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Earnings Disparities in the Czech Republic: Evidence from the Past Decade and a Cross-national Comparison

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1. Introduction

Through ownership restructuring and the liberalization of labor contracts, economic reforms in the Czech Republic since 1989 have profoundly affected earnings distribution. Continuing our previous research (Vecernik, 1991, 1995), we here offer a more contemporary depiction of earnings disparities and causality. To what degree have the returns to education increased and work incentives strengthened, and to what extent has the Czech wage structure approached those of advanced capitalist countries regarding disparities and the causes thereof. Unfortunately, few of these questions can be answered to any degree, as the database of wage surveys is rather limited and only a few variables can be analyzed in a consistent cross-time and cross-national comparison.

In the first part of this study, we look at the present level of wage inequality in the Czech Republic and observe the main factors of disparity. In the second part, we present evidence toward a cross-national comparative analysis. We document that (1) the introduction of a market economy led to significant increases in earnings disparities; (2) the "communist demographic" determination of earnings is being replaced by the capitalist characteristics of workers in the new market economy; (3) previously socialist preferences for the secondary sector are disappearing in the economy in favor of the better wage position of the service (tertiary) sector, however uneven among branches; (4) while political privileges are disappearing, ownership disparities become important; and (5) the earnings structure approaches models characteristic for Western countries.

Throughout the text, we try to capture change in earnings distribution qualitatively and systemically. This is tentatively summarized in *Schema 1*. It suggests that the whole context of earnings disparities is changing, starting with the general economic goal that proceeds from so-called extensive growth with little regard to costs to so-called intensive growth involving much better use of resources, including human capital. Instead of communist equalization where little disparities reflected mostly the reproduction costs of workers (with the main attention to heavy manual work), market differences appear which reflect better individual contribution to productivity of labor and efficiency of production. However, no radical breaks have occurred in fact – the two columns of Schema 1 depict model pictures representing approximation of much more complicated and blurred reality.

2. Earnings disparities in economic transition

The transition to a market economy has opened great opportunities for private entrepreneurship, employment in foreign firms, and higher earnings for higher managerial positions. High earnings were accorded to employees in finance and in the top echelons of the state bureaucracy. The possibility was opened for rewarding work differently according to skills and performance. Newly established and foreign firms have had greater liberty in wage settings, and attract highly skilled people by offering considerably higher wages. Job mobility increased as individuals found better-remunerated jobs, were promoted in *de novo* private firms or sought work abroad. After state wage regulations were removed,

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formerly state-owned companies also began to have greater discretion in compensating their employees. All of this contributed to a general de-equalizing trend in wages.

SCHEMA 1 Earning disparities under a command and a market economy

Characteristic	Command economy	Market economy
General economic goal	Amount of product (high-costs growth)	Productivity, efficiency (low-costs growth)
Generator of inequality	The state and (marginally) the labor market	The labor market and (considerably) the state
Distribution according to	Basic needs, loyalty to the regime	Skills, performance, network visibility
Main factors of disparities	Gender, age, hard manual labor	Human capital, entrepreneurship
The role of education	State investment generating small disparities	Individual investment generating large disparities
The role of age	Generation, accumulated loyalty (linear increase)	Career, accumulated experience (curvilinear)
Preferred branches	Mining, metallurgy, heavy manufacturing	Finance, top technologies, professional services
Managerial premiums given for	Political position, risk aversion	Innovation, risk taking
Public/private sector distinction	No	Important

The rise in disparities was attenuated by some adverse measures. A previously non-existent national minimum wage was set by the state in 1991 and increased soon thereafter. However, it was subsequently kept frozen until 2000, when the current Social Democratic government ruled that the minimum wage had crossed below the official subsistence minimum for an individual adult. Wage growth continued to be state controlled until 1992, when wages were partially liberalized, but regulation remains, though in a less-strict manner, for state-owned firms. After a lack of any control in the beginning of 1993, tax-based wage regulation was re-introduced, but then completely removed again in 1995. The fact that the conduct of firms has not changed since 1995 may attest to the uselessness of this manner of wage restraint (Flek, 1996).

2.1 Empirical evidence

The most obvious data source on earnings are wage statistics based on surveys of firms. The coverage of these surveys has changed over time. Until 1992, only companies with 100 or more employees were included; since 1992, the coverage was expanded to firms with +25 employees and, since 1997, firms with +20 employees were included. Banking and insurance and public organizations were included without employee limits. Whereas between 1993 and 1995 information on wage distribution was estimated combining various sources, in 1996 and 1997 wage surveys were again collected as a sample survey for units with 1-999 employees, with full coverage of larger organizations following the recommendations of Eurostat, the statistical office of the European Commission. Since 1998, the database of *Information System on Average Wage*, administered by the Trexima company for the Ministry of Labor and Social Affairs of the Czech Republic, has been used instead of wage surveys.

Wage statistics produced by or under the auspices of the Czech Statistical Office (CSO) are surely the best source for presenting basic figures on changes in earnings disparities over time.

However, given our main focus on distribution issues and the effort to identify various factors affecting wage distribution, we need to use micro data toward original analyses. For our purpose, the best source are the "personal" files ofCSO household income surveys – Microcensuses – from the years 1988, 1992 and 1996. Their advantage is that they are conducted on large samples representative of the entire population. The disadvantage, however, is that they do not include important variables such as industry or occupation, except for the 1996 survey. An additional problem is that, whereas before 1989 wage data were provided by employers, they are reported by individual respondents thereafter.

The dependent variable in our analyses is earnings, meaning all forms of wage and salary incomes from dependent labor gross of employee taxes but net of employer taxes. In some explicit cases, we also include self-employed earnings. Such a definition of earnings conforms to the *Luxembourg Income Study* definition, as per Smeeding and Coder (1993), which is then suitable for cross-national comparisons. For the sake of comparability with wage statistics and over time, we limit our analysis of Microcensus data concerning the full-time labor force by excluding cooperative farmers. This latter group was never included in wage surveys and was exempted from wage taxes under the communist regime, and largely disappeared after 1989.

For some additional variables and questions, we also use sociological surveys. For the early phase of transition, *Social Stratification in Eastern Europe after 1989* is sometimes used (Chase, 1998) (Vecernik, 1996). For longitudinal observation, the 1990–1998 series *Economic Expectations and Attitudes (EEA)* can serve as in some surveys a set of employment variables is included, such as ownership status and firm size, trade union membership and secondary jobs, etc. (Flanagan, 1995) (Vecernik, 1996) (Lorenz – Hraba – Pechacova, 1999). More focused are the 1992 and 1999 ISSP modules in *Social Inequalities*, also including a retrospective self-assessment on income position. Yet another is the survey *SIALS (Second International Adult Literacy Surveys),* which adds literacy skills to a standard human capital set of variables (Vecernik, 1999).

2.2 Overall inequality

All available data confirm that, since 1989, earnings inequality has risen. According to wage surveys, the decile ratio rose throughout 1989–1999, from 2.45 to 2.8, i.e., by 14 percent. According to Microcensus data, the decile ratio increased in 1988-1996 from 2.44 to 3.11, i.e., by 27 percent. However, we have to bear in mind that the decile ratio, which is the ratio of the lower-bound value of the tenth decile of wage distribution to the upper-bound value of the first decile, does not take into account the earnings of the lowest and highest 10 percent of earners. If we relate the averages of the upper and lower ten percent, then the ratio appears even higher and the change over time becomes more important. Various sources converge to an estimate of 6:1 as the ratio of the high-to-low average income decile in the mid-1990s, which is almost twice that of 1989 (*Table 1*).

Statistical evidence on the inequality of earnings after 1989 is not unambiguous. According to wage statistics, the widening of disparities occurred differently in various periods. Whereas up to 1992 the fastest changes were associated with high-wage categories, which moved upwards, after 1992 low wages began to move downward. However, neither statistical wage surveys conducted later nor sociological surveys confirm a considerable drop of low-wage categories in relative terms. What is certainly sure is that the top category of income distribution has considerably increased while the bottom income category was stable or only slowly rising. This means that differences in the middle of earnings distribution relatively narrowed and the bulk of income disparities remained compressed.

Table 1 Distribution of earnings by deciles (percentage and coefficients)

Deciles and coefficients	Wage statistics gross wage				Microcensus gross earnings			EEA net earnings		
	1989	1993	1997	1999	1988	1992	1996	1993	1996	1998
1	4.7	4.4	4.6	4.4	5.3	5.0	3.9	4.8	4.4	4.3
2	6.5	5.6	5.9	5.8	6.6	6.1	5.5	5.6	5.3	5.2
3	7.3	6.6	6.9	6.7	7.4	6.9	6.6	6.4	6.3	6.2
4	8.2	7.4	7.7	7.5	8.3	7.7	7.5	7.2	7.1	7.2
5	9.1	8.4	8.5	8.3	9.2	8.5	8.4	8.1	7.9	7.9
6	10.1	9.4	9.3	9.1	10.0	9.4	9.4	9.0	8.8	9.0
7	11.0	10.7	10.2	10.1	10.9	10.4	10.4	10.5	10.0	10.1
8	12.2	12.2	11.0	11.4	12.0	11.7	11.8	12.1	11.4	11.8
9	13.7	14.6	13.1	13.8	13.3	13.8	14.1	14.1	14.3	14.2
10	17.2	20.7	22.8	22.9	17.0	20.5	22.4	22.2	24.5	24.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio 10:1	3.7	4.7	5.0	5.2	3.2	4.1	5.7	4.6	5.6	5.6
Robin Hood Index	14.1	18.2	17.1	18.2	13.2	16.4	18.7	18.9	20.2	20.2
Coefficient Gini	-	-	-	-	0.19	0.23	0.24	0.25	0.27	0.27

Sources: Microcensus 1989, 1992 and 1996; Wage surveys 1989-1997; EEA January 1993 and 1996, and April 1998.
Note: Net earnings according to EEA surveys also include self-employed persons.

The change in the overall range of earnings informs us about the abstract "space of inequality," but not about the concrete disparities themselves, their meanings and their factors. A more important question than how large the differences in earnings are is how they actually work within the labor market and business environment in rewarding various aspects of jobs and workers. A related question is in which direction are the concrete differences moving. Unfortunately, such a picture can be presented in much fewer dimensions that we would wish and need, given the limited availability of worker characteristics in wage statistics and income surveys.

2.3 Demographic factors

The weak status of skilled labor, the dominance of political criteria and the application of the "needs principle" under the communist regime in Czechoslovakia resulted in the far greater prevalence of demographic characteristics of workers over economic ones in determining the level of earnings. Particularly in the free-market Czech Republic, gender was the main variable of wage disparities. Age was also important because of the coincidence of its generational and career meanings. The founders of the communist regime, a young generation in 1948, were treated preferentially their whole lives. Further, older age served as a "special qualification" for top management. Unlike gender and age, skills and job requirements were less important (Vecernik, 1991).

Regression analyses of 1988 and 1996 data document the extensive or even revolutionary changes in the earnings structure (*Tables 2a* and *2b*). While in 1988, gender explained 30.5 percent of the variance of earnings, its weight dropped to 12.6 percent by 1996. This obviously does not mean that the gender wage gap decreased that dramatically, but it suggests that the importance of this

dimension has diminished in the context of a thoroughly changing earnings structure. Also, the weight of the age variable (5-year categories) halved and the total weight of demographic characteristics (gender and age together) decreased from 40 to 17 percent. In contrast, the explanatory power of education (measured crudely by four types of highest degree achieved) has increased from 11 to almost 20 percent. This suggests that in a relatively short time span, education became the paramount factor in earnings variance.

TABLE 2a Regression analysis of (ln) earnings by gender, age and education: non-standardized coefficients

Independent variable	1988		1996	
	1	2	1	2
Gender (men)	0.380	0.366	0.358	0.369
Age:				
25–29	0.139	0.109	0.177	0.108
30–34	0.223	0.203	0.225	0.154
35–39	0.274	0.264	0.251	0.194
40–44	0.315	0.304	0.256	0.222
45–49	0.317	0.308	0.257	0.223
50–54	0.316	0.316	0.254	0.211
55–59	0.246	0.245	0.192	0.149
60–	0.055	0.059	0.174	0.295
Education:				
vocational		0.060		0.157
secondary		0.143		0.421
university		0.329		0.746
Intercept	8.212	8.103	9.433	9.211
Adjusted R2	0.398	0.475	0.172	0.365

Sources: Microcensus 1989 and 1996.
Notes: Omitted categories: age -25; elementary education.
All coefficients significant on the level < 0.001.

TABLE 2b Regression analysis of (ln) earnings by gender, age and education: summary of adjusted R^2

Independent variable	1988		1996	
	univariate	additive	univariate	additive
Both genders				
Sex	0.305	0.305	0.126	0.126
Age	0.078	0.398	0.036	0.172
Education	0.111	0.475	0.195	0.365
Men				
Age	0.159	0.159	0.073	0.073
Education	0.096	0.244	0.210	0.267
Women				
Age	0.112	0.112	0.040	0.040
Education	0.145	0.276	0.247	0.293

Sources: Microcensus 1989 and 1996.
Note: All coefficients significant on the level < 0.001.

A regression analysis separate for men and women shows some dissimilarities. The weight of age is still somewhat greater among men than women, while education is somewhat more important for women than men. Both demographic factors taken together determine women's earnings more than men's. By comparing sums of univariate R^2 with the multivariate additive results, we see that among men, the former is higher than the latter, whereas the opposite is true with women. Also, results of the SIALS survey support the hypothesis that while, with men, characteristics of education

and experience function relatively separately and, therefore, one could be then replaced by the other, both job requirements shall be met by women simultaneously.

Unfortunately, available data do not allow more detailed study, such as concretely indicating which characteristics of workers actually fill up the space left by the decreasing effects of gender and age, which are not fully compensated by the increasing effect of education. We might speculate that instead of being determined by demographic characteristics, earnings are more determined by occupation, industry and the sector of ownership. This cannot be analyzed on homogeneous data across time, because the variable occupation based on the first two-digits of the ISCO code (28 categories), as well as detailed variable of industry, were included only in the 1996 survey. The only way to recover this deficiency is to use retrospective information, such as Daniel Munich, Jan Svejnar and Katherine Terrell provided (1999). However, income retrospect can be biased by (the usual) overestimation of past earnings and underestimation of current earnings.

2.4 Returns to education and experience

According to the theory of human capital, education and experience determine the productivity of labor and, consequently, worker's earnings (Becker, 1964). From this point of view, communist Czechoslovakia was among those countries where the importance of education was the most downgraded. This was true not only in comparison with the advanced West, but also with other Central and East European (CEE) countries. After a period unfriendly to the evaluation of human capital and to investment into it, one can expect a reactionary effect and a rapid increase of rewards to those with higher levels of education, despite the problematic nature of skills and diplomas received during the communist era.

Disparities according to education have increased significantly during the transformation period. Relative to the average, workers with only an elementary education (which is a rapidly disappearing category) saw a decline from 90 to 70 percent of the average in 1988–1996 while university-educated workers strengthened their wage position from 134 in 1988 to 165 percent in 1996. The range of disparities between workers with an elementary and with a university education for both genders increased from 1.48 to 2.37 in the same period, and was somewhat higher for men than for women in 1996. The greatest absolute and relative increase was registered by both men and women with university education (*Table 3*).

To measure changing return to education and experience according to a standard procedure, we use Mincerian equations (Mincer, 1974), written as:

$$ln(y) = b_0 + b_1 s + b_2 e + b_3 e^2$$

where $ln(y)$ = natural logarithm of earnings, s = years of schooling and e = years of experience. As usual, the schooling variable is calculated by taking the years needed on average to get the degree reported in the survey, while experience is calculated as age minus schooling minus six. In order to distinguish among returns of various educational levels we use another equation in the form:

$$ln(y) = b_0 + b_1 sv + b_2 ss + b_3 su + b_4 e + b_5 e^2$$

where $b_1 sv$ = dummy for vocational training, $b_2 ss$ dummy for high school and b_3 = dummy for university education, with elementary education as an omitted category.

We have to note that over the actual lifetimes of the individuals surveyed in the sample, the education system was repeatedly restructured. To homogenize various systems of schooling, we thus averaged elementary education (the reference group) as corresponding to eight years of compulsory schooling from the age of six, followed either by vocational school (three years) or secondary school (four years) and university (another four to five years). The data do not distinguish post-graduate university qualifications, which are uncommon. All earnings functions are estimated by ordinary least squares (OLS).

TABLE 3 Earnings by education and gender (percent of the average)

Level of education	Both genders			Men			Women		
	1988	1992	1996	1988	1992	1996	1988	1992	1996
Elementary	90.5	75.7	69.6	90.5	81.0	73.0	93.1	80.3	74.6
Vocational	95.4	92.9	87.6	95.4	90.3	85.9	93.9	85.2	81.8
Secondary	101.4	103.7	106.9	102.2	104.5	110.3	104.3	112.6	112.7
University	134.0	144.0	164.7	124.6	140.0	161.3	133.1	145.4	160.7
Average	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
In % of total	100.0	100.0	100.0	115.3	119.3	116.4	79.6	77.8	81.7
Ratio univ/elem	1.48	1.90	2.37	1.38	1.72	2.21	1.43	1.81	2.15

Sources: Microcensus 1989, 1992 and 1996.

At the end of the communist era, one year of schooling increased men's earnings by 4.0 percent and women's earnings by 5.1 percent. In 1992, this figure increased to 6.1 percent for men and 8.0 for women; in 1996, the return amounted to 8.3 percent for men and 9.4 for women. Simultaneously, the effect of experience (years on the job) on earnings was stagnating. Whereas in 1988 the effect of experience (or, rather, the joint effect of a person's age and his/her generation demographic) were nearly as strong as those of education for men, education clearly dominated over experience in 1996 (*Table 4*).

Our results are basically consistent with other observations. According to Filer, Jurajda and Planovsky (1999), who used a database of firms, return to education for men in the Czech Republic amounted to 8.1 percent in 1995 and 9.0 in 1997. However, according to Munich, Svejnar and Terrell (1999), who used a special survey that reached households containing 4,700 individuals in the labor force, the return to education in 1996 amounted only to 5.8 percent for men and 7.0 for women, which is rather low, and which is close to the Microcensus figures for 1992. The underestimation of disparities according to education are otherwise quite common also in sociological surveys where people tend to respond by estimating net rather than gross earnings, even if they are asked for the latter.

2.5 Earnings by industry

After 1989, regressive changes occurred in agriculture, manufacturing and transport industries. The position of the service branches, however, improved somewhat. Trade and catering, health and social services slightly improved their earnings positions, while education, research and culture stagnated. The most apparent change is in the expansion of the banking sector, which advanced considerably by utilizing all possible means, even by paying penalties for overstepping the limit of allowed wage increases. In the last two years, health services, education and administration experienced several wage fluctuations: they improved their position slightly in the early 1990s, but then slid backwards again, reaching their lowest figures in 1998; in 1999, they almost recovered their 1997 positions due to a substantial increase in the tariff wages of the public sector (*Table 5*).

Generally speaking, wage shifts according to industry led to the diminishing significance of this dimension of income distribution relative to others; there are certainly much more intra- than inter-branch disparities in income at present than previous to 1989. Earnings differences by branch of employment remain important despite the fact that a significant equalization of the former disparities has occurred. Moreover, as we stated above, available statistics do not present all changes in branch disparities, because the data collected did not include small firms until 1996.

TABLE 4 Returns to education: non-standardized beta coefficients (dependent variable ln gross earnings)

Category and variable	1988	1992	1996	1988	1992	1996
BOTH GENDERS						
Years of school	0.044	0.069	0.088			
Experience	0.028	0.032	0.032	0.028	0.033	0.033
Experience squared/100	-0.059	-0.063	-0.066	-0.059	-0.064	-0.066
Sex	-0.358	-0.408	-0.350	-0.362	-0.421	-0.367
Intercept	*7.692*	*7.738*	*8.341*	*8.072*	*8.319*	*9.077*
Education:						
vocational	-	-	-	0.054	0.102	0.138
secondary	-	-	-	0.151	0.317	0.406
university	-	-	-	0.381	0.576	0.737
Adjusted R^2	*0.465*	*0.384*	*0.362*	*0.466*	*0.390*	*0.369*
MEN						
Years of school	0.040	0.061	0.083			
Experience	0.034	0.044	0.037	0.038	0.044	0.037
Experience squared/100	-0.074	-0.092	-0.077	-0.082	-0.092	-0.077
Intercept	*8.071*	*7.331*	*8.005*	*7.634*	*7.834*	*8.659*
Education:						
vocational	-	-	-	0.043	0.098	0.166
secondary	-	-	-	0.124	0.260	0.391
university	-	-	-	0.339	0.525	0.731
Adjusted R^2	*0.253*	*0.222*	*0.274*	*0.264*	*0.224*	*0.278*
WOMEN						
Years of school	0.051	0.080	0.094			
Experience	0.022	0.017	0.027	0.022	0.017	0.027
Experience squared/100	-0.038	-0.022	-0.054	-0.038	-0.022	-0.054
Intercept	6.922	6.904	7.614	7.358	7.560	8.390
Education:						
vocational				0.055	0.096	0.107
secondary				0.182	0.370	0.421
university				0.453	0.642	0.757
Adjusted R^2	*0.264*	*0.249*	*0.267*	*0.268*	*0.268*	*0.278*

Sources: Microcensus 1989, 1992 and 1996.
Note: All coefficients significant on the level < 0.001

While we cannot compare the changing weight of industry dispersion over time, we can at least observe it in comparison with other characteristics of workers in 1996. Regression analysis in *Table 6* measures the weight of branch disparities themselves and additively to other variables, following our previous analysis in Tables 2a and 2b. The sole industry variable (containing ten branches) explains about five percent of all workers' and men's earnings variance, but as much as nine percent of women's earnings variance – for women it is therefore much more important in which branch they are employed. If added to the previously analyzed variables (gender, age and education), branch disparities can explain an additional three percent for both genders and for men, and four percent for women.

