items normally tend to be tax-deductible, the present model assumes that this would always be the case.

[10] We believe that it is appropriate to use the term "Leverage" for λ, as the parameter, in fact, combines the cash-flow based features of both financial and operating leverage.

[11] For a detailed overview of options and their valuation techniques, see e.g. Hull (2005).

Rubinstein (1976) to hold for non-traded values (i.e. the underlying indices of real options), under fairly general assumptions.

In principle, Rubinstein's valuation method can be applied as follows: First, payoffs have to be defined at the option's expiry date. Second, the expected value of the payoff function is calculated under the assumption that the underlying asset value is lognormally distributed. Third, this expected value will be discounted using a rate, commensurate with the costs of withholding the underlying asset.[12] For example, under flat tax with a tax-exempt allowance B_0, the payoffs at the time of assessment for the state as one of the stakeholders can be stated as follows:

$$T_t = \tau \max\{R_t - B_0; 0\}$$

The payoff function T_t is thus contingent on whether the value of income R_t is in-the-money (i.e. $R_t \geq B_0$) in terms of the state's call option, or out-of-the-money ($R_t < B_0$). Since $T_t = 0$ if $R_t < B_0$ and $T_t = R_t - B_0$ if $R_t \geq B_0$, the expected value of the tax claim, if positive, is given by:

$$\mathrm{E}(T_t) \mid (R_t \geq B_0) = \mathrm{E}[\tau (R_t - B_0) \mid (R_t \geq B_0)]$$

Assuming there is a particular probability of $\Pi[R_t \geq B_0]$, the expected value of T_t can be stated as:

$$\mathrm{E}(T_t) = \Pi[R_t \geq B_0]\ \mathrm{E}[\tau (R_t - B_0) \mid (R_t \geq B_0)]$$

Defining $\gamma = \ln(R_t/R)$, where R is the current value of the taxpayer's income, and substituting, this leads to:

$$\mathrm{E}(T_t) = \tau R \Pi[\gamma \geq \ln(B_0/R)]\ \mathrm{E}[(\mathrm{e}^{\gamma} - B_0/R) \mid (\gamma \geq \ln(B_0/R))]$$

We thus establish the formula for calculating the expected value of a firm's tax liability at time t, where we have defined as $f(\gamma)$ the probability density function of the stochastic variable γ, representing continuously compounded income growth over that time period:

$$\mathrm{E}(T_t) = \tau R \int_{\ln\left(B_0/R\right)}^{\infty} \left(e^{\gamma} - B_0/R\right) f(\gamma) d\gamma$$

Assuming R_t to be lognormally distributed, γ will be normally distributed around the mean $\ln(\mu_R) = \mu_\gamma + \sigma_\gamma^2 / 2$, where σ_γ^2 represents the variance of γ and μ_γ its expected value. Taking $t = 1$, which represents the usual annual assessment period, we then get the solution:

[12] It is to be noted that, due to incompleteness of the relevant markets, r need not necessarily equal the risk-free rate of interest, as would be the case with financial options.

$$T = \tau\,[R\,N(d_1) - B_0\,e^{-r}\,N(d_2)]$$

where $N(d_1)$ denotes the standard normal cumulative distribution for

$$d_1 = \ln(R\,e^{r}/\,B_0)\,/\,\sigma + \sigma\,/2, \text{ and } d_2 = d_1 - \sigma$$

Obviously, this is an analogy of the familiar Black-Scholes model for the valuation of a European call option on an underlying asset, whose current market value amounts to R, featuring the excercise price B_0, and a time to expiry of one year. The parameter r represents the expected annual income growth.

For the corporate model, which includes total leverage $\lambda = X/R$, we substitute $\lambda\,R$ for X, with the future value $X\,e^{r}$ replacing B_0 from the personal model as the option's strike price. The solution of the probability density function can then be stated as:

$$T = \tau\,R\,[N(d_1) - \lambda\,N(d_2)] \text{ for } d_1 = \ln(\lambda)\,/\,\sigma + \sigma\,/2;\; d_2 = d_1 - \sigma$$

More generally, valuation of the tax claim under an n-tiered rate schedule can be described using formula:

$$T = \sum_{i=1}^{n}(\tau_i - \tau_{i-1})\left[RN(d_i) - B_{i-1}e^{-r}N(d_i - \sigma)\right]$$

with $\tau_0 = 0$ and $d_i = \ln(R\,e^{r}/\,B_{i\text{-}1})\,/\,\sigma + \sigma\,/2$ for $i = \{1, 2, \ldots n\}$.