TABLE 5 Earnings by industry of employment (percent of the average)

Industry	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Manufacturing	104.4	103.8	103.6	103.5	101.3	99.9	99.7	99.1	100.5	101.4	100.1
Construction	111.2	109.9	106.6	108.2	112.3	110.6	108.1	105.1	104.9	103.3	100.6
Agriculture	108.2	109.6	97.7	91.8	87.7	85.0	84.2	80.7	79.5	78.9	75.9
Transport and communications	106.4	104.6	103.2	99.1	97.5	98.7	100.8	101.8	105.8	108.1	107.8
Trade and catering	83.8	85.0	86.2	90.1	88.6	91.6	88.4	87.8	98.1	98.2	97.6
Health care and welfare services	90.1	92.6	96.6	94.5	95.0	93.9	92.1	93.7	90.0	85.1	89.4
Education	89.8	88.1	90.3	90.6	90.3	91.7	90.9	92.9	88.1	84.2	87.5
Banking and insurance	98.3	102.0	136.9	169.6	177.7	175.2	171.5	169.6	174.5	181.0	181.7
Administration and defense	101.3	100.4	105.3	114.6	117.8	120.7	117.6	118.3	110.2	103.1	107.8
Average	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Statistical Yearbooks

TABLE 6 Regression analysis of (ln) earnings by industry: non-standardized coefficient beta before and after controlling for gender, age and education in 1996

Industry	Before controlling			After controlling		
	Both genders	Men	Women	Both genders	Men	Women
Manufacturing	0.196	0.169	0.110	0.210	0.237	0.174
Construction	0.270	0.107	0.269	0.187	0.196	0.172
Agriculture	0.046	-0.043	0.023	0.055	0.040	0.090
Transport and communication	0.242	0.143	0.232	0.213	0.203	0.242
Trade and catering	0.094	0.183	0.076	0.162	0.209	0.129
Health and welfare	0.141	0.200	0.247	0.156	0.098	0.152
Education	0.180	0.295	0.252	0.064	0.047	0.052
Banking and insurance	0.707	0.796	0.734	0.587	0.569	0.584
Administration and defense	0.372	0.340	0.367	0.244	0.249	0.237
Intercept	*8.911*	*9.100*	*8.748*	*9.015*	*8.606*	*8.371*
Adjusted R2	*0.053*	*0.056*	*0.091*	*0.395*	*0.299*	*0.335*

Source: Microcensus 1996

2.6 Political factors and ownership

In the communist regime, political factors exerted a comprehensive influence on earnings. First, they conditioned one's educational level (through controlled access to secondary and, in particular, university education). Secondly, they had a considerable influence on job searches, both through informal social networks and formal channels to managerial positions in low-level organizations and, almost all, positions in high-level organizations. Third, the application of higher

wage tariffs or higher premiums privileged party members over non-members, even when occupying the same positions. Under the *ceteris paribus* condition, the residual premium of party membership on earnings amounted to 10 percent in 1984, according to a social stratification survey of the time (Vecernik, 1996, p. 57).

The political dimension of earnings rapidly disappeared in the early transition, although not completely – skills and knowledge formerly acquired in politically determined positions became a precious "social capital" to be used in top jobs in new private business and foreign companies under market conditions (the first expert engaged by a foreign company after 1989 was the previous communist minister of foreign trade). As Bogdan W. Mach observed for Poland, "…political segmentation of the former state-socialist labor market exerts a strong influence on individuals' placement in the current capitalist market. We discovered that the former middle managerial statuses and not top or lower managerial positions can be effectively exchanged for advantaged positions under the new system – especially for the status of an owner and for greater economic well-being" (Mach, 2000, p. 33).

In the transition period, the political dimension was in some sense "replaced" by differences according to ownership status. Unfortunately, there is no variable in statistical income surveys (including the 1996 Microcensus) that would enable us to add this dimension to a variance analysis of earnings. The CSO only calculates one-way averages of wages according to ownership sector and such variables are thus available only in special wage or sociological surveys.

The CSO has published wage statistics according to economic sector since 1995. Most differences in earnings are, however, hidden by the categorization used. According to the 1999 results, only a negligible number of workers were employed in state-owned production firms, but these workers had substantially higher wages than those in the private business sector. On the whole, there is almost no substantial difference between the domestic private and state sectors (both displaying about 95 percent of the average), while earnings in companies where there is foreign-capital participation are much higher: 132 percent of the average in foreign firms (about 150,000 workers), 128 percent in international firms (200,000 workers) and 116 percent in mixed firms (500,000 workers) were reported in the statistical wage survey in 1999 (Wage differentiation 2000).

However, wage averages do not answer the question of how ownership education is rewarded in various sectors. Processing individual data, Filer, Jurajda and Planovsky (1999) distinguished among private, state and foreign firms in the Czech Republic and Slovakia in 1995-1997. They found that a university degree was best remunerated in the private sector throughout the whole period. Rather unexpectedly, the least profitable workplaces for employees with a diploma were foreign-owned firms. General and specialized secondary education is better rewarded in private domestic than in foreign firms, but its position in both is improving over time. In state organizations, specialized secondary education is much better paid than the secondary general. The explanation probably lies in the contrast between professional public services (such as education and health care) and simple administrative jobs.

According to Munich, Svejnar and Terrell, who analyzed a survey of households conducted in 1999, returns to education in individual sectors differ yet again by gender. Whereas for men the most profitable jobs were in privatized firms (6.5 percent), secondly in *de novo* firms (6.1 percent), and last in state-owned enterprises (5.6 percent); for women the most advantageous were *de novo* firms (8.1 percent), followed by privatized firms (7.0 percent), and last, again, were state-owned enterprises (6.3 percent). It is interesting that wages in the *de novo* firms were most determined by education and experience ($R^2 = 0.247$ for men and 0.352 for women), although here we might rather expect the greatest liberty in wage settings, which also accounts for not-measured skills and abilities. It seems that these firms did not share the overwhelming enthusiasm for young workers apparent during most of 1990s.

Even in the post-privatization period since the mid-1990s, some differences according to education between state, private domestic and foreign firms remain important. However, a thorough analysis of the ownership dimension of earnings disparities would require a better categorization than

is provided by statistical surveys. At least, we should be able to distinguish production firms that have remained in state hands from public service institutions, as well as differentiating foreign-owned firms from the first phase of transition (restructured from the very beginning) from firms bought by foreign companies in later phases (after the urgent need of a strategic investor has appeared). We also shall distinguish privatized formerly state-owned firms from *de novo* small and medium enterprises (SMEs).

Such variables were basically described in sociological surveys, but the samples used are rather small. The 1998 EEA survey documents, for instance, the wage dominance of privatized firms over not-yet-privatized and a greater variability of earnings in the private sector. The 1999 ISSP survey shows the superiority of rewards in foreign-owned firms and the inferiority of earnings in the public sector, after controlling for gender and education. However, we can hardly expect a completely consistent hierarchy ranking wage disparities following their degree of marketization – for instance, from the not-yet-privatized state enterprises at the wage bottom to foreign-owned companies at the top, with various transitory ownership forms in between. The situation is quickly changing with the restructuring process.

3. Cross-national comparison

Given that changes in earnings range and structure also contribute to the trajectory of the country to a standard market economy, a question arises: how large is the distance that remains between the Czech wage structure and that in Western countries, and how does this distance differ in various regards? Trying to answer this, we face two difficulties: First, there is no "standard" market economy, but rather national market economies, each with many specificities. Second, there is no all-inclusive source of information allowing us to make a detailed comparative analysis. In the best source of micro data, the *Luxembourg Income Study (LIS)*, variables of education, industry, and occupation are not comparable or are even missing. Thus, we have to compose a depiction from various sources, which does not offer a consistent multivariate analysis.

3.1 Overall disparities

In communist-era Central Europe, Czechoslovakia and East Germany had an exceptionally equal earnings distribution. Unlike Poland and Hungary, where liberalizing forces began before 1989, little similar happened in the Czechoslovak economy until 1990. Before 1989, the bottom half of earnings distribution was similar in all CEE countries in 1988, while the upper half of the distribution was less equal in Poland and even more divergent in Hungary than in Czechoslovakia. The same contrast can be observed when comparing Czech data with wage statistics of the same period from Germany and France, and an even greater contrast appears vis-à-vis Austria and Great Britain, where earnings distribution is also less equal in the bottom half (*Table 7*).

Without any particular intention to increase inequality, the economic reforms launched in 1990 started to direct distribution of earnings towards greater disparities. Although this process has affected all CEE countries, previous differences between them in income inequality have been largely maintained: dispersion in earnings inequality in the early 1990s was again the greatest in Hungary, still considerable in Poland, and the least in the former East Germany. The split of Czechoslovakia after 1993 has entailed a divergence in the earnings distribution into larger disparities in the rapidly (although only formally) privatized and more marketized Czech Republic and narrower disparities in the intentionally more statist and welfarist Slovakia.

TABLE 7 Earnings distribution in CEE countries and Western Europe between 1988 and 1992
(percentiles and decile ratios)

Year and country	Percentile (percent of median)						Decile ratio 90/10
	5th	10th	25th	75th	90th	95th	
1988							
Czech Republic[a]	53.8	60.0	74.4	118.9	143.8	162.5	2.40
Slovakia[a]	53.6	61.7	77.0	123.2	149.3	168.0	2.42
Hungary[b]	50.0	58.3	74.4	135.1	183.3	225.9	3.14
Poland[b]	55.4	62.7	78.2	126.3	163.3	191.6	2.60
East Germany[c]		68.1	82.1	121.1	141.9		2.08
West Germany[c]		62.5	78.3	129.7	173.1		2.77
Austria[d]		51.0			181.0		3.55
Great Britain[b]	47.3	54.7	72.3	137.1	183.9	226.5	3.36
France[d]		65.0			194.0		2.98
1991/1992							
Czech Republic[a]	51.2	56.1	69.6	116.7	153.5	184.2	2.74
Slovakia [a]		68.1			170.5		2.50
Poland[b]		61.6	77.3	132.4	179.8	219.3	2.92
Hungary[b]	48.3	56.0	72.6	145.9	203.7	257.1	3.64
East Germany[c]		69.6	82.9	123.8	159.4		2.29
Austria[d]		51.0			178.0		3.49
Great Britain[b]	47,3	54,8	71,7	138,0	186,5	228,0	3.40
France[d]		65.0			196.0		3.02

Sources: [a] Microcensus 1989 and 1992
[b] (Atkinson – Micklewright, 1992)
[c] (Krueger – Pischke, 1992)
[d] OECD Economic Outlook 1993

Table 8 displays changes in wage disparities along a single indicator of decile ratio. This is a simple indicator, the advantage of which is availability and clarity, but whose disadvantage is in neglecting the lowest and highest wage deciles of workers. Let us remember again that in the Czech Republic, the fastest increase in wages has been in the tenth income decile, which was likely the case in other countries as well. For a comparison of over-time changes, we gather various sources which are not always completely comparable; we then have to interpret the figures cautiously. As Atkinson and Brandolini (2000) remind us, the secondary use of various data sets always involves many uncertainties and leads to differing results.

In our collection, given the great disparity in Hungary it might be suspected that not only full-time jobs were included in the data (despite the explicit statement of a CSO officer). The jump in differences in the Czech Republic in 1993–1995 should also be taken as illusory, because the wage statistics of the time were compiled from various sources instead of from a standard survey. If these two years are omitted, we see a continual, slowly rising wage disparity. As a result of this increase, the Czech Republic locates itself somewhere between the cluster of typically "liberal" and South European countries displaying more inequality and the cluster of welfarist West and North European countries displaying less inequality.

TABLE 8 Disparities in earnings in OECD countries (decile ratio 90/10)

Country	1980	1985	1989	1992	1993	1994	1995	1996	1997
Czech Republic		2.52	2.45	2.74	(3.19)	(3.14)	(3.73)	2.82	2.80
Hungary	2.39	2.64	3.14	3.64	3.59	4.16			4.19
Poland	2.88	2.70	2.43	2.9	3.0	3.4	3.4	3.5	3.5
East Germany			2.08	2.29					
West Germany	2.67		2.45	2.44	2.32		2.37		
Austria	2.61		3.55	3.54	3.58	3.66			(2.70)
Belgium	2.01		2.36	2.29	2.25	2.08			
Denmark	2.14	2.17	2.18	2.17					
France	3.08	3.12	3.28	3.23	3.26	3.28			
Italy	2.64	2.50	2.16		2.77		3.11		
Netherlands		2.89	3.05	3.08		3.04	2.57		
Portugal		3.62	3.49	3.96	4.05		3.96		
Sweden	2.04	2.07	2.12	2.10	2.13				
Switzerland			2.72	2.67	2.71	2.65	2.72	2.75	
Great Britain	2.79	3.06	3.28	3.31	3.33	3.31	3.38		
USA					4.16	4.35	4.39		
Japan	3.01	3.11	3.16	3.03	3.04	3.02			

Sources: Czech Republic: Wage surveys of the CSO (figures in parentheses based on estimates whose reliability is limited.)
  Hungary: (Atkinson – Micklewright, 1992); since 1992 personal communication of Elizabeth Lindner (CSO).
  Poland: (Atkinson – Micklewright, 1992); (Rutkowski, 2000)
  East Germany: (Krueger – Pischke, 1992)
  Other countries: OECD Economic Outlook, 1993, 1996
  Figures of 1995 for West Germany, France, Netherlands and Portugal, see OECD DEELSA/ELSA/WP7(99)4.

Notes: – *OECD Economic Survey Czech Republic 1998* reports for Austria 1994 different figure than *OECD Economic Outlook*
  – 2.95.
  – Austrian Microcensus 1997 returns much lower figures for dependent workers than are reported by OECD.

3.2. Returns to education

Returns to education also reveal considerable international differences. If observing transitory changes, we have to consider the quite opposite forces shaping dynamic markets against static command economies. In a market economy, education is primarily a personal investment that is validated in economic competition where a higher productivity of labor is expected vis-à-vis knowledge capital. In a command economy, education is considered a public good that does not need to be individually rewarded. Although the original hard-line-communist ideology ("as you have studied with working-class money, thus the surplus of your work should belong to it") was never applied to its full extent, the position of educated workers in communist Europe and especially in the former Czechoslovakia was hardly comparable with those in Western countries.

As *Table 9* shows, educational disparities in OECD countries differ greatly, with the extreme of welfarist countries (Denmark, Norway) displaying small inequalities and liberal countries (Great Britain, USA) displaying larger inequalities. In our opinion, the reliability of such data is a little doubtful as at least two countries do not meet expectations: Italy, with extremely small wage differences, and France, with disparities that are large (we refer here back to Table 8, which displays a quite similar range of disparities in both countries). Following this source, educational disparities in the Czech Republic already exceeded the level of the "socially generous" Western countries. Czech disparities among all employees were similar to those in Germany, and among men alone they are about at the level of Italy, Switzerland or Great Britain.

TABLE 9 Disparities in earnings by education in OECD countries, data from 1995
(in percent of earnings of secondary educated workers)

Country	Lower education			Tertiary education			The ratio tertiary/lower		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Czech Republic	78	75	69	151	143	138	1.94	1.91	2.00
Germany	76	82	82	158	152	151	2.08	1.85	1.84
Denmark	84	86	87	134	138	132	1.59	1.60	1.53
Finland	93	91	93	187	190	174	2.01	2.09	1.87
France	82	85	79	178	185	167	2.17	2.18	2.11
Ireland	85	77	62	183	171	187	2.15	2.22	3.02
Italy	77	74	74	134	142	120	1.74	1.92	1.62
Netherlands	86	87	77	137	135	143	1.59	1.55	1.86
Portugal	64	62	64	184	182	175	2.88	2.94	2.73
Sweden	90	88	89	153	158	144	1.70	1.80	1.62
Switzerland	71	80	75	161	146	161	2.27	1.82	2.15
Great Britain	74	79	69	181	161	190	2.44	2.04	2.75
USA	67	64	64	183	183	175	2.73	2.86	2.73

Sources: OECD; Figure of the Czech Republic recalculated according to Microcensus 1996.

Note: Only persons 25–64 years old are included.

The more widespread higher skills are (which is the case in developed countries), the lower their returns in comparison with lower levels of education (Baudelot – Glaude, 1990). This helps to explain why education in transitory countries might be even better rewarded than in more advanced countries, where education enrollments are higher. To the point, Denis H. Sullivan and Timothy M. Smeeding observed that "while there is evidence that sufficiently increased supplies of highly educated workers can reduce or reverse growing education premia, the cross-section evidence is not consistent with the claim that among advanced (OECD) nations, higher levels of educational attainment are associated with lower levels of inequality" (Sullivan – Smeeding, 1997:12). While in Sweden, a steady decrease of return to education was documented (Björklund, 2000), the US college wage premium experienced a narrowing in the 1970s and increased again in the 1980s, due to developments in the private sector (Katz – Krueger, 1991).

In transition countries, education premia are growing simultaneously with the increasing supply of well-educated people. This seems to be a unique case that contradicts the observation of countries where capitalist development was never disrupted. The higher return to education in reform countries should not be necessarily backed by higher labor productivity. As the improvement of the position of educated workers outstrips the restructuring of their jobs and firms, we can seek an explanation in a sort of "political rent" associated with the establishing of a democratic regime. This regime suppressed the degradation of higher education and spiritual work imposed by communism. People with higher education are also abundant among the best-paid workers, in reference to whom Kertesi and Köllö (1999, p. 11) speak about a special "privatization gain."

We present quite opposite trends regarding premiums for higher education in reform and advanced countries by overtime changes in four Central European countries (*Table 10*). Education levels substantially rose in all reform countries – most so in the Czech Republic. The opposite is true for Austria. Surprisingly enough, current disparities seem to be quite close in all countries under observation, which is a result of opposing tendencies: while in reform countries wage premiums for educated employees were increasing, in Austria they were decreasing. Even so, the most-recent Austrian figures are somewhat lower than in the reform countries. On the other side, however, rewards for university education is more distanced from secondary education in Austria than in reform countries.

In fact, the comparison of relative returns to education reveals little about the actual functioning of the national economy in general and the labor market in particular. A close relationship

between the higher productivity of labor of educated workers and their earnings is an assumption of human capital theory. Observing the actual developments in the Czech Republic in the 1990s, although returns to education considerably rose, overall productivity of labor actually fell or has improved due to reductions in the labor force. In any case, changes in employment were much more important for overall labor productivity than rising earnings disparities. Apparently, there are many more conditions for long-term economic growth than only the profitability of skills, reaching from the macroeconomic background to functioning market institutions and business ethics.

TABLE 10 Wage premiums for individual levels of education and for one year of schooling in three transition countries and Austria (percent)

Country and year		Primary	Vocational	Secondary	University	One year of school
Czech Republic						
All	1970	reference	4.9	12.8	32.3	3.0
	1988	reference	5.4	15.1	38.1	4.4
	1992	reference	10.2	31.7	57.6	6.9
	1996	reference	13.8	40.6	73.7	8.8
	1996	*reference*	*11.9*	*39.8*	*93.6*	*11.1*
Men	1970	reference	3.6	14.1	30.1	3.0
	1988	reference	4.3	12.4	33.9	4.0
	1992	reference	9.8	26.0	52.5	6.1
	1996	reference	16.6	39.1	73.1	8.3
	1996	*reference*	*15.8*	*40.3*	*94.4*	*10.9*
Women	1970	reference	7.2	11.3	34.2	2.9
	1988	reference	5.5	18.2	45.3	5.1
	1992	reference	9.6	37.0	64.2	8.0
	1996	reference	10.7	42.1	75.7	9.4
	1996	*reference*	*7.8*	*39.3*	*96.7*	*11.4*
Hungary						
Men	1989	reference	11.6	24.8	67.8	-
	1992	reference	14.5	34.9	83.9	-
	1996	reference	14.5	32.9	86.8	-
Women	1989	reference	12.8	26.0	74.1	-
	1992	reference	14.2	35.7	86.7	-
	1996	reference	11.6	33.1	88.0	-
Poland						
All	1987		-	-	-	5.0
	1992		-	-	-	7.9
	1996		-	34.0	77.4	7.3
Men	1992	-9.3	reference	(-4.1)–8.6	29.7	-
	1995	-10.3	reference	7.6–13.6	44.1	-
Women	1992	-8.6	reference	14.2–15.8	30.2	-
	1995	-3.5	reference	7.4–12.3	43.2	-
Austria						
Men	1981	reference	9.7	33.0	67.2	10.3
	1989	reference	10.6	33.1	60.7	9.7
	1993	reference	10.7	26.0	61.2	9.4
	1995	*reference*	-	-	-	*6.9*
	1997	reference	-	-	-	7.4
Women	1981	reference	-	-	-	11.6
	1989	reference	-	-	-	10.4
	1993	reference	-	-	-	8.9
	1995	*reference*	-	-	-	*6.1*
	1997	reference	-	-	-	8.0

Note: In Poland and Austria general secondary education is taken as secondary level.

Sources: – *Czech Republic*: Microcensus 1970, 1989, 1992 and 1996 (budget and non-budget sectors, controlled for gender, experience, experience[2]; the italicized line for 1996 was controlled for industry and

region as well)

– *Hungary:* (Kertesi – Köllö, 1999) (non-budget sector, controlled for gender, experience, experience[2], occupation, productivity, capital/labor ratio, firm size, industry)

– Poland: figures on all employees according to (Rutkowski, 2000) (budget and non-budget sectors, controlled for gender, experience, experience[2], industry); figures on men and women according to Puhani, quoted by (Kertesi – Köllö, 1999) (budget sector, controlled for experience, experience[2], occupation, residence, industry, household type, local unemployment rate, previous employment status and disability); last column according to Rutkowski, 2000 (budget and non-budget sectors, controlled for gender, experience, experience[2], industry).

– *Austria:* figures for individual education level according to (Hofer – Pichelmann – Schuh, 1999) (non-budget sector, controlled for gender, experience, experience[2]), figures for return of schooling according to (Fersterer – Winter-Ebmer, 1999) (budget and non-budget sectors, controlled for gender, experience, experience[2]; italicized figures were controlled for family background, nationality, region, city size and industry as well)

3.3 Gender disparities

According to wage surveys, the gender gap was reduced somewhat in the Czech Republic after 1989. While in 1988, the average wage of full-time female workers was 71 percent of their male counterparts, it rose to 77 percent in 1996 but declined again to 72 percent in 1999, with a tendency towards a slight leveling of disparities in 1999, when it reached 73 percent (Wage differentiation, 2000). However, a more positive trend is registered by using wage median — according to it, the relation has increased from 71 in 1988 to 78 in 1997. While men's low wages stagnated and upper wages mounted, the increase in women's wages was more proportionate (Holy, 1999). In those calculations, wages were not adjusted to working hours; even if only full-time jobs are taken into account in wage surveys, women still work fewer hours.

Also, in other reform countries, the wage position of women compared with men somewhat improved after 1989, as Elizabeth Brainerd (1997) observed; however, not on fully consistent and comparable data. The Czech Republic was somewhat backward in the process. As Rutkowski (2000) found, gender variable returned a 24 percent gap in Hungary (1996, data of household panel) and 31 percent in Poland (1996, LFS data). The 1996 Microcensus data (see Table 2a) returns 37 percent, which is by far the highest figure. However, our experience tells us that wages observed by statistical surveys cover, in fact, a lesser share of actual earnings (from all jobs and informal economy) in Hungary and Poland than in the Czech Republic. Therefore, the real gender gap in those countries is likely to be greater than available statistical data show.

As we reported above, although the variance explained by gender differences decreased considerably in the Czech Republic after 1989, wage disparity between men and women still remains considerable. However, the gap does not differ from Western European countries substantially. In the mid-1990s, women's gross hourly wages as a percentage of men's varied between 72–74 percent in Southern European countries like Portugal and Spain (but also in Austria and the UK), and 87–88 percent in Northern European countries like Denmark and Sweden, France, Germany and Italy, which are located somewhere in the middle of the range. After allowing for the structural gap, the EU average was 15 percent less for women. Even in the age group cohort 25–29, who have had equal access to education and jobs, women's earnings were only 86 percent of men's (Population, 1999). The Czech Republic is thus closer to Southern European countries in gross gender gap, which is largely produced by discrimination.

The weight of "discrimination" in total gender gap is estimated by decomposition methods which distinguish between structural differences and the "rest" which can be attributed to a break of equal pay. Some results for Western countries are surprisingly favorable in this sense. In Germany, Monika Jungbauer-Gans (1999) observed that after controlling for job-access variables, self-employed women do not bear any earning difference compared with men, unlike dependent employees. In France, Dominique Meurs and Sophie Ponthieux (1999) calculated on the Labor Force Survey (LFS) data four interesting figures measuring the ratio of women's to men's wage in percent: –23.9

for all employees, –12.4 for full-time employees, –11.4 in addition after controlling for differences in access to any job, and only –6.9 after controlling moreover for differences in access to full-time employment.

In the Czech Republic, the situation is much less favorable than in Western countries. Stepan Jurajda made an original decomposition analysis on 1998 wage surveys from the Czech Republic and Slovakia using both worker and company variables. The results show that after including age, education, occupation and firm ownership, one-third of the overall pay difference in the public sector remains attributable to gender, and almost two-thirds in the private sector. As the author states, this is much higher than. in the USA, for example, where the "discrimination" residue amounts to only one-third of the entire gap, which is, however, much larger (Jurajda, 2000). In this sense, the Czech Republic is considerably behind Western countries.

4. Conclusion and discussion

Pre-1989 Czechoslovakia was characterized by earnings equality and, within remaining disparities, by the predominance of demographic features of individuals (gender and age) over their market characteristics (skills and occupation) in the determination of earnings. Alongside this, some industries (mining, metallurgy, heavy machinery) were favored, and selected categories of workers (top state and party bureaucrats, army and police officers) privileged. Behind the facade of an almost stable range and small overall disparities, demographic factors had been gaining further importance and so-called productive industries had been promoted, while the wage position of higher educated people had declined and younger generations were disadvantaged in favor of older workers.

The transformation process since 1989 broke those tendencies and has begun to change the established earnings structure. The overall range of inequality in wages has increased, as have returns to education, while the gender gap has somewhat attenuated and the age profile of earnings has became considerably flatter. Cross industry, the former administrative "tariff grid" was replaced by market differences in a considerable, though not to a full degree. In the public sector, a new and simpler tariff grid has been applied that (again) favors experience above qualification. In most of the private sector, wages are negotiated between employers and trade unions. Lawyers, managers and experts in marketing and other special services to foreign firms currently enjoy salaries comparable with their Western counterparts.

Despite a step-by-step adjustment of the earnings structure, the current system is still a mixture of previous features (as the importance of gender attests), transitory characteristics (displayed especially by disparities among ownership sectors), and a targeted system (which is best documented by the increasing returns to education). Given various circumstances, the adjustment to market standards is uneven. The shift towards the "western model" of rewarding labor has been apparently more rapid in new private firms and in foreign-owned companies. Also, public services have seen an uneven rise in earnings, some of which are advancing (in finance, public administration, justice), while others lag behind (in health and social services, education and research). There is also a segment of foreign (most often Ukrainian) workers in the Czech Republic performing low-prestige jobs in construction and light manufacturing.

Within all limitations, observed tendencies and cross-national comparisons demonstrably show that, in a relatively short time span, Czech wage inequality and structure have greatly converged toward the Western pattern. The decreasing significance of demographic characteristics and the increasing importance of education conveys this most clearly. Here again, as is the case in so many areas of economic and social life under transformation, important questions appear: how substantial are these changes; is the placement of competent people in responsible jobs markedly better; what is the impact on labor productivity; how do they contribute to the creation of incentives to work well and manage rationally; and, do they improve the efficiency of the economy as a whole?

Such questions certainly exceed the limits of our contribution and the explanatory power of all available survey variables. Nevertheless, without going into a profound discussion, we can

assume that, in fact, there is no guarantee that higher disparities ensure higher labor productivity, that more education yields higher labor productivity, or that the more room left for the "market" characteristics of workers in wage determination will be actually used for the improvement of work and management incentives. There are certainly many doubts about all of this, and only one observed result can be taken as a certainty: that after decades of stagnation the whole of the Czech earnings and incentive structure is in motion and that this motion provides a unique opportunity to develop an open-market economy.

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SOURCES USED AS PRIMARY DATA IN THE STUDY

Microcensus surveys

Large income surveys, began in 1958, as regular statistical surveys conducted every 3–5 years on 1–2 percent samples of households. Data on wages were reported by employers and pension benefits by post offices. Here, we used the 1989 Microcensus conducted by the CSO on a 2 percent random sample ($N = 69,912$) in March 1989, including yearly incomes in 1988; the 1992 Microcensus, conducted by the CSO on a 0.5 percent random sample ($N = 16,234$) in March 1993, and including yearly incomes in 1992; and the 1996 Microcensus, conducted by the CSO on a 1 percent random sample ($N = 28,148$) in March 1997, and including yearly incomes in 1996. In the two later surveys, incomes were not confirmed, but data corrections were made by the CSO. In Table 10, we used also the 1970 Microcensus conducted by the CSO on a 2 percent random sample of the population included in Census of the Population 1970. Our calculations are made on the sample of 14,533 full-time employees.

ISSP modules on Social Inequalities

The International Social Survey Program (ISSP) is a long-term international research project that is based on international and inter-project cooperation in the social sciences. Each year, research on one topic is conducted in all participating countries. Data files are archived by the *Zentralarchiv für Empirische Sozialforschung* at the University of Cologne. In 1992 and 1999, a module on social inequality was applied involving opinions that addressed income distribution and social stratification. Our calculations are made on the sample of 977 respondents in the labor force.

Economic Expectations and Attitudes (EEA)

The surveys of the Czechoslovak and later only Czech population started in May 1990 and were conducted biannually in 1990–1992 and in following years, annually (1993–1998). Surveys were organized by the team of socioeconomists of the Institute of Sociology of the Academy of Sciences headed by Jiri Vecernik. The samples include adults selected by a two-step quota-sampling procedure, whereby the region and size of the locality were defined in the first step, and gender, age and education in the second. The data was collected by the Center for Empirical Research STEM.

(Second) International Adult Literacy Survey (SIALS)

A long-term international research project, which originated in 1995, and is backed by Statistics Canada and ETS at Princeton University. The survey is focused on a detailed surveying of the so-called functional literacy of adult persons based on testing their ability to understand printed information and use in everyday life. The Czech data were collected by the SC&C agency from December 1997 to April 1998 from 3132 respondents (5000 were targeted).

SUMMARY

Wage and income surveys from 1989 to 1999 reveal the extent of changes in the inequality of earnings

in the Czech Republic and the main components of the new income disparities. The author first examines the increasing differences and the decreasing weight of demographic characteristics in wage structure. Then, in the second part of the paper, evidence is gathered toward a cross-national comparison of income distribution in order to demonstrate the increasing similarity of the Czech wage structure with those in Western countries. The introduction of a market economy in the Czech Republic in the Nineties has led to an increase in earnings disparity similar to those in the West; the communist-era demographic of earnings is being replaced by capitalist market characteristics; and ownership disparities, instead of political privileges, have come to the fore. Thus, the overall earnings structure underwent systemic changes and approaches the Western pattern.

Monetary Policy in the Czech Republic and EMU Accession

Jiří JONÁŠ[*]

In the future, the Czech Republic is expected to become a member of the European Union (EU) and subsequently of the European Monetary Union (EMU). Future membership in the EU and EMU has important implications for domestic economic policy, including monetary policy. EU membership will affect the institutional framework of monetary policy, particularly the institutional aspects of central-bank independence, more than it will the conduct of monetary policy.[1] Conversely, eventual EMU membership will directly affect the conduct of monetary policy, for two reasons. First, because of the need to meet the Maastricht qualification criteria for EMU membership; and second, because of the introduction of the common European currency and the loss of an exchange rate as an instrument of economic policy.

The Maastricht criteria specifying maximum acceptable inflation and the behavior of nominal exchange rates are of most relevance to the conduct of monetary policy. Inflation in the EMU-candidate countries must not exceed by more than 1.5 percentage points average inflation in the three EMU members with the lowest inflation rates. Moreover, for a period of two years before the EMU membership, the nominal exchange rate of the EMU candidate is allowed to fluctuate at maximum by ± 15 percent against the euro. To a large extent (though not exclusively), the monetary policy of the Czech National Bank (CNB) will be responsible for meeting these requirements.

I will not discuss in this article the desirability of EMU membership for the Czech Republic. Nevertheless, for the purpose of this discussion, I will assume that EMU membership will take place as soon as possible, and I will discuss the implications of such an outcome for the conduct of monetary policy in the Czech Republic. First, I will discuss two issues related to the rate of inflation: the disinflation path specified in the CNB's long-term monetary strategy, and the quantification of the rate of inflation that corresponds to price stability. Second, I will discuss what room exists for price level convergence between the Czech Republic and the euro area in the period before and after joining the EMU, either by means of a higher rate of inflation or by means of the nominal appreciation of the koruna. Finally, I will address the mutual compatibility of the Maastricht criteria under the conditions of the rapid growth of labor productivity.

1. The Speed of Disinflation

There is broad agreement that, in the long run, it is economically beneficial to reach and maintain price stability (I will discuss below what exactly price stability means). However, there is less agreement with respect to the speed with which price stability should be reached. Some

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[1] Recent changes in the Central Bank Act have stimulated intensive discussion about the compatibility of the amended Act with the EU membership requirements. This issue is not discussed here. In June 2001, the Czech Constitutional Court has decided that some of these changes contradict the Constitution.

economists and politicians are concerned that too-rapid disinflation, produced by excessively restrictive monetary policy, could be very damaging to transition economies. For that reason, they recommend a more careful approach to disinflation. This is also the main reason for past criticism of the CNB's disinflation strategy as being too ambitious.[2]

The CNB's long-term monetary strategy, which outlines the disinflation trajectory, was originally formulated in April 1999. Subsequently, it was modified to take into account the actual behavior of inflation, and it also reflected changes in the inflation-targeting framework. The first column in *table 1* shows the original disinflation path from April 1999. This original disinflation strategy was based on targeting net inflation. Net inflation was targeted to decline from 3.5–5.5 percent (a valid medium-term target for 2000, established in 1998) to 1–3 percent in 2005. The CNB acknowledges that its 2005 inflation target is somewhat higher than the inflation target of the European Central Bank (ECB), but it justifies this on the basis of the distortion of price indices resulting from changes in the quality of goods, and also by more frequent and larger changes in relative prices.

However, after this long-term monetary strategy was publicly announced, actual inflation declined much faster (see the first line in the second column of table 1). For this reason, the CNB decided to modify the disinflation path. The original net inflation target for 2001 was reduced, from 3–5 percent to 2–4 percent, while the long-term target for 2005 remained unchanged.[3] Moreover, in its April 2001 Inflation Report, the CNB expects that at the end of 2001, net inflation will somewhat undershoot this target. This means that the originally assumed linear disinflation trajectory for 2000–2005 is no longer valid, as net inflation has already approached its long-term targeted level. Instead of shifting the targeted band down by 0.5 percentage points annually, based on the principle of the nonacceleration of inflation, it will now be necessary simply to maintain net inflation roughly at the present level in a horizontal band, as the CNB assumes. This reduction in the required speed of disinflation was made possible by the CNB's decision to lock in the effects of the positive disinflation shock from previous years, and not to allow a significant acceleration of inflation, even though such an acceleration could still have been compatible with the original disinflation path.

In April 2001, the CNB introduced some modification of the inflation-targeting framework. The main change was the shift from targeting net inflation to targeting headline inflation, measured by the consumer price index. At the same time, the CNB announced a long-term headline inflation target (see the third column in the table). The 2005 headline inflation of 2–4 percent is intended to be compatible with the original net inflation target of 1–3 percent.

Is this pace of disinflation adequate or is it too fast, as some critics of the CNB claim? There are two possible approaches to the discussion of the speed of disinflation in the Czech Republic under current conditions: theoretical and institutional.

Let's first briefly look at the theoretical approach. Theoretically, there exists an optimal speed of disinflation that minimizes the sacrifice ratio of disinflation. The sacrifice ratio is defined as the costs in terms of loss of output and employment of reducing inflation by a certain amount. In practice, it is always difficult to exactly specify the optimal speed of disinflation. The knowledge that disinflation, which is either too fast or too slow, would result in too high a sacrifice ratio is not likely to be very useful for practical monetary-policy decisions.

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[2] The CNB has been criticized quite often for the speed of disinflation, particularly during the period 1998–99. However, I am not aware of any *specific proposals* as to what an alternative strategy of disinflation should look like.

[3] It should be also noted that at the end of 2000 and early in 2001, the CNB has twice reduced its projected net inflation for the end of 2001, first from 2.2–3.9 percent to 2.0–3.7 percent, and subsequently to 1.7–3.4 percent.

TABLE 1 CNB Disinflation Strategy

	Long-term monetary strategy 1999 [a]	Actual inflation and short-term target		Inflation target for 2002-2005, headline inflation [c]
		Net inflation	Headline inflation	
2000	3.5–5.5	3.0	4.0	-
2001	3.0–5.0	2.0–4.0 (1.9–3.2) [b]	4.3–5.8 (3.3–4.4) [b]	-
2002	2.5-4-5	-	-	3.0–5.0
2003	2.0–4.0	-	-	-
2004	1.5–3.5	-	-	-
2005	1.0–3.0	-	-	2.0–4.0

Notes: [a] The document does not specify explicitly net inflation for 2001–2004, it only notes that in case of linear disinflation, net inflation would decline by about 0.5 percentage points annually.

[b] Net inflation target and headline inflation forecast from April 2000 (in parenthesis, April 2001 forecast).

[c] Modification of the inflation-targeting framework announced by the CNB in April 2001.
The interval 3–5 percent corresponds to expected inflation for January 2002. The CNB considers the headline inflation target of 2–4 percent for December 2005 compatible with the original net inflation target of 1–3 percent.

Source: CNB

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While it is difficult to pin down the optimal speed of disinflation, we are, however, able to identify factors that affect the sacrifice ratio of disinflation. One of the most important determinants of the sacrifice ratio is the extent to which nominal contracts in the economy, and actual inflation, depend on past inflation, that is, on the degree of indexation in the economy. Usually, in an economy with a long history of high inflation, nominal contracts reflect past inflation (for example, wage growth in period t is derived from inflation in period $t–1$). In that situation, it is usually quite difficult to reduce inflation without a strong shock to the structure of such contracts, such as could result from a change in the monetary-policy framework. The structure of nominal contracts also bears on the ability of a central bank and government to affect inflation expectations, and thus weaken the dependence of the future inflation on present and past inflation. The less widespread the indexation, and the higher the ability of a central bank and government to affect inflation expectations, the faster can disinflation proceed, for a given cost of disinflation.

Somewhat less clear is the role of the length of nominal contracts in the economy in affecting the sacrifice ratio. For example, Fuhrer (1994) argues that if nominal contracts in the economy have longer duration, in the short-run they are less responsive to the unexpected acceleration of disinflation and, as a result, disinflation may be more costly. One reason is the excessive increase in real wages as a result of lesser erosion of the given nominal-wage increase when inflation turns out to be less than expected in setting nominal wages. Another reason could be the unexpected increase in real interest rates and debt service cost. However, it is likely that in an economy with a history of price instability that deals with the problem of disinflation, long-term nominal contracts will not be very widespread. Also, when inflation reaches low levels and incentives for long-term contracts increase, there will be less room for potentially costly "inflation surprises" on account of faster disinflation.

In the literature, it is quite difficult to find clear support for slow or fast disinflation *per se*.[4] If there is a consensus at all, it is that an optimum speed of disinflation will be different for different economies, depending on their specific characteristics as discussed above, and also depending on the initial level of inflation. If we assume that higher inflation is usually more costly for an economy, in this case, faster disinflation could be more beneficial.