The payoffs, characterized by particular structures of the tax codes, thus translate into more-or-less complex option combinations, describing the income-dependent payoffs by the end of the year of assessment. For example, the Czech personal income-tax model uses five European-style call options, and three put options (both long and short), written at various strike prices,[13] as suggested by Vlachý (2007).

Effective rates are calculated simply by dividing T/R under simulations of various scenarios.

3. Model Application and Results

We have applied the model under the 2007 terms of the Czech and Slovak Tax Codes, as summarized in Table 1.[14] The Slovak tax is essentially flat, at a single 19% rate, avoiding double-taxation of corporate earnings. Individuals may file tax-exempt earnings up to a fixed amount.

[13] This includes options related to the mandatory tax base.

[14] The model is purported to be a generalization and thus does not include miscellaneous deductible items, exemptions etc. which currently abound mainly within the Czech legislation. We should also point out that neither social security taxes nor mandatory health policy levies are part of the model (that issue is addressed in more detail by Vlachý (2008b).

In the Czech Republic, there is a rate of 24% on corporate profits, plus a withholding tax on dividends, which effectively results in a rate on distributed income (assuming a dividend ratio $D = 1$) of 35.4%. As concerns personal incomes, there are four gradually ascending tax brackets ranging from 12% to 32%. There is no tax-exemption, but payers may claim a personal tax credit. There is also a minimum mandatory tax obligation for the vast majority of non-wage earners, which features automatic annual indexation, in contrast to the other parameters.

In both cases, we have used the latest published antecedent (i.e. 2006, end-of-year) nominal wage growth index as a proxy for r. This provides for the inclusion of the bracket-creep effect into the models.

T a b l e 1

Structural Parameters of the Models

Parameter	Czech Republic	Slovakia
t	1	1
r	6.4%	8.0%
τ_C	24%	19%
n	4	1
B_0	–	SKK 95 616
B_1	CZK 121 200	–
B_2	CZK 218 400	–
B_3	CZK 331 200	–
τ_1	12%	19%
τ_2	19%	–
τ_3	25%	–
τ_4	32%	–
C	CZK 7 200	–
$T_{\min}$	CZK 120 800	–
τ_D	15%	–

Sources: Czech Republic Act No. 586/1992 Coll.; Slovak Act No. 595/2003 Coll. (both as of 2007); Czech Statistical Office; Slovak Statistical Office (both 2006, end-of-year data).

Running a simulation of the model, we derive the net-income value under various income, volatility and leverage assumptions. An illustrative summary of selected results is shown in Tables 2 and 3.

Note that we are showing here several representative income categories, characterized by selected values of R, with benchmark volatilities set at $\sigma = 20\%$ and $\sigma = 50\%$, respectively. As indicated earlier, a particular income relates to a single investor's or partner's share, not necessarily to that of the enterprise as a whole.

The exhibits show the respective effective annual tax rates for individual enterpreneurs τ_P, the effective annual tax rates for investors in a company τ_λ (whose leverage $\lambda = X/R$), arbitrarily using $\lambda = 50\%$, and the break-even leverage λ^*, at which the respective effective rates would match, as well as the actual fixed expenses X^*, corresponding to $\lambda^*(50\%)$.

T a b l e 2

Income and Volatility Dependencies – Czech Republic

R [CZK]	200 000	300 000	400 000	500 000	1 000 000	2 000 000
σ_P (τ = 20%)	11.85%	16.31%	19.76%	22.16%	27.08%	29.54%
σ_P (τ = 50%)	13.44%	17.50%	20.39%	22.44%	27.09%	29.54%
$\sigma_{50\%}$ (τ = 20%)	18.80%	18.80%	18.80%	18.80%	18.80%	18.80%
$\sigma_{50\%}$ (τ = 50%)	19.13%	19.13%	19.13%	19.13%	19.13%	19.13%
$\lambda^*(\sigma$ = 20%)	71.1%	57.5%	47.1%	39.9%	25.0%	17.5%
$\lambda^*(\sigma$ = 50%)	71.2%	55.7%	45.9%	39.3%	25.0%	17.5%
X^* [CZK]	142 400	167 100	183 600	196 500	250 000	350 000

Source: Author.