In the period 1998–99, inflation in the Czech Republic declined unexpectedly and significantly.[5] What were the implications of this unexpected decline in inflation for nominal contracts? To begin with, faster-than-expected disinflation resulted in an unexpected increase in real wages, as nominal-wage contract agreements were reached based on much higher expected inflation. Higher real wage growth is not particularly desirable when the economy suffers from weak economic activity, and the result was a notable increase in the unemployment rate, from an average 5.2 percent in 1997 to 9.4 percent in 1999. However, one should keep in mind that faster-than-expected disinflation during that period resulted mainly from a positive price shock in the form of the decline in prices of foodstuffs, oil and some other items, combined with an appreciation of the currency. It could be argued that this positive shock reduced the cost of disinflation, in the following sense: a significantly more restrictive macroeconomic policy would be needed to ensure the same speed of disinflation in the absence of the positive price shock, and this restrictive policy stance would produce a much sharper decline in production and increase in unemployment.

When discussing the optimal speed of disinflation in the Czech Republic, potentially more relevant for monetary policy are the institutional aspects, specifically, the prospect of future EMU membership. The Czech Republic can become an EMU member at the earliest two years after joining the EU. Before joining the EMU, a candidate country must first participate for at least two years in the special exchange-rate regime, the ERM II. Participation in the ERM II is possible only after joining the EU. Let's assume for the purpose of our discussion that the Czech Republic will join the EU in 2005, and that it will join the EMU at the beginning of 2008. According to the Maastricht criteria, inflation in 2007 should not exceed by more than 1.5 percentage points the average inflation in the three EMU members with the lowest rates of inflation. Obviously, inflation in the EMU-member countries will depend, among other things, on the phase of the business cycle and on the effects of eventual price shocks. If we assume that the average inflation rate in the three EMU countries with the lowest inflation will be 1.5 percent, inflation in the Czech Republic should not exceed 3 percent.[6] The CNB 2005 headline inflation target is 2–4 percent, and net inflation target 1–3 percent. If the CNB reaches these long-term targets, and if it subsequently keeps headline inflation in the 2–4 percent range, the Czech Republic should not have serious problems with meeting the EMU qualification requirement concerning inflation. At most, some small additional disinflation could be needed if headline inflation remains in the upper part of the band (and if our assumption about euro-area inflation is correct).

Partly as a result of the positive price shocks that allowed a significant unexpected decline in inflation during 1998–99, meeting the 2005 inflation target is realistic. Both net and headline inflation have declined to levels approaching price stability in the aftermath of these shocks. That, however, does not guarantee an easy path to meeting the 2005 target. Several risks exist which could make it difficult to meet this objective.

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[4] One exception is Ball (1994), who argues that faster disinflation per se is preferable because it is more credible than slow disinflation.

[5] In its July 1998 report, which for the first time contained an inflation forecast, the CNB expected that at the end of 1998 net inflation would reach the lower part of the 5.5–6.5 percent interval. However, net inflation actually fell to 1.7 percent. Regarding the consumer price index, the CNB expected in the same report that, by the end of 1998, CPI would return to the level that prevailed at the end of 1997, i.e., to around 10 percent. In reality, at the end of 1998 the CPI reached 6.8 percent. Similar inflation target and forecast undershooting took place in 1999.

[6] In 2000, euro-area inflation was somewhat higher, 2.3 percent, as a result of higher oil prices. The market consensus forecast, quoted in the June 23–29 issue of *the Economist,* shows the euro-area inflation rate is projected to remain at 2.3 percent in 2001 as well, but it should decline to 1.7 percent in 2002.

One potential risk rests with fiscal policy. Unless radical reform of public budgets takes place soon, the general government budget deficit will further increase. That includes, most importantly, a restraint on the rapid growth of mandatory spending. As a consequence, fiscal policy would become procyclical. In other words, it would provide additional stimulus to domestic demand growth at a time when economic recovery is well advanced. A procyclical fiscal policy would make it more difficult to reduce inflation further. The second potential risk is wage development. If the CNB's long-term disinflation strategy is to serve as a basis for wage negotiations, and if aggregate real wage growth does not exceed the growth of labor productivity, wages should not become a source of inflationary pressures, and they should not complicate the attainment of the 2005 inflation target. In this respect, an important role will be played by the credibility of the CNB's disinflation strategy, and by the willingness of trade unions to accept the CNB's inflation targets and projections as a basis for negotiating nominal-wage contracts. The third potential risk to disinflation is the need to complete price deregulation. Under conditions of rapid economic growth and the full use of productive resources, there is a risk that price deregulation could result in secondary price effects. Finally, it is not possible to exclude the prospect of an adverse price shock, such as might result from repeated oil-price increases.[7] Given the openness of the Czech economy, exchange-rate development will be also important. For example, a sudden slowdown in the inflow of foreign direct investment, which presently finances the current-account deficit of the balance of payments, the koruna could weaken significantly, with adverse inflationary effects.

2. Quantification of price stability

As has already been noted, there is general agreement that price stability has a beneficial effect on economic activity, and is thus a desirable economic-policy objective. Above, we have discussed the issue of how fast to reach price stability. There is, however, another practical issue: what exactly does price stability mean? There is extensive literature discussing how to quantify price stability.[8]

In the literature, we can find several reasons why central banks should not quantify price stability as inflation at zero or near zero (in the range of 0–1 percent). The first reason relates to downward nominal-wage rigidity. A condition of downward wage rigidity, and inflation near zero, would make it very difficult, if not impossible, to achieve real wage adjustment in response to changed market conditions, such as a negative demand shock. The result could be higher real wages than are desirable, higher unemployment and lower economic growth. The second reason relates to the impossibility of reducing nominal interest rates below zero. If the rate of inflation is close to zero, it means that real interest rates cannot be pushed below zero. However, for an economy in recession, it could be desirable to reduce real interest rates temporarily to a below-zero level in order to stimulate economic activity.[9]

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[7] In 2000, the Czech economy was hit by such an adverse price shock, in the form of higher oil prices, but inflation did not increase much. However, to a large extent, this could be explained by the still relatively weak economic activity at that time, which reduced the intensity of the transition of this primary shock into the economy. As domestic demand and growth accelerate, the intensity of the transition of primary shocks into the economy could change.

[8] See, for example, Ackerlof et al. (1996), International Monetary Fund (1996) and the references therein.

[9] This argument has been made by Summers (1991).

TABLE 2 Targeted inflation

Country	Targeted inflation in %	Period
Czech Republic	1.0–3.0	2005
Australia	2.0–3.0	Average during a business cycle
Brazil	2.0–6.0	2001
Chile	2.0–4.0	2001
Poland	< 4.0	2003
Israel	3.0–4.0	2001
Mexico	3.0	2003
United Kingdom	2.5	From 1996
New Zealand	0–3.0	From 1996
Canada	1.0–3.0	From 1995
Euro area	< 2.0	From 1999

Source: Schaechter aj. (2000), Web sites of Banco de México, http://www.banxico.org.mx/, and the European Central Bank, http://www.ecb.int/.

In the theoretical literature, one can observe a convergence of views that an inflation rate of 1–3 percent corresponds to price stability. If we look at how central banks quantify price stability in practice (*table 2*), we see that there is not much difference between this theoretical recommendation and what the central banks actually do. This is the case for all economies — developed, developing and transitional.

Evidently, it is not possible to say with certainty at this time whether the CNB intention to reach headline (net) inflation in 2005 in the range of 2–4 (1–3) percent is too ambitious, whether this is too low a level of inflation, and whether reaching such low inflation would require maintaining an excessively restrictive monetary policy. However, data in table 2 show that the CNB inflation target is not too different from inflation targets in other economies. A question arises, though, whether the specific conditions of transition economies would not justify targeting somewhat higher inflation than in developed economies. Škreb (1998) notes that in the transition economies, it is particularly difficult to measure precisely the improvements in the quality of goods. As a result, actual inflation could be much lower than measured inflation. Taking into account this imprecision, as well as other reasons, Škreb argues that in transition economies, inflation in the range of 4–5 percent would correspond to price stability.

Other authors argue, however, that during the convergence with the developed economies, transition economies should be expected to experience a rapid growth of labor productivity, which should produce lower inflation. Deppler (1998) argues that a large positive supply shock resulting from the implementation of economic reforms should allow a significant painful reduction in inflation. Clinton (2000) argues that rapid productivity growth in transition economies weakens the traditional arguments in favor of a notably higher-than-zero inflation rate. Given the rapid growth of labor productivity, a decline in nominal wages would rarely be needed. Similarly, given the high real return on capital and high-trend economic growth, it is not very likely that a situation would arise in which a central bank would have to stimulate an economy in recession with the help of negative real interest rates.

3. Convergence of rate of inflation and price levels

Let's now have a closer look at a frequently discussed issue, the relationship between the rate of inflation and convergence of price levels. One argument used against the rapid reduction of inflation to a level comparable with developed European economies is based on the perception that the convergence of price levels in the Czech Republic and the euro area requires higher inflation in the Czech Republic to persist for some time. Another related argument for a slower pace of disinflation concerns the need to complete the adjustment of relative prices. The correction of relative price deformations from the period of central planning remains under way in transition economies. To the extent that there exists a downward nominal-wage rigidity, it is feasible to achieve this correction

more through a different speed of increase in individual prices, rather than through an increase of some and a decline of other prices. The result is that relative price adjustment produces higher inflation.[10]

As is documented in the literature, at the end of the 1990s the adjustment of relative prices in the Czech Republic to the structure of relative prices typical to the euro area was far from over. Therefore, it could be expected that the combination of nominal rigidities and continued relative price adjustment could produce higher inflation.[11]

According to different estimates, the price level in the Czech Republic (P^{CR}) is about 40 percent of the price level in the EU (P^E). Generally, we can express the relationship between the price levels in the Czech Republic and the euro area as follows:

$$P^E > P^{CR} . 1/E^n$$

where E^n is the nominal exchange rate of the koruna, expressed as a number of koruna per euro. A convergence of price levels could proceed in one of the following ways. First, the rate of inflation in the Czech Republic must be higher than rate of inflation in the euro area (assuming stable nominal exchange rate). Second, the nominal exchange rate of the koruna, E^n, must appreciate faster than the difference between the growth of price levels in the euro area and in the Czech Republic. Third, a combination of the growth of price levels in the Czech Republic and the nominal appreciation of the koruna vis-à-vis the euro must occur such that the result would be a faster growth of price levels in the Czech Republic relative to the euro area, expressed in euros.

For the purpose of the discussion of price level convergence before the EMU accession, it is useful to specify three periods. Each period is characterized by different constraints on inflation rate and changes in nominal exchange rate.

Period I — before EU accession and before adopting the ERM II regime. In this period, there is theoretically no limit for movements of the nominal exchange rate of the koruna. As for the rate of inflation, let's assume that the constraint is the long-term inflation objective for 2005 and the corresponding disinflation trajectory. However, actual convergence of price levels on account of higher inflation may occur faster than would be permitted by the inflation target. During this period, price deregulation and tax changes will be completed, and, as a result, actual inflation may exceed targeted inflation. Under such circumstances, the CNB is ready to use the escape clause provision that permits it to exceed the inflation target.

Period II — EU membership and ERM II membership. During this period, nominal exchange-rate fluctuations will be limited by the ± 15-percent fluctuation band. The increase in prices will depend on the CNB inflation target after 2005. In the year preceding entry into the EMU, the inflation rate will be constrained by the need to meet the Maastricht criteria.

Period III — EMU membership. Introduction of the common currency would mean the end of the Czech currency, and changes in the exchange rate will no longer apply. However, there will be no constraint on the inflation rate in the form of the Maastricht criteria.

Let's now discuss in more detail how quickly price levels in the Czech Republic and in the euro area could converge, given the existing institutional constraints for the rate of inflation and the fluctuations of the exchange rate.

In the first period, there is no external institutional constraint for price level convergence resulting from relatively higher inflation in the Czech Republic. There is only internal institutional constraint in the form of the CNB's inflation targets. For illustrative purposes, let's assume that headline inflation in the Czech Republic will be in line with the CNB's long-term target. Specifically,

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[10] It should be noted that the same speed of such adjustment of relative prices could proceed at different levels of inflation.

[11] See (Čihák – Holub, 2000).

let's assume that inflation will decline linearly from 3–5 percent in January 2002 to 2–4 percent in December 2005.[12] Furthermore, we assume that euro-area price levels will increase by 2 percent every year (the inflation rate measured as by the consumer price index). Under these assumptions, in the period 2001–2005 price levels in the Czech Republic will come nearer to euro-area price levels by 2.7 to 9.4 percentage points.[13]

Presently, it is not fully clear to what extent price level convergence will be affected by price deregulation. In the three years following the introduction of inflation targeting, increases in regulated prices have contributed more than 50 percent to the increase in consumer prices. Moreover, the price level differences in the Czech Republic and the euro area are largest for exactly those items in the consumer basket with regulated prices.[14] Therefore, to an important extent, the speed of price level convergence will depend on the speed of price deregulation in the coming years, or on the size of the increase in regulated prices. True, it follows from the CNB's document specifying the 2005 inflation target that the targeted level of headline inflation already takes into account the effect of expected changes in regulated prices and other administrative measures. However, should changes in regulated prices result in higher headline inflation than the CNB's inflation target, price levels in the Czech Republic and in the euro area would converge more than shown in the calculation above.

Regarding the possibility of price level convergence in the first period resulting from a nominal appreciation of the koruna, the current floating-exchange-rate regime does not create any constraint. However, in considering the scope for price level convergence on account of nominal exchange-rate appreciation, it is necessary to keep in mind two points.

First, the nominal exchange rate is an across-the-board instrument for price level convergence. Nominal exchange-rate appreciation results in an increase in the Czech Republic's price levels, measured in foreign currency, but it does not change relative prices. As we have already noted, price level differences between individual items differ quite substantially from differences in average price levels. To illustrate, in the commodity group "household appliances," price levels in the Czech Republic in 1998 had reached 62 percent of price levels in Germany. However, "healthcare" prices were only 13 percent of those in Germany. Nominal exchange-rate appreciation could assist in price level convergence for items where price differences are relatively small, but cannot ensure a price level convergence for those items where price differences are above average, without at the same time creating "an overshooting" of convergence in other items with smaller price level differences. In other words, nominal exchange-rate appreciation cannot be the only or the prevailing mechanism to achieve price level convergence, and relative price changes in the form of different speeds of price increase will play an important part in price level convergence as well. Also, this means that one cannot fully deny the possible inflationary effect of price level convergence by arguing that this convergence could be accomplished by nominal exchange-rate appreciation (Clinton, 2000).

Second, the speed and extent of price level convergence resulting from nominal exchange-rate appreciation is limited by its effect on the balance of payments. For this reason, it is unlikely that price level convergence in excess of that contributed to real appreciation (caused by the above-discussed inflation differential), plus the eventual effect of a higher increase in regulated prices would produce a more significant convergence of price levels in the Czech Republic and the euro area. To see why this is the case, we note that nominal exchange-rate appreciation, ΔE^n equals the difference between real exchange-rate appreciation, ΔE^r and the excess of inflation rate in the Czech Republic relative to the euro area, $(\pi^{CR} - \pi^E)$:

$$\Delta E^n = \Delta E^r - (\pi^{CR} - \pi^E)$$

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[12] For simplicity, we assume that inflation of 3–5 percent applies to year-end 2001, and that it declines by ¼ percentage point every subsequent year.

[13] During this period, the price level in the Czech Republic would increase by 13.1–19.8 percent, while the euro-area price level would increase by 10.4 percent.

[14] See Čihák – Holub (2000), table 1.

If exchange-rate movements should not neutralize the price level convergence produced by the relatively higher inflation rate in the Czech Republic, higher inflation in the Czech Republic must not produce a nominal exchange-rate depreciation (negative ΔE^n). In other words, a real exchange-rate appreciation must take place. The question is, to what extent is the real exchange-rate appreciation sustainable?

Two factors determine the scope for real exchange-rate appreciation. First, initially, the actual real exchange-rate could be lower than the equilibrium real exchange rate, and real exchange-rate appreciation could take place as a result of closing this gap. There are several reasons identified in the literature why presently the real exchange rate of the koruna could be undervalued. Most importantly, this reflects the fact that the GDP level in the Czech Republic relative to other countries is much higher than the relative price level, which could reflect the slower increase in regulated prices on nontradables.[15] Second, the actual real exchange rate could appreciate because of the appreciation of the real equilibrium exchange rate. There are several reasons why the real equilibrium exchange rate in transition economies should appreciate. There is the traditional Balassa-Samuelson effect related to differences in labor productivity growth. Also, this appreciation could reflect the gradual improvement in the quality of exported goods (or, the willingness of the importers to pay higher prices as a result of the recognition of the good quality), and capital inflow related to the higher marginal productivity of capital in transition economies with a lower stock of capital.[16] However, in the long run, real exchange-rate appreciation will be mainly determined by differences in the growth of labor productivity.

According to the above-described assumptions concerning inflation in the Czech Republic and the euro area, during the period 2001–2005, a stable nominal exchange rate of the koruna/euro would imply a real appreciation of the koruna against the euro by 2.7–9.4 percent, plus any additional effect of the increase in regulated prices on headline inflation that would result in actual inflation in excess of the upper limit of the inflation target range. It is uncertain how much inflation could exceed the upper limit of the target range on account of the unexpected impact of an increase in regulated prices. It is, however, unlikely that during 2001–2005, the real exchange rate of the koruna against the euro on account of higher inflation would significantly exceed 10 percent. Would it be possible to achieve further price level convergence in excess of the convergence implied by higher inflation in the Czech Republic? This would depend on the scope for additional real appreciation of the koruna against the euro compatible with sustainable balance of payments development. An important determinant of such sustainable real appreciation will be the increase in investment and accompanying growth in labor productivity.

In the second period, i.e., the period of ERM II membership, two constraints will determine how much the rate of inflation in the Czech Republic will exceed inflation in the euro area. First, the inflation target specified by the CNB, and second, the specific value of inflation prescribed by the Maastricht criteria for EMU membership concerning inflation. Regarding the former, if the CNB continues to pursue the principle of nonacceleration of inflation after 2005, then whatever inflation target it chooses, the effect on price level convergence would be negligible. During this period, inflation in the Czech Republic cannot much exceed inflation in the euro area. At the beginning of the second period, during the entry into the ERM II, headline inflation is supposed to be in the 2–4 percent range. At the end of the second period, the Czech Republic will have to meet the Maastricht criteria, which in all likelihood means that inflation will have to be somewhere in the range of 2–3 percent.[17]

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[15] For a more detailed discussion see (Čihák – Holub, 2000), and (Krajnyák – Zettelmeyer, 1998)

[16] For discussion of the scope for real exchange rate appreciation in transition economies see (Halpern – Wyplosz, 1997).

[17] However, views have been expressed that there is an inherent tendency of transition economies to display higher growth of labor productivity and thus higher inflation. As a result, the Maastricht criteria should take this into account and be interpreted flexibly (Szapary, 2000). However, strictly speaking, this observation is correct

How tight a constraint for increases in price levels will the Maastricht criteria of maximum permissible inflation represent? If we assume that the rate of inflation in the three EMU countries with the lowest inflation will reach 1.5 percent, then the maximum permissible rate of inflation for the Czech Republic will be 3 percent. However, the effect on the speed of convergence with euro-area price levels depends on total euro-area inflation. Generally, the closer the average rate of inflation in the three EMU countries with the lowest inflation is to the euro-area rate of inflation, the faster will be the convergence, and vice versa. A situation can even arise that inflation in the three best euro-area performers will be so much lower than in the rest of the euro area that the permissible rate of inflation in the Czech Republic would still be too low to ensure convergence in price level with the euro area. In practice, this is unlikely to happen, and the effect of a skewing of inflation-rate distribution on the speed of price level convergence would be small. More importantly, the Maastricht criteria will be in force for only one year preceding EMU membership. ERM II membership will last at least two years, and thus for at least one year, the CNB's inflation target will be the only constraint on price level increases. Assuming that inflation in the Czech Republic stays at 3 percent in that period, and given the assumption about euro-area inflation, price levels in the Czech Republic would converge with the euro-area price level by 1.2 percentage points.

Given the limited scope in the second period for price level convergence resulting from higher inflation in the Czech Republic relative to the euro area, a more important role in this convergence would belong to nominal exchange-rate appreciation. In the ERM II fluctuation band, there is room for a 15 percent nominal appreciation from parity, which exceeds by a significant amount the possible size of price level convergence resulting from different speeds of inflation. Moreover, before joining the ERM II, it is possible to introduce a one-time revaluation of the exchange rate. Such a step does not make sense, however, in countries like the Czech Republic which have floating exchange rates.

During *the third period*, when the Czech Republic becomes a member of the EMU, the situation will be completely reversed compared to the second period. Because the Czech Republic will no longer have its own currency, there will be no exchange rate, and therefore no possibility of price level convergence on account of nominal exchange-rate appreciation. Any further convergence of price levels will have to happen in the form of relatively faster inflation in the Czech Republic. Once an EMU member, the Czech Republic would not be subject to any formal inflation constraint. The CNB will be a member of the European system of central banks, and it would participate in the pursuit of the inflation target set for the whole euro area. Domestic inflation will lose its crucial importance to monetary policy. Ireland, where the growth of consumer prices has recently reached 6 percent, illustrates that euro-area members with lower price levels and faster growth can indeed record higher inflation. Particularly in smaller euro-area members, which do not affect much euro-area-wide inflation, a rapid growth of domestic prices does not represent a serious problem for euro-area monetary policy.[18]

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only for countries with a fixed exchange rate, where relatively higher growth in labor productivity could not result in nominal exchange-rate appreciation.

[18] Gross domestic product of the six EU-accession countries represent about 5 percent of EU GDP (and slightly more of euro-area GDP).

4. Compatibility of low inflation, growth in labor productivity and fixed exchange rate

Before concluding, let's return to one issue that has recently become the subject of an intense debate, which we have already briefly noted above. The issue is one of the mutual compatibility of the Maastricht criteria concerning inflation and exchange-rate stability in a situation of the real convergence of transition economies with the euro-area economies. A possibility has been raised in the literature that for transition economies with a fixed exchange rate and rapid growth in labor productivity, it could be difficult to ensure the compatibility of price and exchange-rate stability assumed by the ERM II mechanism before EMU membership (Masson, 1999). This consideration is based on the empirical observation that inflation is relatively higher in countries that have relatively higher growth in labor productivity (the so-called Balassa-Samuelson effect).

If relatively higher growth of labor productivity is not to result in relatively faster growth in price levels, the size of nominal exchange-rate appreciation must be as follows:

$$\Delta E^n = \alpha \pi^{NT} \cdot (PP^t - PP^{nt})$$

where $\alpha \pi^{NT}$ is the share of nontradables in the consumer price index, and the expression in parenthesis shows the difference in the growth of labor productivity between sectors of tradable goods and nontradeables. For the Czech Republic, the Balassa-Samuelson effect should not represent a serious problem during ERM II membership, because the fluctuation band is wide enough to accommodate the effect of faster growth in labor productivity in the sector of tradable goods on the rate of inflation. To illustrate, let's assume that the share of nontradables in the consumer price index is one-third, [19] and that, at the beginning, the koruna exchange rate will be in the center of the fluctuation band. The scope for 15 percent nominal appreciation against the euro implies that the excess of growth in labor productivity in the sector of tradable goods relative to nontradeables could reach 50 percent, and could be accommodated by a nominal appreciation without adversely affecting the rate of inflation.

However, the Balassa-Samuelson effect could cause problems for EMU-candidate countries that presently maintain a fixed exchange rate in the form of a currency board, and that would like to keep this exchange-rate arrangement all the way up to EMU membership. These countries include Bulgaria, Estonia and Lithuania. This means that during the ERM II membership, these countries would maintain a zero fluctuation band, which could conflict with the requirement to keep inflation low in line with the Maastricht criteria. Moreover, it is not clear whether the ECB would allow a country to maintain its currency board during the ERM II membership, and whether this would allow a country to meet the requirement of exchange-rate stability. According to some ECB representatives, a currency board does not allow a country to fully test its ability to maintain currency stability (in the limits set by the ERM II band) under the conditions of the free movement of capital.

During the ERM II stage, the Balassa-Samuelson effect could be easily accommodated in countries with floating exchange rates, like the Czech Republic. However, simultaneously maintaining price and exchange-rate stability could be complicated for a different reason. One cannot exclude the possibility that the prospect of approaching EMU membership would attract an accelerating inflow of foreign capital, which could produce appreciation pressures that could turn out to be stronger than otherwise accommodated by the 15-percent fluctuation band. In such circumstances, the CNB could be forced to intervene in the foreign exchange market, in order to keep the koruna in the required fluctuation band. Unless the CNB succeeds in fully sterilizing the monetary effect of these interventions, capital inflow could produce a faster growth in monetary aggregates, which could lead to higher inflation and potential problems in meeting the Maastricht criteria. To the extent that the accelerated inflow results from the approaching EMU membership, and not from structural distortions or inappropriate macroeconomic policy, it should be a temporary problem that in itself

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[19] The CNB Inflation Report from October 2000 notes that the share of nontradeables in the consumer price index is 32.7 percent.

should not represent an insurmountable obstacle to EMU membership. For example, one solution could be an upward shift of the exchange-rate band.

5. Conclusion

In this article, we have discussed some monetary-policy issues that arise in connection with the expected membership of the Czech Republic in the EMU: the speed of disinflation, the quantification of price stability, and the possibility of keeping inflation low under conditions of real convergence and the convergence of price levels in the Czech Republic and the euro area.

The CNB has approved a long-term headline inflation target for 2005 in the 2–4 percent range, which should be compatible with the original net inflation target of 1–3 percent. Is the speed of disinflation implied by this long-term target too ambitious? First, we have discussed the theoretical approach to determining the optimal pace of disinflation, based on the minimization of the sacrifice ratio. For practical monetary-policy conduct, this theoretical concept is of only limited use, but at least it identifies the determinants of the costs of disinflation. The planned future membership of the Czech Republic in the EMU is more important toward determining the speed of disinflation, because this membership is conditional on meeting certain qualification criteria, including the criteria of maximum permissible inflation. The speed of disinflation implied by the CNB's long-term inflation target for 2005 seems to be compatible with the subsequent observation of the EMU's inflation qualification criteria.

When we evaluate the cost of disinflation, it is necessary to keep in mind the eventual costs that the Czech Republic would incur as a result of delay in EMU membership. If the Czech Republic did not succeed in reducing inflation to a level prescribed by the Maastricht criteria, it would have to postpone its entry into the EMU. Such a delay could have important costs for the Czech Republic. One major source of such costs would be the fact that it is extremely difficult for a small, open economy in an environment of the free movement of capital to pursue, in the long run, an independent monetary policy without being, from time to time, exposed to financial and economic instability that could result exclusively from external shocks.[20]

Furthermore, the article discusses the issue of whether the CNB's long-term inflation target is too low for a transition economy, and whether its attainment would require an excessively restrictive monetary policy. While it is not possible at this time to definitively answer this, quantified estimates of price stability and the inflation targets of other inflation-targeting central banks do not suggest that the CNB's inflation target is unduly low. However, it must be noted that different views exist.

This article comes to the conclusion that the CNB's long-term inflation target, and institutional constraints to price level and nominal exchange-rate movements in the period before EMU accession should not seriously limit the possibility of price level convergence between the Czech Republic and the euro area. We have tried to indicate the extent and the form of price level convergence during the different stages of EMU accession. In the case of the Czech Republic, the flexible-exchange-rate regime mitigates the potential conflict between the needed relative price adjustment and the requirement to keep inflation sufficiently low to meet the Maastricht criteria. Both during the EU pre-accession period (that is, before the introduction of the ERM II mechanism), and during the ERM II membership, nominal exchange-rate flexibility will be sufficiently large to absorb any of the inflationary effects of the relatively high growth of labor productivity (the so-called Balassa-Samuelson effect). However, the across-the-board change in price levels as a result of nominal exchange-rate change does not allow relative price adjustment. Under conditions of downward nominal-price rigidity, relative price changes result in higher inflation. Before EMU

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[20] However, there are also different opinions, namely that after the EU accession it is not necessary to pursue speedy EMU membership. For example, CNB Board member M. Erbenova argues that given the worrying developments in public finance, the Czech Republic should maintain monetary-policy independence for several years after EU accession (*Svoboda*, May 23, 2001).

accession, the CNB's inflation target and the Maastricht criteria will set limits for maximum permissible inflation. Only after the EMU accession will these constraints on inflation and price level convergence disappear.

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SUMMARY

This article discusses monetary policy issues that arise in connection with the expected entry of the Czech Republic into the EMU. The paper first discusses the disinflation path specified in the Czech National Bank's (CNB) long-term monetary strategy, and the quantification of inflation corresponding to price stability.

Considered next is the issue of what room exists for price level convergence between the Czech Republic and the euro area in the period before and after EMU membership, either by means of a higher rate of inflation or by means of a nominal appreciation of the Czech koruna. The author concludes that the CNB's long-term inflation target, and institutional constraints regarding prices and nominal exchange rate movements in the period before joining the EMU, should not seriously limit the possibility of price level convergence.

Lastly, the author briefly describes the mutual compatibility of the Maastricht criteria under the condition of the rapid growth of labor productivity. During the pre-accession EU period, and during ERM II membership, nominal exchange rate flexibility will be sufficiently large to absorb any inflationary effects related to the relatively high growth of labor productivity.

Measuring Monetary Conditions in the Czech Republic

Anne-Françoise BLÜHER[*]

This essay describes, firstly, the main channels of monetary policy from a theoretical point of view. The monetary conditions index (MCI), originally constructed by the Canadian central bank is considered at length. This MCI will be modified and applied to the Czech Republic. Next, possible implications for Czech monetary policy are investigated. After a critical examination it seems that MCI may be used as broad reference variable for the development of aggregate demand. However, it might be insufficient as an operational target for monetary policy for the Czech National Bank, which targets internal price stability.

1. Theoretical background: channels of monetary policy[1]

Output gap (the difference between production potential and demand) and expected inflation are the important driving forces behind inflationary pressure – when domestic demand exceeds domestic production capacities, it leads to inflationary pressure. Central banks tend to focus on the development of demand, which is a key determinant of changes in the output gap, whereas demand is largely influenced by monetary conditions. By means of money instruments, which affect demand via monetary transmission, central banks seek to control the development of aggregated demand. According to Mishkin (1996), we may summarise the monetary transmission process into aggregated domestic demand mainly along three channels: traditional interest-rate channels, asset price channels, and credit channels.

According to *traditional interest-rate channels*, monetary expansion leads to a fall in real interest rates, which lowers the cost of capital. This causes a rise in investment spending (in business, but also affects private household decision making regarding residential housing investment and durable expenditures), which triggers demand. Real long-term interest rates, and to a lesser extent also the real short-term interest rates, are generally seen to play a major role in investment decisions. Monetary expansion can lead to a decline in real interest rates via a decline of nominal interest rates and/or via a rise in the expected inflation rate.

This traditional interest channel focuses only on one asset price, the interest rate. Two other key assets receive substantial attention in economic literature, according to Mishkin (1996), the foreign-exchange rate and equities.

Monetary expansion leads to a decline in domestic real interest rates. By that, domestic deposits become relatively less attractive than deposits denominated in foreign currencies, which leads to net capital outflow, resulting in a depreciation of the *exchange rate – ceteris paribus*. Depreciation of the exchange rate triggers a rise in net exports and, hence, in demand. According to the second asset price channel, monetary expansion causes a rise in equity prices. Higher *equity prices* lead to a rise in investment spending as companies are able to buy new investment goods with a small issue of equity. Furthermore, an alternative channel occurs via the wealth effects on consumption, as the financial wealth of households rise, which leads to an increase of household consumption, hence boosting aggregate demand.

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[1] See also Mishkin (1996).

The *credit channels* are partly related to the fact that, with monetary expansion, banks' reserves and deposits grow, which increases the quantity of bank loans available, but which arises also as a result of information problems in credit markets, according to Mishkin (1996). (The information problem also refers to the costly verification and enforcement of financial contracts.) The lower the net worth of business firms, the more severe the adverse selection and moral-hazard problems are in lending to these firms.[2]

Monetary expansion causes a rise in equity prices, i.e., the net worth of firms. This, on the other hand, decreases adverse selection and moral hazard. Secondly, monetary expansion, which lowers nominal interest rates, improves firms' balance sheets because it increases cash flow, thereby reducing adverse selection and moral-hazard problems. Thirdly, monetary expansion can lead to an unanticipated rise in prices, which decreases the value of companies' liabilities in real terms, which, in return, means a rise in firms' real net worth. And again, adverse selection and moral hazard is reduced. Through all these channels monetary expansion leads to higher investment spending, which triggers demand. The credit channel should also apply in analogy to consumer spending, particularly as regards consumer durable goods and housing. In contrast, a financial crisis sharply and severely increases asymmetric information problems of the type described above.

2. The monetary conditions index (MCI)[3]

Central banks, which seek an objective of price stability, face the issue of a time lag between the implementation of monetary-policy instruments (e.g., the setting of key interest rates) and the realization of the effect. Therefore, central banks use indicators which stand between the instrument and the ultimate goal, e.g., an operational target, which is directly and mainly influenced by central-bank instruments. Usually short-term interest rates are used as operational targets. However, the Canadian central bank, the Bank of Canada (BoC)[4], argues that in the case of a floating exchange rate, it is preferable to use the monetary condition index (MCI). "First, in flexible rate regime monetary policy operates through two channels – the interest rate and the exchange rate. Since the relative movements of the two variables will depend on market responses to Central Banks actions, they can differ appreciably in different circumstances. Second, if there are exogenous shocks to the exchange rate, monetary policy actions should typically offset their effects on aggregate demand." (Freedman, 1996, p. 73)

The concept of the monetary condition index was introduced by the BoC. The MCI itself is not deduced from a structural model, but it aims to aggregate and to reflect changes in the monetary conditions which result from changes in the real effective exchange rate and in real interest rates. The MCI is the weighted sum of the change in the short-term real interest rate relative to a base period and the percentage change of the real effective exchange rate relative to a base period. The base period is chosen arbitrarily, therefore the absolute level of the MCI has, in fact, no interpretation. Only the changes compared to the base period indicate if the monetary conditions have relatively eased or tightened.

The relative weights for the Canadian MCI for the aggregation of these two factors are based on empirical research carried out by Duguay (1996). According to Duguay "[...] the transmission mechanism starts with the influence of monetary actions on interest rates and the exchange rate and from there goes on to the effect on aggregate demand and supply and to the adjustment of prices and costs." (Duguay, 1996, p. 88). Instead of estimating a large structural macromodel[5], which would specify

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[2] Adverse selection and moral-hazard problems are due to asymmetric information.

[3] Compare Freedman (1996).

[4] The Bank of Canada's objective is to reach a rate of inflation within target bands six and eight quarters in the future.

[5] Peeters (1998) investigates the interest- and exchange-rate transmission channels in large macroeconometric models, i.e., in NIGEM (developed at the National Institute in London) and EUROMON (developed at the Dutch Central Bank).

the components of GDP explicitly and which would describe the interest- and exchange-rate transmission in detail, Duguay argues that an aggregated approach yields much more robust and more significant estimates. (Duguay, 1996, p. 92). For the estimation of the effect of real interest-rate changes and real exchange-rate changes on total spending he uses a single equation, which is interpreted as an aggregate demand equation. The following is a representative regression from that paper, which is often quoted.[6]

$$\Delta y_t = + 0.13 + 0.52\Delta y_t^* + 0.45\Delta y_{t-1}^* - 0.40\Delta r_t + 0.15\Delta s_t$$

$$(1.0) \quad (4.8) \quad\quad (4.2) \quad\quad (1.8) \quad\quad (1.3)$$

$$\overline{R}^2 = 0.64 \quad\quad\quad DW = 1.96$$

where:

Δy = growth rate of Canadian real GDP,

Δy^* = growth rate of U.S. real GDP,

Δr = 8-quarter moving average of quarterly change in short-term real interest rates (the 90 day commercial paper rate minus the four-quarter growth rate in GDP deflator, lagged one quarter),

Δs = 12-quarter moving average of the rate of growth in the real exchange rate between Canada and the United States (based on GDP deflators).

The series are all quarterly data from the first quarter 1980 to the fourth quarter 1990.

These results of Duguay´s estimations were used by Freedman (1996) for the official introduction of the monetary condition index (MCI) in 1994. Duguay´s results suggest that "[...] a one percentage point increase in short-term interest rates has the same effect on spending over time as a 3 per cent appreciation of the currency" (Dunguay, 1996, p. 104). This relation has been chosen by the Canadian central bank for the MCI (Freedman, 1996, p. 75), i.e.,

MCI = [real interest rate $_{\text{at time } t}$ − real interest rate $_{\text{at base period}}$] + 1/3[(real effective exchange rate index $_{\text{at time } t}$/real effective exchange rate index $_{\text{at base period}}$)-1]*100

3. The construction of the modified MCI

The channels of monetary transmission described in the above chapter on the theoretical background reveal that "traditional" MCI includes the interest-rate channels and the asset-price channel via the exchange rate, but it does not incorporate credit channels. Therefore, the "traditional" MCI will be enlarged to the "modified" MCI by a variable, i.e., the real credit volume, to incorporate the credit channels as well.

MCI = w_i*[real interest rate $_{\text{at time } t}$ − real interest rate $_{\text{at base period}}$] + w_e*[(real effective exchange rate index $_{\text{at time } t}$ / real effective exchange rate index $_{\text{at base period}}$)-1]*100 + w_c*[(real credit volume $_{\text{at time } t}$ / real credit volume $_{\text{at base period}}$)-1] * 100

In the following sections, first the data for the quantification of the variables will be defined and, afterward, the relative weights for a Czech MCI will be assessed.

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6 Compare (Duguay, 1996, pp. 94–97.

3.1 The interest-rate channels

The interest-rate channels refer mainly to the impact of changes in the real interest rate on fixed capital investment activity. Investment decisions are rather long-term directed; therefore, investors primarily take long-term interest rates into account. On the other hand, the interest rate should be close to the monetary instruments of the central bank and, therefore, short-term interest rates are often used as an operational target of policy. For the construction of a modified MCI for the Czech case, something in-between has been chosen – a 1-year PRIBOR rate.

Company investment represents the major part of investment into tangible goods in the Czech Republic, i.e., almost 70%. Hence, for the quantification of the real interest rates, the industrial producer price index (PPI) y-on-y rate was chosen because the business sector is confronted more with producer than consumer price development.

Fixed-capital investment (excluding changes in stocks) represented around 30% of real GDP in the Czech Republic during recent years. In previous years, about 20% of investment into tangible goods was made by the public sector – this share is less subject to changes in real interest rates, but is sensitive to budgetary considerations, i.e., to political decisions. Even though the share of investment in GDP is relatively large compared to other countries, the share of GDP is not the only determinant which is important; we have to ask how sensitive investment spending is to changes in real interest rates.

GRAPH 1 Real interest rate in % (inverted left scale) and fixed capital investment in % (right scale)
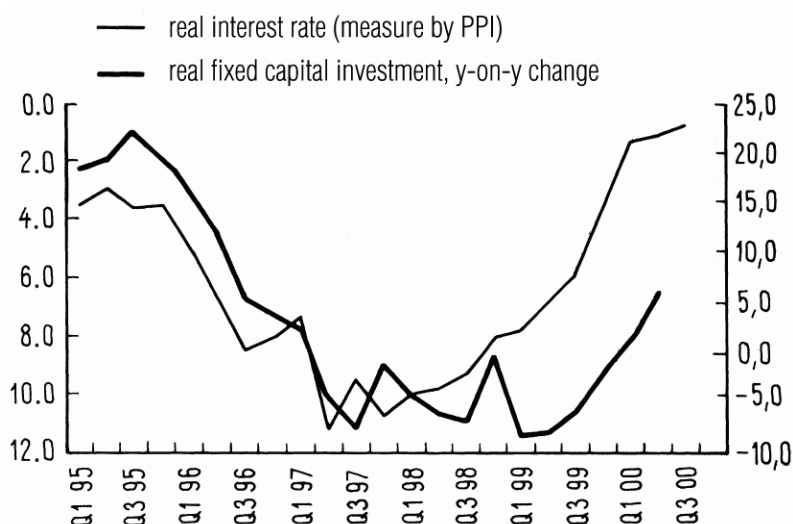

Although some empirical research[7] suggests that the response of investment to price variables (which also includes interest rates) tends to be small and unimportant relative to quantity variables (such as GDP growth), the *graph 1* suggests that there might be a relationship between investment activity (measured as the y-on-y changes in real fixed capital investment, GDP definition) and real interest rates (measured as 1Y PRIBOR minus PPI y-on-y rate) in the Czech Republic. The correlation coefficient result is only 0.60.

3.2 The credit channels

Changes in the *real volume of credits* seem also to play an important role in the Czech economy. The nominal volume of credits represented more than 60% of nominal GDP The correlation coefficient between changes in the real credit volume and real fixed capital investment is 0.63, which does not suggest a strong relationship – *graph 2*.

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7 See for example Chirinko (1993).