T a b l e 3

Income and Volatility Dependencies – Slovakia

R [SKK]	200 000	300 000	400 000	500 000	1 000 000	2 000 000
σ_P (τ = 20%)	10.61%	13.41%	14.81%	15.65%	17.32%	18.16%
σ_P (τ = 50%)	10.75%	13.42%	14.81%	15.65%	17.32%	18.16%
$\sigma_{50\%}$ (τ = 20%)	10.23%	10.23%	10.23%	10.23%	10.23%	10.23%
$\sigma_{50\%}$ (τ = 50%)	10.40%	10.40%	10.40%	10.40%	10.40%	10.40%
$\lambda^*(\sigma$ = 20%)	48.0%	31.9%	23.9%	19.1%	9.6%	4.8%
$\lambda^*(\sigma$ = 50%)	47.8%	31.9%	23.9%	19.1%	9.6%	4.8%
X^* [SKK]	95 600	95 600	95 600	95 600	95 600	95 600

Source: Author.

The results suggest several interesting insights. Firstly, the effective tax rates for different volatilities, tend to differ under the Czech personal tax model, with ${}^{CZ}\tau_P(50\%) > {}^{CZ}\tau_P(20\%)$. Vlachý (2007) argues in more detail that this penalty on volatile earnings, most pronounced on median and below-median incomes, is due to the progressive characteristics of the tax, comprising tiered rates and the minimum mandatory tax liability.[15]

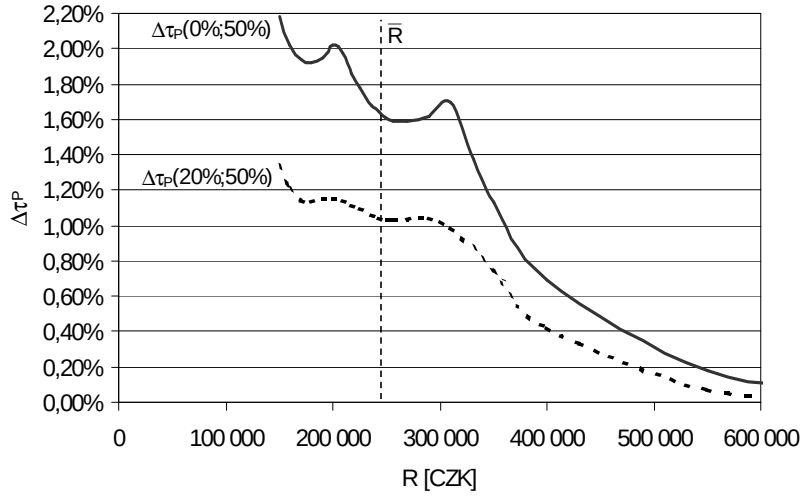
Figure 2 visualizes the penalty $\Delta\tau_P(\sigma_1;\sigma_2) = \tau_P(\sigma_2) - \tau_P(\sigma_1)$; $\sigma_2 > \sigma_1$ as a function of income, with $\overline{R}$ indicating the average-wage level.

On the other hand, the effective corporate tax rates remain unchanged across all possible income levels, that tax being purely proportional. However, at a given leverage, they will always be higher for higher volatilities, i.e. $\tau_C(50\%) > \tau_C(20\%)$. This is due to the tax-shield not protecting the value of the limited-liability put option held by the shareholder. While the particular figures in Tables 2 and 3 presume an arbitrary leverage of λ = 50%, the essence of this inequality will hold for any $\lambda > 0\%$, with the effect increasing at higher levels of leverage (see Figure 3). Of course, considering the tax asymmetry, a higher λ principally lowers the effective tax rate, as postulated by Miller and Modigliani (1963).

[15] The effect does appear under the Slovak model as well, but is very slight and affects very low incomes only, due to progression incurred solely through the tax-exempt allowance.

Figure 2

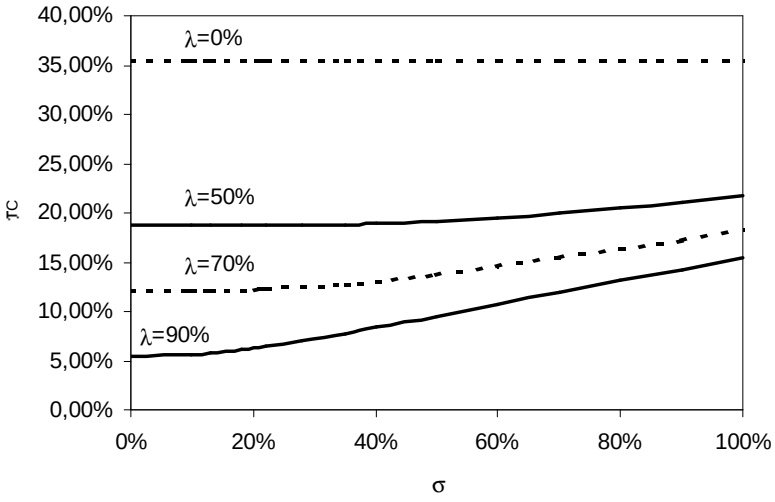
The Tax Penalty on Risky Personal Income



Source: Author; Czech Statistical Office (2007 data).