GRAPH 2 Real volume of credits (left scale) and fixed capital Investment in % (right scale)
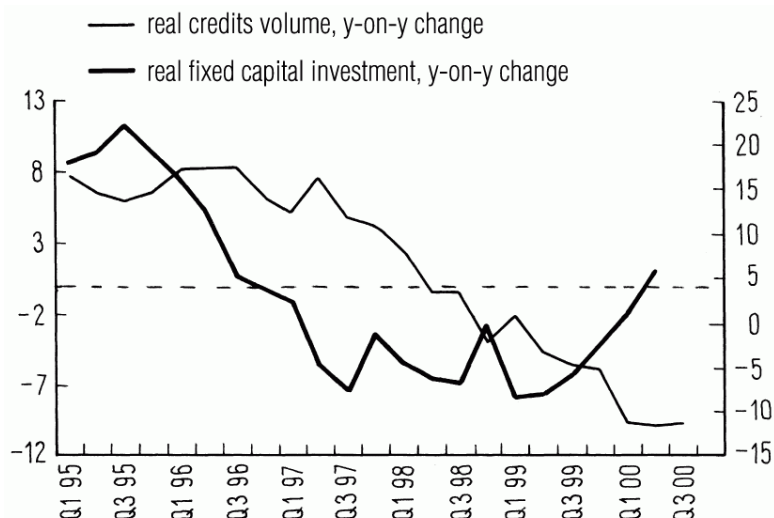
Changes in the volume of real credit and changes in real interest rates may exhibit a negative relationship, i.e., falling real interest rates lead to an increase in real credit volumes. Such dependence between these two explanatory variables would lead to the problem of multicollinearity, i.e., a notable loss in the quality of the regression analysis undertaken for the assessment of the relative weights.[8] However, changes in credit volumes are also dependent on other factors. Mishkin (1996) explains that credit volumes also rise and fall, for example, because of information asymmetries, adverse selection, and moral-hazard problems. Dornbush et al. (1998) found significant differences in monetary mechanisms across Europe, depending on a country's financial structure, i.e., if companies are rising capital on capital markets, such as in Great Britain, or if banks are providing credits, which is more often the case in continental Europe. Dornbush et al. (1998) mention also that there is evidence that the role of collateral in the provision of bank loans differs significantly across Europe, that the tightness of relationships between banks and firms and the degree of competition in the European banking industry play an important role, especially in the timing of the response of bank lending rates to changes in the interest rates controlled by the central bank. Therefore, it seems probable that in the Czech Republic the structure and the process of transformation of the financial sector may play a significant role in the transmission mechanism as well.[9]

To avoid the problem of multicollinearity a regression analysis of changes in real credit volumes on changes in real interest rates was concluded.

$$\Delta c_t = \quad 2.05 \quad + \quad 1.41 \Delta r_{t\text{-}12}$$
$$\quad\quad\quad (4.36) \quad\quad (10.69)$$

$$\overline{R}^2 = 0.63 \quad\quad DW = 0.30$$

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[8] See also (Johnston, 1972, pp. 159–168.

9 The "small" and the "large" amendment to the Banking Act in 1998, which where mainly directed to solve the problems arising from the close inter-relationship between banks and enterprises, should have had an effect strengthening the supervisory power of the Czech National Bank (CNB) and to improve bank governance. In addition, the CNB was gradually tightening prudential regulations, bringing them in line with Basle Committee's recommendations and European Union banking directives, which were restricting the banks' ability to grant credits. Furthermore, bank privatization reduces the political influence on banks' credit policy and the economic recession was devaluating collaterals backing loans. All these factors where influencing the banks' credit-granting behaviour.

where:

Δr = change over 12 months in %-points of the real short-term interest rates (the 1year PRIBOR minus the producer price index y-on-y rate),

Δc = y-on-y change in the real credit volumes in the Czech Republic (based on the producer price index y-on-y rate).

The values below the estimated coefficients are the t-statistics.

The estimation is based on time series, i.e., monthly data from January 1995 till August 2000.

GRAPH 3 Real volume of credits (change y-on-y) and real interest rate (delta y-on-y)
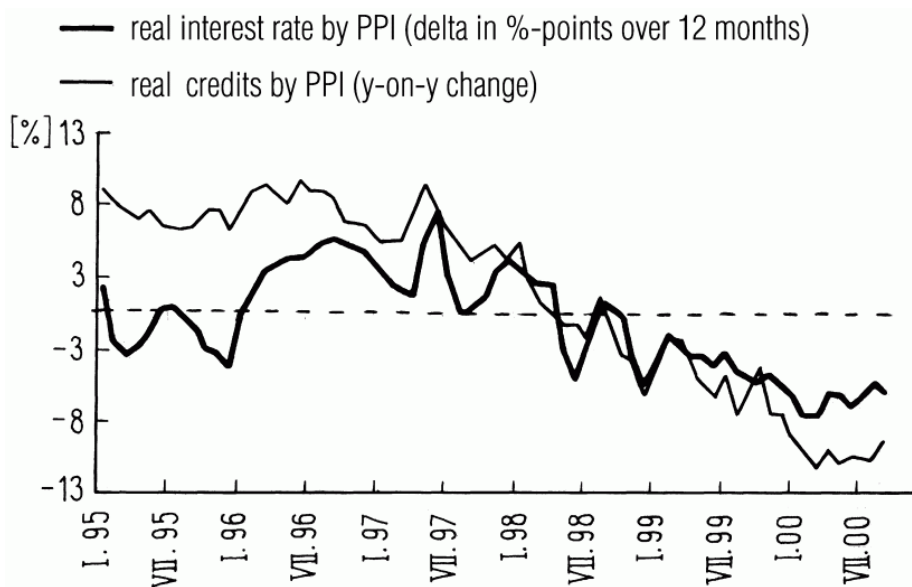
Not only is the adjusted R^2 statistic, 0.30, relatively small, but more worrying is that the coefficient of the changes in real interest is positive, which would mean that, with rising real interest rates, the real credit volumes are increasing (see also *graph 3*). This contradicts economic theory. Due to this result, it is assumed that the volume of real credits and real interest rates do not indicate a strong dependency in the Czech Republic, and that the changes in real credit volumes and the changes in real interest rates can be used as explanatory variables without running the risk of multicollinearity.

## 3.3 The exchange rate channel

The Czech economy is a very open economy. Total exports and total imports each represent more than 70% of real GDP. Therefore, one can assume that changes in the *real effective exchange rate* may show a strong impact on the external trade balance and, with it, on real GDP growth. The *graph 4a,b* reflects the development of the real effective exchange rate and the real trade balance. For the quantification of the real effective exchange rate, the Czech crown/German mark exchange rate was used. Although, per definition, this is not the *effective* exchange rate, it should be a relative good proxy because more than 60% of imports and exports in the Czech Republic are accounted for by EU countries, i.e., countries whose currencies are stable vis-à-vis the German mark, previously due to the ERM, and, since 1 January 1999, due to the EMU.

GRAPH 4a, b

Real exchange rate (CPI) (left scale) and real trade balance (right scale)

— real exchange rate by CPI

— trade balance (goods and services)
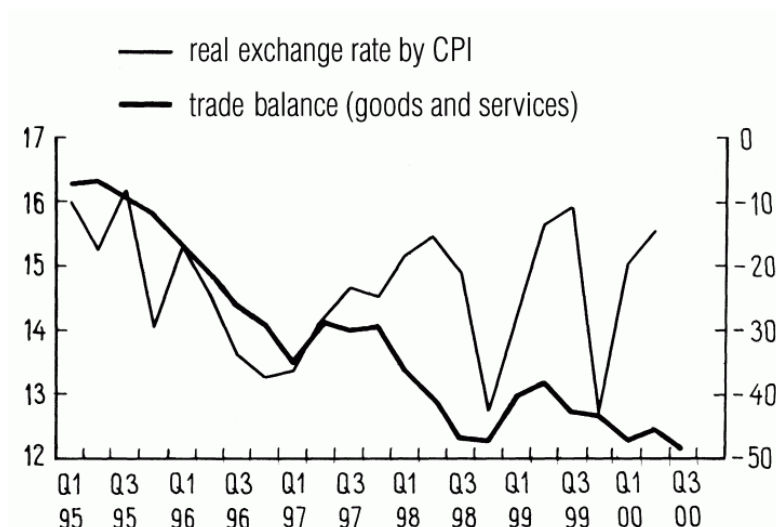
Real exchange rate (PPI) (left scale) and real trade balance (right scale)

— real exchange rate by PPI

— trade balance (goods and services)
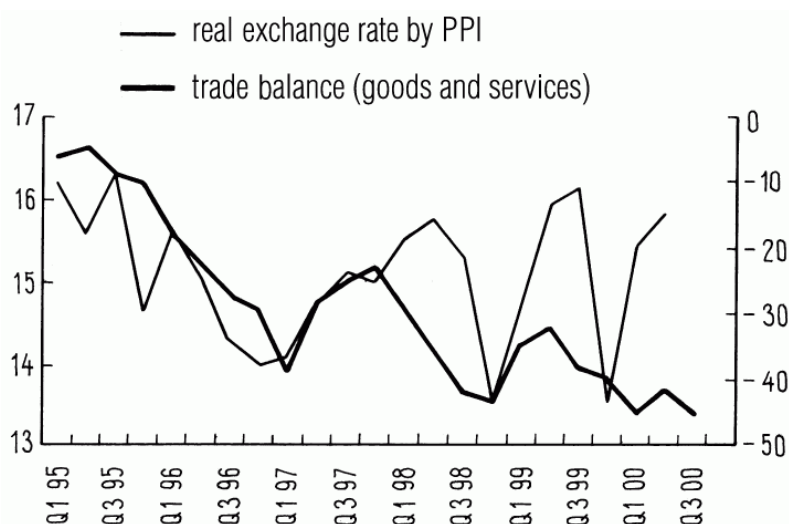
Czech and German consumer price indices were used toward the measurement of inflation differential; however, it has to be taken into account that prices of non-tradable goods went up by more than the prices for tradable goods in the Czech Republic, mainly because of the price deregulation. Therefore, the Czech consumer price index might overstate price development in the Czech Republic, which is relevant for the evaluation of the impact on the trade balance. The graph 4 suggests some relationship, but the correlation is not that strong, reaching only 0.49. The real exchange rate, deflated by Czech and German producer prices, does not suggest a better fit (see graph), and the correlation coefficient is only slightly higher: 0.52.

3.4 Assessment of the relative weights

The next step is the selection of the *relative weights* w_i, w_e *and* w_c. A regression analysis was carried out toward the quantification of the weights. Analogous to the research paper of Duguay (1996), an aggregate demand equation for the Czech Republic was estimated, yet changes in real credit volumes were included as an explanatory variable.

An estimation, which included real GDP figures for Germany, has not only shown that the coefficient of y-on-y change in German real GDP is close to zero, but is also insignificant. Therefore, this coefficient has been set equal to zero. This result seems at first glance surprising, as Germany is the most important trading partner of the Czech Republic (from 1995 to 1999 exports to Germany represented 38% of total Czech exports and imports from Germany represented 32% of total Czech imports in average). Tomšík (2000), for example, determines that the income elasticity of Czech exports with respect to German GDP is greater than its price elasticity, which suggests that the development of the German economy has a strong impact on Czech exports. Hlušek and Singer (1999) too separately estimated import and exports equations toward constructing a forecasting model for changes in the Czech external trade deficit. But Hlušek and Singer (1999) use German import data instead of German GDP data, mainly because GDP data are available with a long time delay and therefore is not an appropriate explanatory variable for their forecasting model. Hlušek and Singer determined that these two equations did not adequately forecast change in the Czech external trade deficit and constructed another model, which focuses directly on changes in the Czech external trade deficit. Interesting in the context of this paper is that Hlušek and Singer's forecasting model for changes in the external trade deficit does not include German imports as an explanatory variable anymore. Their estimated equation for changes in the Czech external trade balance contains as explanatory variables only changes y-on-y in the Czech crown against the USD and DEM, difference y-on-y in the amount of working days, and, although only slightly significant, the growth of Czech retail sales (which was an explanatory variable in the import function). These findings suggest that, although the development of the German economy bears a strong affect on Czech exports, it is difficult to find an affect on net exports.

Due to the already short length of the time series, no quarterly moving averages were computed as Duguay (1996) did, but some variables were lagged as the change in the explaining variable may take time to show a effect in real GDP.

$$\Delta y_t = \quad 2.01 \quad + \quad 0.17\Delta e_{t-1} - \quad -0.95\Delta r_{t-4} + 0.31\Delta c_t$$

$$(3.9) \qquad (2.2) \qquad (-6.7) \qquad (4.6)$$

$$\overline{R}^2 = 0.76 \qquad DW = 2.48$$

where:

Δy = y-on-y change of Czech real GDP,

Δr = y-on-y change in %-points of the real short-term interest rates (the 1 year PRIBOR minus producer price index y-on-y rate),

Δe = y-on-y rate in the real exchange rate between the Czech and German currencies (based on the consumer prices index y-on-y rate),

Δc = the y-on-y rate in the real credit volumes in the Czech Republic (based on the producer price index y-on-y rate).

The values below the estimated coefficients are the t-statistics.

The estimation is based on time series, i.e., quarterly data from the first quarter 1995 to the second quarter 2000.

The estimations, including the real exchange rate based on the Czech and German PPI, resulted in similar coefficients, but the coefficient was not significant. Therefore, the real exchange rate based on the consumer price index was chosen.

All estimated coefficients have the expected signs. With rising real interest rates, real GDP growth slows, and with a rising real exchange rate – i.e., with a weakening of the Czech crown against the German mark in real terms, or with a rising credit volume in real terms – real GDP growth rises. The 95%-confidence interval of all estimates is relatively narrow in comparison with other findings (Ericsson et al., 1998, pp. 248–260) – *table I*.

TABLE 1

variable	estimated coefficient	lower level of the 95%-confidence interval	upper level of the 95%-confidence interval
intercept	2.01	0.93	3.09
real exchange rate	0.17	0.01	0.33
real interest rate	-0.95	-1.25	-0.65
real volume of credits	0.31	0.17	0.45

GRAPH 5 Real GDP growth (left scale) and modified MCI (inverted right scale)
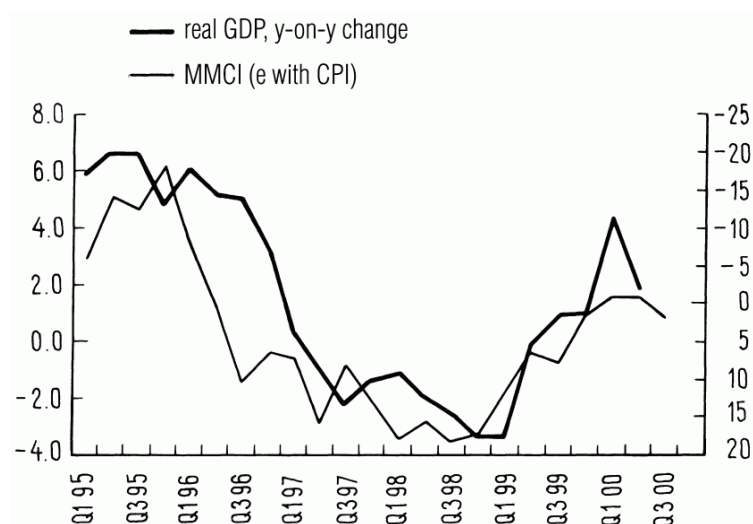
The significance of all coefficients is satisfactory, as well as the fit of the estimated equation (adjusted $R^2 = 0.76$). The relative size of the coefficients suggests that the weights should be roughly 1/6/2 with respect to the real exchange rate, the real interest rate, and to the real credit volumes. Despite the fact that the resulting relative weights look atypical for an open economy such as the Czech Republic's, many studies found a much higher weight for the real interest rates than for the real exchange rate, even for open-economy countries – Ericsson et al. (1998, p. 244) provide a good overview of the empirical findings. In addition, the modified MCI with the estimated weights exhibits a relative good fit (see the *graph 5* also). Furthermore, the results for the modified MCI look relatively good in comparison with the results from other investigations (compared with Ericsson et al., 1998, p. 244). However, it has to be emphasised that the time series are very short, which makes the results of regression analysis less reliable. Furthermore, the Czech economy is subject to much structural change, which raises questions about the stability of the coefficients – therefore, the results have to be interpreted with caution.

4. Evolution of the modified MCI

1995: The modified MCI indicates a loosening of monetary conditions throughout 1995 compared to the beginning of the year. Real interest rates declined and the volume of real credits rose. These expansive effects were only slightly offset by the appreciation of the real exchange rate – *graph 6a,b,c,d.*

1996: The modified MCI indicates a notable tightening of monetary conditions during 1996 compared to 1995. While the volume of real credits continued to grow steadily, real interest rate rose notably during the first half of the year and the real effective exchange rate appreciated strongly throughout the whole year.

1997: The modified MCI reflects the Czech Republic's currency crisis during the spring of 1997 (the strong depreciation of the CZK and the jump in interest rates). Even though interest rates came down again after the currency crisis abated, real interest rates rose notably the whole year. The real volume of credits stopped growing following the currency crisis and the Czech crown depreciated quickly. With the resignation of the Cabinet at the end of 1997, interest rates rose again and the Czech crown weakened further in real terms. After all these ups and downs, the modified MCI indicates that monetary conditions were tighter at the end of 1997 than at the end of 1996.
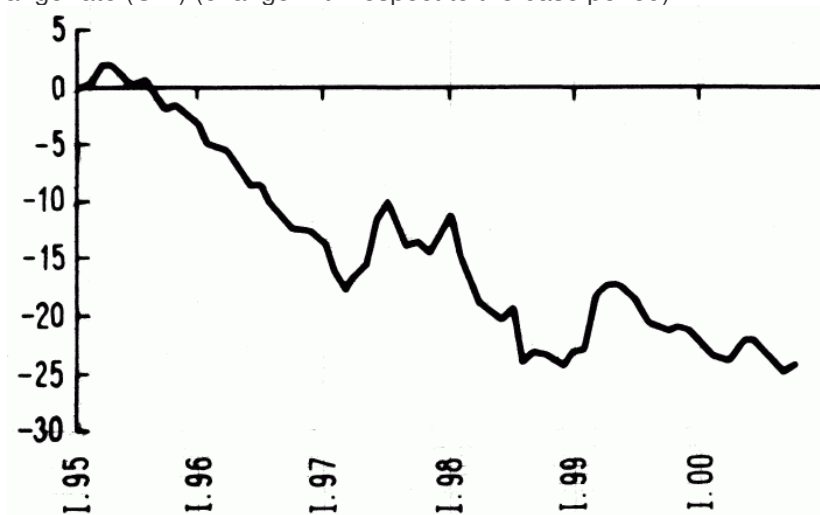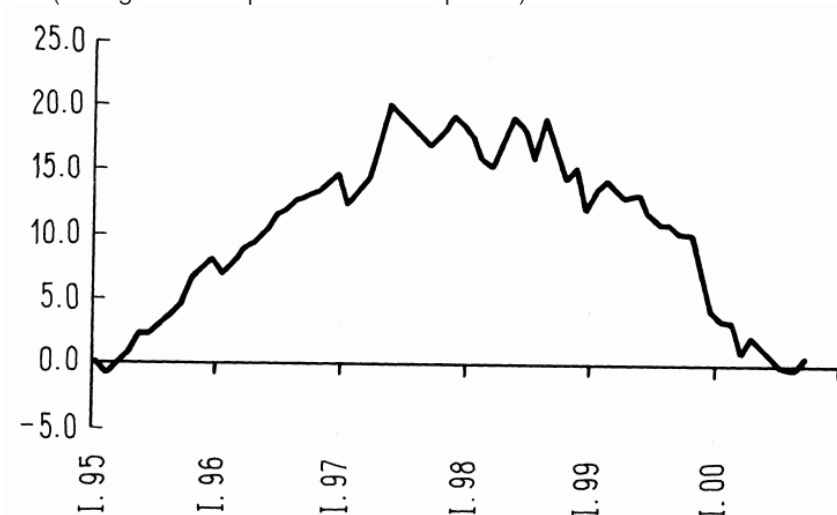
GRAPH 6

Modified MCI

Real interest rate (change with respect to the base period)
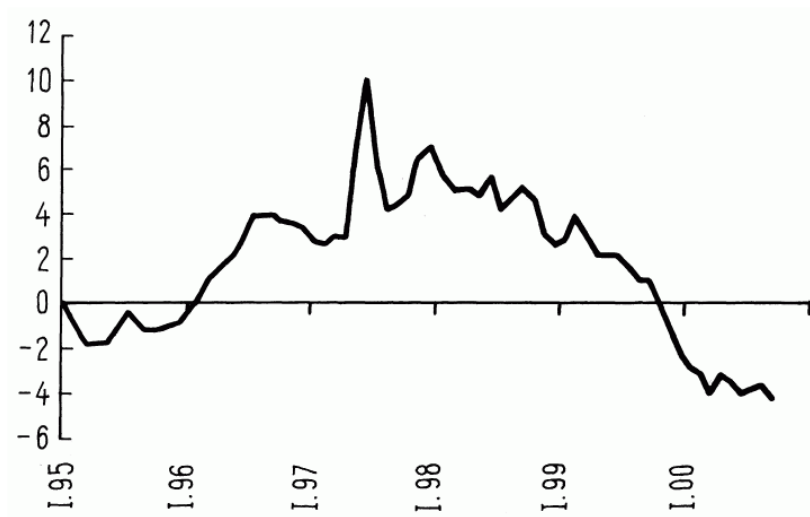
Real exchange rate (CPI) (change with respect to the base period)

Real credits (change with respect to the base period)

1998: The modified MCI fluctuated around the level reached at the end of 1997. A tightening of monetary conditions stemmed from the appreciation of the real exchange rate but also

was due to the stagnation and later decline of the volume of real credits. Yet, in 1998 real interest rates declined notably on the year, especially after the CNB started to lower key interest rates. The decline in real interest rates was enough to mitigate monetary conditions.

1999: The real exchange rate depreciated strongly and was the main factor behind the significant easing of monetary conditions at the beginning of the year. The CNB continued to cut key interest rates during the year and real interest rates fell further, easing monetary conditions as well. This was only partly compensated by a further decline in the volume of real credits and by a re-appreciation of the real exchange rate later that year, so that modified MCI indicates relaxed monetary conditions at the end of 1999 compared with the end of 1998.

2000: The year 2000 can be said to be a year of stabilization; the MCI indicates that the monetary conditions have had a similar impact on the economy as at the beginning of 1995.

5. Evaluation

MCI has been criticised in the literature for many reasons. Partly because the construction of the MCI leaves its specification ambiguous and as its econometric estimations have shown to be very sensitive to quantification (Deutsche Bundesbank, 1999, p. 56).

Ericsson et al. (1998, pp. 246–248) criticise several underlying assumptions of MCI. First, the relationship between monetary-policy instruments, the exchange rate, the short-term interest rate, output, and inflation generally are dynamic. Second, the data might be integrated, which would mean that a cointegration analysis should be undertaken. Third, the postulated exogeneity of monetary-policy instruments and other variables can be misleading, as it assumes, for example, no feedback effects from aggregate demand or inflation onto exchange and interest rates. Also, causality between these variables has to been investigated. Fourth, parameter constancy is critical for MCI interpretation, eespecially in a country such as the Czech Republic, which is undergoing important structural changes, the stability of the estimated coefficients is doubtful. Fifth, other potentially important variables are omitted, which may have an important impact on aggregate demand, such as (mentioned above) the stance of fiscal policy or international demand, but also world oil and commodity prices, which may alter a country's terms of trade.

Questionable is also whether MCI, as well as modified MCI, is a sufficient indicator for the stance of monetary policy for an inflation-targeting central bank. Duguay (1996) estimates a relatively simple version of the expectations-augmented Phillips curve, which serves as his model for an explanation of inflation. He uses lags of price inflation to describe persistence in the inflationary process. In addition, he adds lags of the real exchange rate, lags of the real oil prices, changes and lags in indirect taxes to explain changes in the price level (Dunguay, 1996, pp. 100–102). Duguay's regression analysis does not include the MCI itself. Therefore, the relation between inflation and MCI has not been explicitly tested, only indirectly, i.e., MCI has not reflected changes in the potential output, but only changes in aggregate demand. As a consequence, MCI can not be used as a substitute for output gap, which, however, is the central idea of the Phillips curves, i.e., price changes traced back to existing output gaps.

Freedman (1996) argues that in Canada "[…] it is the output gap, along with expected inflation, that is the principal driving force behind increases and decreases in inflationary pressure and it is changes in aggregate demand that are a key determinant of changes in the output gap." (Freedman, 1996, p. 76). Even if in the short run it might be suitable to assume that changes in the potential output stem mainly from changes in the aggregated demand, for the interpretation of MCI its own construction has to be taken into account as well. MCI is referring to a base period, i.e., it measures the degree of easing or tightening of monetary conditions from a base period. Yet if, for example, the potential output rises with the years as a result of structural change, an easing in monetary conditions would *ceteris paribus* not lead to higher inflationary pressure because the economy, with its higher productions potential, would be able to cope with looser monetary conditions. This in turn means that the farther ago the base period the higher the risk that the interpretation of MCI with respect to inflationary pressure can be wrong.

Furthermore, it has to be emphasized that some important explanatory variables, such as international demand and the development of central-government finance, can have an important impact on changes in the aggregated demand too, although they are not included in the MCI. The Bank of Canada's quarterly staff projections take such external factors additionally into account (Freedman 1995, p. 54). The direct impact of the changes in the exchange rate on prices through import prices is not explicitly included in the MCI. Also, other factors – commodity prices, indirect tax changes, deregulation and inflationary expectations – an have an important impact on price development and are not reflected, at least not directly, in the MCI. As a consequence, it may be misleading to use the MCI as a tool for inflationary forecasting, because to explain domestic price development further facts must be taken into account.

Taken into account all shortcomings the MCI, which are also valid for the modified MCI, it follows that the index may be used only as a broad reference variable for the future development of aggregate demand. Therefore, the MCI and the modified MCI should be taken as rough indicators of potential price pressure, which may stem from the production gap. Both the MCI and the modified MCI seem to be insufficient to serve as operational targets for monetary policy for a central bank targeting price stability, such as most are.

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14

SUMMARY

This essay initially describes the main channels of monetary policy from a theoretical point of view. In the following, the monetary condition index (MCI), originally constructed by the Canadian Central Bank, is described. This MCI will be enlarged to the modified MCI, which will then be applied to the Czech Republic. Possible implications for monetary policy are investigated next. After a critical examination it seems that both the MCI and the modified MCI may be used as broad reference variables for the future development of aggregate demand. However, as it stands, it might be insufficient as an operational monetary-policy target for the Czech National Bank, which concentrates on internal price stability.

The Tax System In the Czech Republic

Chiara BRONCHI – Andrew BURNS[*]

1. Forces shaping the system: past, present and future

The tax system in the Czech Republic is broadly similar to that observed in many OECD countries and it carries relatively few vestiges of the pre-transition system. A fundamental reform was passed in 1992 by the Czechoslovak Parliament but entered into force only in 1993, after the break up of the country into the Czech and Slovak Republics.[1] The new system is based on the same principles as those of mature market economies and in its main features, its structure compares with those of most OECD countries. The overall tax burden is about average, although it is much higher than the levels observed when other OECD countries were at similar stages of development.[2] The tax mix is fairly diversified, with personal income, social security contributions and consumption taxes accounting for the major part of revenues. By international comparison, the share of corporate income tax is average, while those of consumption and social security contributions are high (taken together they account for more than 75 per cent of total tax revenues). Individual income taxes represent a smaller proportion of tax revenues than in most other countries, while that of other taxes, including those levied by local governments (property taxes and other fees) is very small (*Table* 1).

Tax revenues, as a share of GDP, have declined in each year since the establishment of the Republic, and are now close to the OECD average (*Figure 1*). Most of the fall reflects reductions in corporate income tax receipts, following the lowering of rates from 42 to 35 per cent between 1994 and 1998,[3] and a purposeful narrowing of the tax base. Collections from indirect taxes and property taxes have also fallen, while social security contributions have remained a relatively stable share of GDP. Revenues from personal income taxes have increased substantially but, because the authorities sought to reduce the overall tax burden, these increases did not fully compensate for the losses from other revenue sources.

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[1] Both the Slovak and Czech Republics adopted the 1992 Czechoslovak legislation. Since then, subsequent modifications have caused the legislation in each country to diverge increasingly.

[2] In 1997 the tax GDP ratio of the Czech Republic was 36 per cent. Of the five non-transition OECD countries (Greece, Ireland, Korea, Portugal and Spain) which have or had a similar or lower level of income compared to that in the Czech Republic in the preceding 35 years, all had lower average tax burden at that time than the Czech Republic does now. Their aggregate tax rates ranged between 17 and 24 per cent and averaged about 20 per cent. Looking at the remaining OECD countries, their average tax burden in 1965 was 28 per cent at a time when their incomes were on average twice as high as those currently observed in the Czech Republic.

[3] It was 42 per cent in 1994, 41 per cent in 1995 and 39 per cent in 1996 and 1997.

TABLE 1 The structure of taxation by type of tax – 1997

	Corporate income taxes	Individual income tax	Social security and payroll taxes	Consumption taxes	Other taxes, including property taxes
	Per cent of total tax revenue				
United States	9.4	39.0	24.2	16.7	10.7
Japan	15.0	20.5	36.9	16.5	11.0
Germany	4.0	23.9	41.6	27.7	2.8
France	5.8	14.0	43.0	27.9	9.3
Italy	9.5	25.3	33.6	25.9	5.8
United Kingdom	12.2	24.8	17.2	35.0	10.9
Canada	10.3	38.0	15.5	24.4	11.7
Australia	14.6	42.0	6.7	27.5	9.2
Austria	4.7	22.1	40.4	28.2	4.6
Belgium	7.5	31.0	31.8	26.7	3.0
Czech Republic	**8.6**	**13.5**	**43.9**	**32.6**	**1.4**
Denmark	5.2	52.4	3.7	33.0	5.7
Finland	8.1	33.4	25.2	30.9	2.5
Greece	6.4	13.2	32.2	41.0	7.2
Hungary[1]	4.9	16.8	36.3	39.3	2.7
Iceland	2.8	32.8	8.8	47.5	8.2
Ireland	10.0	31.4	14.0	39.7	4.9
Korea	10.5	17.1	9.1	45.4	17.9
Luxembourg	18.5	20.4	25.4	27.0	8.7
Mexico[1]	18.9	14.8	22.1	39.3	4.9
Netherlands	10.5	15.6	41.0	28.0	5.0
New Zealand	10.6	43.2	1.0	34.6	10.6
Norway	12.2	25.7	22.4	37.0	2.7
Poland	7.7	21.5	32.9	34.9	3.1
Portugal	10.9	17.7	26.0	42.0	3.4
Spain	7.8	21.9	35.0	28.9	6.3
Sweden	6.1	35.0	32.5	22.3	4.1
Switzerland	5.9	31.2	36.9	18.3	7.7
Turkey	5.7	21.7	14.5	37.1	20.9
Average OECD[2]	8.8	26.6	26.1	31.3	7.2
Average G7[2]	9.5	26.5	30.3	24.9	8.9
Average EU(15)[2]	8.5	25.5	29.5	30.9	5.6

Note: Consumption taxes equal total taxes on goods and services less "profits of fiscal monopolies" and other "taxes".

[1] 1996 data. PEMEX revenues have been excluded from consumption taxes. Individual and corporate taxes have been estimated as well as payroll and property taxes. Unallocated state and municipal tax revenues have been included.

[2] Excluding Mexico.

Source: OECD (1998b) – Revenue Statistics.

Looking forward, tax policy will be driven by a number of issues. Perhaps the principal one is the necessity of meeting the harmonisation criteria for EU accession. At the moment, the most serious changes involve the alignment of a number of indirect taxes (VAT and excise rates) with EU norms. In addition, there are numerous smaller fine-tuning tasks that need to be accomplished but which will undoubtedly take time. Over the medium term, the tax-system faces important challenges emanating from the changing nature of the Czech economy. Its reliance on indirect taxes and payroll taxes from dependent employment means that the rise in unemployment and fall in labour force participation of the past few years have had a strong impact on the overall tax base. Similarly, the decreasing importance of large-scale manufacturing firms in the economy and the concomitant rising share in total output of small service-sector firms implies increases in the cost and complexity of tax

administration.[4] An additional transitional pressure is likely to flow from the newly introduced regional level of government. For the moment, the full range of its tax powers have not been specified (see OECD, 2001) but this change will certainly play a role in the future development of tax policy in the Czech Republic.

FIGURE 1 Total tax revenue
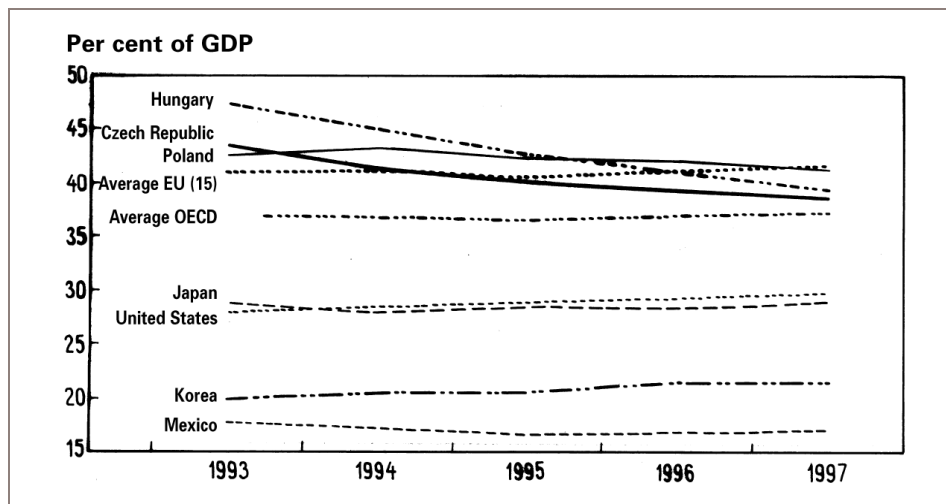
Over the longer term, the tax system will face increasing pressure to meet growing expenditures from existing entitlement programmes. As indicated in OECD (2000 and 2001), an ageing population and a relatively generous pension scheme that is indexed on wages rather than inflation will impose considerable additional demands on the system. By the same token, health spending can be expected to increase as the population ages. While improved productivity performance and the general process of catch up in the economy will counterbalance these pressures somewhat, they are likely – nonetheless – to require some hard decisions concerning spending. A more fundamental and longer-term issue concerns the creation of fiscal conditions that will maximise the speed with which living standards converge to those in western Europe. While international evidence is not conclusive and the issues involved extend well beyond distortions created by the tax system, high levels of government spending (and taxation) have often been found to be associated with slower economic growth (Bleaney et al.). With standards of living in the Czech Republic some 40 per cent lower than in the rest of the OECD, the need to keep economic distortions and other impediments to growth at a minimum is of primary importance if convergence is to be achieved within a reasonable time frame. The following section presents an overview of the main features of the personal income and consumption tax systems, and of the administration related to these taxes. The third section provides a review of the key issues that need to be addressed in improving the system, while the final section outlines the main options for reform.

2. Main features of the personal tax system

2.1 Personal taxes

The personal income tax system (PIT) applies a progressive rate schedule to all earned income[5] and income from some other sources (principally intellectual property and rents from secondary

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[4] The smaller size of the average reporting unit and the overall increase in their number implies the large losses of economies from scale.

[5] However, the taxable base of the self-employed may be determined as the difference between the income and the related deductible expenses. Alternatively, the taxpayer may opt for a lump-sum deduction of expenses from income as defined by the tax law.

dwellings). The schedule comprises five income brackets with rates ranging from 15 to 40 per cent, the number and level of top rates having been reduced since its original implementation in 1993. A wide range of tax allowances, awarded on the basis of marital status and family size, helps to promote horizontal and vertical equity. Standard deductions range from 18 to 58 per cent of the earnings of an average production worker (APW).[6] The degree of progressivity in the system is about average, with the top 20 per cent of wage earners paying 46 per cent of all personal income taxes (*Figure 2, Panel A*). However, as compared with most OECD countries relatively few taxpayers are exposed to top rates and not all personal income is taxed according to this schedule. Distributed income from capital holdings is taxed under a separate flat-rate regime at rates ranging between 0 and 25 per cent depending on the manner in which the income concerned is distributed (*Table 2*). These rates are low by international comparison and are substantially below the top income tax rate. Nevertheless, the after-tax distribution of taxable income in the Czech Republic is among the most evenly distributed in the OECD area (*Figure 2, Panel B*) principally reflecting the evenness of the pre-tax distribution of income.
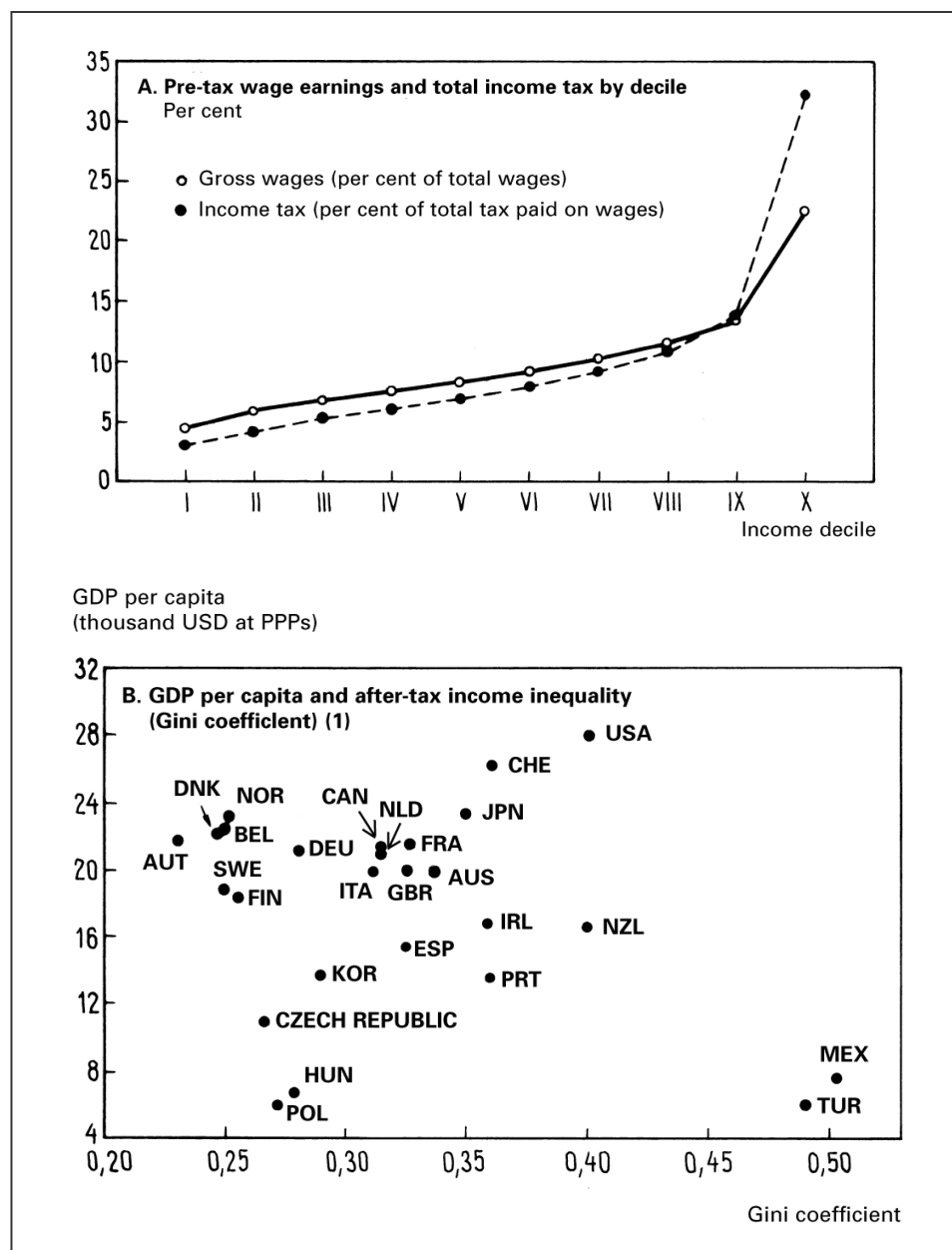
In addition to personal income taxes, labour income is subject to social security taxes. The entire social security system was described in detail in OECD (1998*a*) and progress in its reform since then is discussed in OECD (2000 and 2001). The various compulsory contributions that are part of it were first introduced in 1993 and the aggregate contribution rate, both statutory and net of other taxes, is among the highest in the OECD area (*Table 3*). Only healthcare payments are earmarked contributions. Payments from the other social security taxes enter general revenues and over the period 1993–98 receipts from these sources have exceeded expenditures on the programmes that carry their names by 14 per cent.[7] Social security contributions represent the largest and a growing share in government revenues, having increased between 1993 and 1997, from 38.6 to 43.9 per cent – well above the OECD average of 26 per cent.

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[6] In 2000, each taxpayer was entitled to a basic personal allowance of Kc 34 920 (about 18 per cent of the earnings of an average production worker). An additional allowance of Kc 19 884 was granted for a spouse living in the taxpayer's household if the spouse's annual income did not exceed Kc 34920. Further, an allowance of Kc 21 600 was granted for each dependent child.