Figure 3

The Corporate Leverage Effect



Source: Author.

Observing the levels of corporate leverage λ^*, at which the effective rates for the corporate form of organization match those of the individual enterprise, one easily notices that these tend to diminish at higher incomes. Particularly under the Czech tax code, it is clearly prohibitive to incorporate at low expected incomes,

not even taking various other aspects, such as transaction costs, into account.[16] Interestingly, the break-even leverage for the Slovak model (in contast to the Czech one) comes up to fixed annual expenses[17] of X^* = SKK 95 616, irrespective of total business income and its volatility, which is due to the neutrality of the flat tax.[18]

We may point out another particular context to this result. Provided, for the sake of argument, that a company in Slovakia used all of its equity solely for the financing of fixed assets, carrying, on the average, a 20% rate of amortization. Its fixed, tax-deductible expenses would then amount to the break-even SKK 95 600 subject to a capital floor of SKK 478 000. That is well above the statutory minimum for a limited liability company, but below that of a joint-stock company (Table 4). There is thus an incentive to set up a limited liability company solely from the tax point of view, provided the enterpreneur intends to incur investments of ca SKK 0.5 million.

Within the Czech framework, the commensurate break-even would be considerably higher, as well as income-dependent, implying e.g. investments of CZK 0.85 mil. for annual incomes of CZK 300 000, and CZK 1.75 mil. for incomes of CZK 2 mil. To outline the functional trend, we may further note that for R = CZK 20 mil., the fixed expenses required to break even would amount to X^* = CZK 2.2 mil., corresponding to investments of CZK 11 million.

This may conceivably be one of the reasons why limited liability companies (s. r. o.) are relatively more frequent in Slovakia, when compared either to the numbers of individual enterpreneurs, of joint-stock companies (a. s.), or to the sum of all these business forms taken together (Table 4).

T a b l e 4

Organizational Statistics in the Czech Republic and Slovakia

	Individual	**a. s. (Joint Stock Co.)**	**s. r. o (Ltd.)**
Registered units (CZ)	1 796 336	18 093	244 417
% of total	87.25%	.88%	11.87%
Registered units (SK)	388 246	4 786	80 638
% of total	81.97%	1.01%	17.02%
Statutory capital (CZ)	–	2 000 000	200 000
Statutory capital (SK)	–	1 000 000	200 000

Sources: Czech Statistical Office; Slovak Statistical Office (both 2006 end-of-year data); Czech Republic Act No. 513/1991 Coll.; Slovak Act No. 513/1991 Coll. (both as of 2007).

[16] In fact, leverage seems to be the only rational incentive to incorporate, as the unleveraged Czech effective rate is 35.4%, i.e. well above the top personal rate.

[17] These can be easily calculated as $X^* = \lambda^* \times R$.

[18] Obviously, this figure equals the tax-exampt allowance ${}^{SK}B_0$. This is due to the fact that under flat tax with equal personal and corporate rates, the corporate model matches the individual one when strike prices ${}^{SK}B_0 = {}^{SK}X$.

Note that the capital prerequisites for the setting up of limited liability companies (společnost s ručením omezeným) are identical in both countries, while those for the joint-stock companies (akciová společnost) are more stringent in the Czech Republic.Summary and Conclusions

The model demonstrates several asymmetries of existing tax legislations when applied in a dynamic environment. They are much more pronounced under progressive taxation of personal income and a generally higher tax quota (Czech Republic), even though they are not completely absent under a flat-tax schedule (Slovakia) either, mainly due to the availability of tax shields.

In addition to the distortive effect of tiered rates on tax-payers‘ willingness to take risks and thus invest in physical and human capital, which is essentially endorsed by mainstream economic literature, we find that the flat rate schedule as designed in Slovakia effectively eliminates a vested incentive under the Czech system to avoid incorporation for a range of businesses. Namely, high corporate rates and a progressive personal schedule, combined with a withholding tax on dividends, make it more advantageous to run small businesses on a personal basis in the Czech Republic, unless they are particularly capital-intensive and/or risky.

We note that, as of 2008, the Czech Republic has introduced flat-tax features into its tax code and it remains to be observed whether this will influence the business organization preferences of entrepreneurs in the long run. However, as Vlachý [19; 20] shows, there are various reasons to believe that the Czech reform effort has stopped short of achieving perfect neutrality.

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