[7] This surplus would leave place to a deficit of 10 per cent if other social benefits such as the child allowance and administrative costs were added to the expenditures. Moreover, it is expected that rising joblessness will mean that, in 2000, expenditures on the pensions, employment policy and sickness benefits will exceed revenue from the payroll taxes.

FIGURE 2 Tax and the distribution of income

A. Pre-tax wage earnings and total income tax by decile
Per cent

○ Gross wages (per cent of total wages)
● Income tax (per cent of total tax paid on wages)

Income decile

GDP per capita
(thousand USD at PPPs)

B. GDP per capita and after-tax income inequality
(Gini coefficient) (1)

Gini coefficient

Notes: The Gini coefficient is a measure of income inequality, the higher the coefficient, the wider the income distribution. Data are for 1996 or nearest year available.

Source: Ministry of Finance, World Bank, World Development Indicators, 1998.

Employee and self-employed contributions are fully deductible from the personal income tax base and employer contributions are fully deductible from the corporate income tax base. The total contribution rates applied to wage and self-employed income are the same (except that for the latter participation in the sick-leave programme is optional), but the base upon which they are levied differs importantly between the two groups. For the self-employed the contribution rates are applied to only 35 per cent of self-employed income, subject to both ceilings and floors[8], whereas all of an employee's earnings are taxed without reference to floors or ceilings.

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[8] The effect of the floor is that no self-employed worker pays less social security contributions than would a minimum wage worker. On the other hand, the amount of contributions paid by a self-employed person affected by the ceiling is the same as paid by an employee earning about 2.6 times an average production worker's salary.

TABLE 2 Principal statutory personal income tax rates [1]

Income	Tax base	Tax brackets	Tax rates	Lower threshold as a percentage of APW wage
1. Income from labour	Wage income, occupational pensions and income from entrepreneurial activity net of deductible expenses	0–102 000 102 001–204 000 204 001–312 000 312 001–1 104 000 Above 1 104 000	15 20 25 32 40	0 0.65 1.3 1.99 7.03
2. Distributed income from capital	Dividends and other income from profit distribution		25 per cent final withholding tax	
	Interest payments from deposit accounts and saving books		15 per cent final withholding tax	
	Capital gains		Exempt (under certain restrictions)	
	Dividends and interest paid by a *Pension Fund* and annuities paid by private pension schemes		15 per cent final withholding tax	

Note: [1] Data are for 1 January 1999.
Source: OECD; Ministry of Finance

2.2 Value-added tax

With few exceptions, Czech value-added tax (VAT) rules follow the EU model. VAT is charged on all taxable transactions, including domestically-produced supplies in kind, and imported goods. Exported goods are zero-rated while small firms, financial and social-security services are exempt.[9] The tax is imposed at an internationally high standard rate of 22 per cent (down from 23 per cent prior to January 1995) although it falls within the recommended interval of the EU. There is a reduced rate of 5 per cent which, in an apparent effort to serve redistributive goals, is applied to an exceptionally wide range of "socially sensitive" items[10] including foodstuffs, pharmaceutical products,

TABLE 3 Social security contributions of top income wage earners – 1998[1]

Country	Employee contributions		Employer contributions	
	Legal rate	Net rate[2]	Legal rate	Net rate[2]
United States	1.45[3]	1.45	1.45[3]	0.88
Japan	12.75	cap	27.75	13.88
Germany	14.25	cap	20.75	cap
France	13.60	7.60	35-45[4]	20.42-26.25
Italy	9.19	4.96	38.90[5]	21.99
United Kingdom	10.00[6]	cap	10.00	6.90
Canada	2.80	cap	2.90	1.54
Australia	1.50	1.50	n.a.	n.a.

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[9] A zero rating implies that companies can claim refunds of the tax paid on their inputs and that no VAT is paid on their sales. In contrast, exemption implies that VAT is paid on the inputs of a firm but not on its own value added. Firms with an annual turnover in excess of Kc 3 million or whose three-month turnover exceeds Kc 750 000 must register in the VAT system; smaller firms pay VAT only on their inputs. As compared with other OECD countries, this threshold is relatively high.

[10] However, most of these low-rated items do not fall in the seventeen "socially and culturally sensitive" categories recognised by the EU.

Austria	17.15[7]	cap	17.65	11.65
Belgium	13.07	5.10	35.06[8]	20.98
Czech Republic	**12.50**	**7.50**	**35.00**	**22.75**
Denmark	9.00	3.70	0.33	0.22
Finland	8.05	4.54	28.70	20.66
Hungary	11.50	1.50	40.64	32.88
Iceland	n.a.	n.a.	5.83	4.08
Ireland	6.75	2.25	12.00	cap
Korea	2.30	1.38	10-40	6.88-27.54
Luxembourg	10.70	cap	16.35	cap
Mexico	5.25	cap	18.95	12.51
Netherlands	7.65	cap	19.80	cap
New Zealand	n.a.	n.a.	n.a.	n.a.
Norway	7.80	7.80	15.51	11.17
Poland	n.a.	n.a.	48.00	30.72
Portugal	11.00	6.60	23.75	14.87
Spain	6.40	cap	30.80	19.77
Sweden	6.95	cap	38.66	27.84
Switzerland	13.40	7.52	6.55	4.38
Turkey	14.00	6.30	25.00	14.00

Notes: [1] Data are for 1 January 1998.

[2] The net rate differs from the legal rate wherever employee's contributions are deductible from the personal income tax and employer's contributions are deductible from the corporate income tax, and whenever a ceiling applies.

[3] For wages in excess of $68 400 only the Medicare tax applies. For wages below $68 400 the rate rises to 7.65 per cent because it includes social security contributions at a rate of 6.2 per cent.

[4] Employer's contribution rates vary between 35 and 45 per cent, depending on the wage level and the type of employee.

[5] A supplementary contribution to the work injury fund (INAIL) of 1 per cent is compulsory for manual workers.

[6] The rate is 2 per cent on the first £62 per week and 10 per cent on the next £403 per week, up to the upper earnings limit of £465 per week.

[7] Blue collar workers must pay 17.7 per cent. In addition certain employees must pay a state union contribution (0.5 per cent) and a bad weather contribution (0.7). Employers face a 18.2 per cent rate for blue collar workers.

[8] This rate applies when there are more than 19 employees and is 33.25 when there are fewer than 10. For firms with between 10 and 19 compivees the rate is 33.25.

Source: OECD, *European Tax Handbook,* 1999.

telecommunications, heating fuels, construction and most services.The wide range of activities exempt from VAT or subject to reduced or zero rates means that the effective VAT rate (the ratio of VAT revenue to consumption) is low by international comparison as is the productivity[11] of the tax (measured as the ratio of the effective to the statutory rate).[12]

2.3 Administration and enforcement

The administration of the tax system is the responsibility of the Ministry of Finance. Overall, its task is greatly simplified by the system's reliance on withholding taxes for personal income on the one hand and the relatively high threshold for VAT-payers on the other. Nevertheless, the cost of running the system is considerable (2.6 per cent of revenues in 1998) with more than half that amount accounted for by the collection of indirect taxes. Increasingly, the Czech tax authorities are introducing the most modern tools in their efforts to enforce compliance. Thus, all tax subjects – legal entities or physical persons – have a taxpayer identification number which is used by the administrative authorities and electronic means are being used to detect individuals or firms who

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[11] The IMF reports a measure of the productivity of VAT defined as VAT revenues divided by GDP divided in turn by the statutory VAT rate. This measure gives a sense of the additional revenue that could be expected from a percentage point increase in the VAT under some very strict assumptions. The measure reported here is somewhat more informative and has a clear economic interpretation – as it measures the ratio between actual VAT revenues and the revenues that would be expected if the VAT were successfully collected at its standard rate on all consumption goods. It therefore indicates the extent to which exemptions, zero-rating, reduced rates and tax evasion erode revenues. As such it is also an approximate measure of the distortions that these deviations from the standard rate introduce.

[12] In 2000 a small set of additional goods and services were subjected to the standard rate increasing, marginally, the productivity of the VAT.

are suspected of under declaring their incomes or evading taxation entirely. Nevertheless, the government is increasingly concerned that some firms and workers are avoiding taxes and compulsory social security contributions by under reporting their wages. The self-employed are responsible for their own assessment and are a particularly difficult category of taxpayer to monitor. Here, the authorities compare data from various administrative databases (such as business permits, municipal fee records) to identify self-employed individuals who are not paying tax. Despite these efforts, tax arrears represent a growing problem for the economy. By the end of 1998 they accounted for Kc 114 billion or 6.4 per cent of GDP and their share in GDP has increased at an accelerating rate. Total arrears increased by 26 per cent in 1998 or 16 per cent in real terms, with arrears in all tax categories growing faster than nominal GDP (*Table 4*).

TABLE 4 Breakdown of accumulated tax arrears

	Increase over previous period[1]			Increased arrears as per cent of tax due[2]		
	Increase 1993–96	Increase 1996–97	Increase 1997–98	1996	1997	1998
Value added tax	42.7	20.6	22.1	5.5	3.7	4.6
Excises	113.9	32.4	4.2	3.0	3.2	0.5
Corporate tax	37.0	16.0	68.4	3.7	1.8	6.8
Wage tax	52.1	70.1	57.1	2.7	2.8	2.5
Road tax	4.2	39.1	34.4	1.4	1.6	1.8
Inheritance tax	95.7	21.5	29.4	1.1	1.2	1.5
Gift tax	283.1	2.3	18.0	61.6	4.1	21.8
Real property transfer tax	133.0	55.9	38.2	12.6	14.5	12.5
Real property tax	8.6	24.5	28.8	1.5	3.2	4.4
Customs duties	-10.2	0.9	52.7	-0.5	0.1	4.1
Social security contributions	92.9	48.1	22.4	3.6	4.1	2.7
Other taxes	52.8	49.5	31.1	5.4	81.8	87.4
TOTAL	54.2	33.7	26.1	3.8	3.7	3.5

Notes: [1] The first three columns show the percentage increase in tax arrears over the stock of tax arrears of the previous period.

[2] The second set of columns shows, for each tax, the annual increase of the stock of tax arrears over the total tax due in the same year. The total tax due is calculated as the sum of yearly tax revenues and the yearly increase of the stock of tax arrears.

Source: Ministry of Finance, OECD

The second set of columns in the table represent a lower estimate of the share of taxes due that are unpaid each year.[13] On average at least 3.6 per cent of taxes went unpaid in 1998 and the addition to arrears was 1.4 per cent of GDP. In some categories of taxation, these rates are alarmingly high suggesting that failure to collect taxes in the past may be generating a vicious circle of non-payment. The authorities argue that as much as 50 per cent of these arrears are uncollectable, reflecting unpaid taxes of failed companies. However, their data systems do not, as yet, permit them to identify this component, making it impossible to verify the claim. Moreover, even if this figure is accurate, the rate of increase in arrears remains problematic.

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[13] This is a lower estimate because the numerator includes the sum of additional non-payment less payments on pre-existing arrears.

3. Problems with the system

3.1 The overall tax burden

As compared with other OECD countries at a similar level of development and like Poland and Hungary, the overall tax burden in the Czech Republic is high. Firms operating and investing in countries such as Ireland, Mexico, Korea, Greece, Turkey and even Spain and Portugal face much lower taxes. While Czech labour costs are relatively low, and investments there remain attractive, productivity is also low and the cumulative effect of high taxes is likely to reduce the attractiveness of the country as a destination for investment and ultimately also reduce the speed with which living standards are able to converge to the OECD average. Indeed **a** great deal of work done both in the OECD and elsewhere suggests that, for countries with relatively high overall tax burdens, a 10 percentage point drop in taxes can translate into as much as a 0.5 per cent increase in annual growth rates (see *box 1*). Part of the distortionary impact of the current tax regime could be reduced by cutting the rates and widening the bases upon which taxes are currently imposed, but more fundamentally there may be a need to re-examine the level and composition of expenditures of which transfers and subsidies comprise fully 64 per cent of the total.

BOX 1 Taxation and economic growth

The direction of tax effects on the level and growth of income is not always clear. Taxation may, in fact, be beneficial for the economy if it provides the financial basis for the provision of public goods that improve average living standards and social welfare. More and better public goods and services can serve to increase the productivity of private fixed and human capital and hence increase economic growth, while government transfers reduce poverty and improve social cohesion. On the other hand, higher taxes increase distortions and may reduce saving, investment and work incentives and adverse effects on economic efficiency may grow disproportionately with the increase in the tax burden.

As the net effect of taxation on economic performance depends on the level and structure of taxation, and whether tax revenue is spent in a productive or unproductive way, the benefits and costs of taxation are difficult to disentangle empirically. Nevertheless, a number of studies have sought to do so. Leibfritz et al. (1997) examined the relationship between taxation and growth for a sample of OECD countries (not including the Czech Republic, Mexico and other relatively low-income countries) and found that a 10 percentage point increase in the tax/GDP-ratio is accompanied by 0.5 percentage point lower growth. This result is qualitatively consistent with the findings of King and Rebelo (1990), Barro (1991) and Plosser (1992). But several other studies, including Easterly and Rebelo (1993), Levine and Renelt (1992) and Slemrod (1995) have found a non-significant or even positive correlation, leaving some researchers to suggest that there may be non-linearities implying a positive growth effect if taxes are increased from a low level and a negative growth effect if they are increased from a high level.

More recently, Bleaney *et al* (2001) have confirmed change results.

In the communist system the authorities promoted social goals by the extensive use of negative turnover taxes and wide range positive rates. Currently, the high proportion of goods and services subject to the reduced VAT (see OECD, 1998*b*) suggests that this tax (as is the case in many OECD countries) is used in a similar way. Unfortunately, as an instrument of redistribution it is not very effective, principally because the implicit subsidy it provides is equally available to the rich and the poor and the consumption patterns of each group are broadly similar. Thus, the rate of implicit subsidy received by individuals with the lowest earnings is 7.3 per cent and falls only gradually to a still high 5.6 per cent for the richest 10 per cent of the population (*Figure 3*). Moreover, because both groups purchase low-rated goods and services, the higher purchasing power of the rich means that they benefit, in absolute terms, three times as much from the implicit subsidy than do the poor. Many OECD countries subject food to a lower VAT and the lower panel of the figure illustrates the redistributive impact of the low rating of food items alone. Although the variation in subsidy rates across deciles is larger (implying more redistribution), the extent of redistribution remains limited and the richest decile still receives twice as much in implicit subsidy than the poorest.

FIGURE 3   Distribution of implicit VAT subsidy (1998)
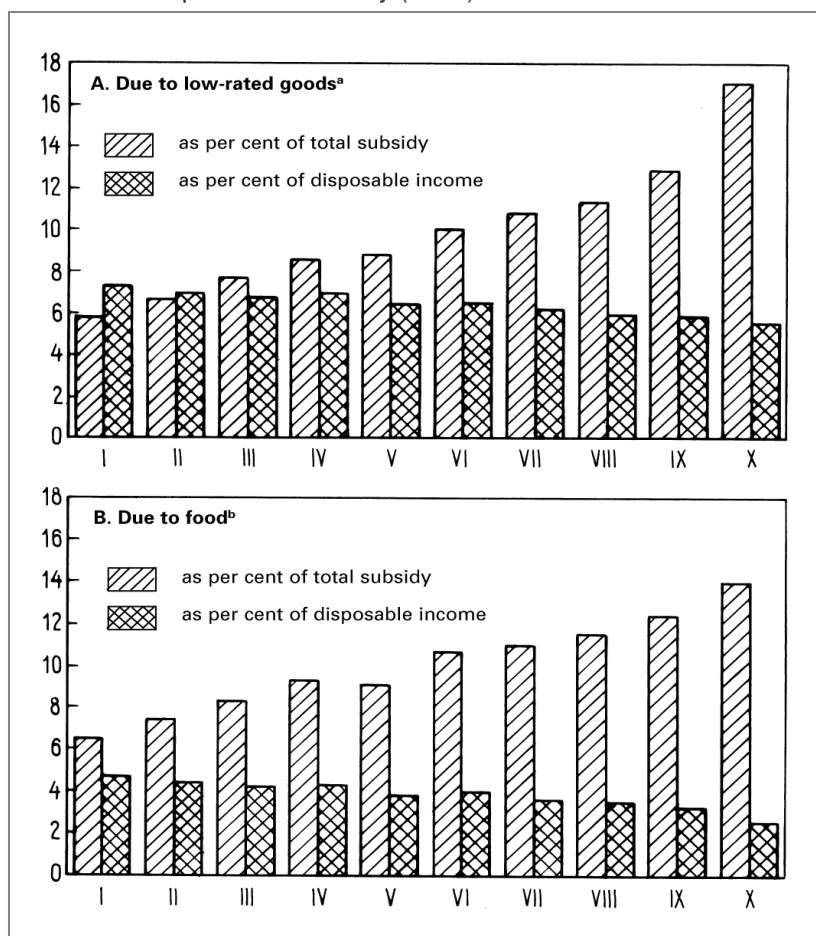
Notes: 1. The implicit VAT subsidy due to low-rated goods is calculated as expenditure on low-rates goods by decided multiplied by the difference between the standard and low VAT rates, i.e. 17%. The basket of low rate goods contains: food, rent and municipal services, central heating, hot water, household equipment and operations, personal and medical care, transport and communications, culture, education, sports and leisure services. The estimate of subsidy does not consider substitution effects between consumption and savings or within the consumption basket. Total consumption, consumption of food and disposable income by decile are from the Ministry of Finance.

2. The implicit VAT subsidy due to food at each income decile is calculated as expenditure on food by decile multiplied by the difference between the standard and low VAT rates, i.e. 17%. The estimate of subsidy does not consider substitution effects between consumption and savings or within the consumption basket.

Source: Ministry of Finance

That the VAT does not succeed in significantly redistributing income despite the exceptionally wide range of low rated items would not in itself be a problem if it did not seriously distort the relative price of goods and deform the allocation of resources within the economy. While nearly every country with a VAT has exemptions and goods and services that are taxed at a reduced rate, the very low productivity of the Czech VAT suggests that the extent of the resulting distortions may be greater than is the case elsewhere. Indeed in terms of value, only 47 per cent of total goods and services consumed in 1998 were subject to the standard VAT. While it is difficult to get a sense of the economy-wide costs of these distortions, it is useful to note that the current system provides an important implicit subsidy to the consumption of a number of energy sources and constitutes a negative green tax. It may partially explain the Czech Republic's poor ranking in terms of per capita energy consumption and production of greenhouse gases (see OECD, 1999*a*).

Applying the lower rate to almost all services other than those in the tourism sector is also an unusual practice. Reducing the number of low-rated goods would widen the base upon which the high rate is levied, raising the possibility of reducing the standard rate of VAT, which if accomplished in a revenue neutral manner would fully compensate for the inflationary impact of raising rates on currently low-rated goods and services. Indeed, unofficial estimates suggest that just raising the VAT rate on heating would allow the standard rate to be reduced from 22 to 19 per cent

without loss of revenue. Subjecting an even larger range of goods and services to the standard rate would allow it to be lowered even further. Alternatively, the additional revenues could be used to reduce distortions elsewhere in the tax system – perhaps most usefully by lowering social security contributions.

3.2 The bias in favour of capital and self-employed income

Generally speaking, the personal income tax (PIT) system (in combination with various benefit schemes) is a more appropriate tool for achieving redistribution goals than is the value-added tax. On the one hand, special credits and allowances can be employed to ensure that assistance is narrowly targeted on those segments of the population most in need, while, on the other, a progressive tax system can be used to ensure that the burden for this assistance is borne by those most able to pay. While the PIT schedule applied to labour and some forms of property income is progressive, the overall progressivity of the personal income tax system is more difficult to determine because the tax-treatment of self-employed income and capital income means that the principle of horizontal equity is not respected. In addition, as compared with other OECD countries relatively few people are subject to the highest rates. Finally, the flat withholding rates applied to most forms of non-labour income means that personal income from these sources is taxed well below both employee and self-employed earnings over all income ranges.

Panel A of Figure 4 attempts to illustrate the interaction of these factors. It reports the total taxes that would be paid by an individual (including the social security contributions of employees and the self-employed – but not those of the employer) depending upon the source and level of his or her income. Thus, the first group of five bars indicates the differences in the average tax rate paid by an individual whose total income (from all sources) is equal to two-thirds of the annual wage of an average production worker depending upon whether his or her revenues come from: wages alone; self-employment only; 65 per cent wages and 35 per cent equity income; 100 per cent equity income; and finally 100 per cent in the form of interest. The subsequent group of histograms shows the same calculation at different levels of income. In each case, there is a significant difference in tax paid depending upon the source of income, with wage earners and the self-employed systematically paying the most tax and individuals receiving their income from interest paying the least. Not shown, because no personal income tax is paid, is the case of someone receiving capital income in the form of capital gains.

FIGURE 4   Average tax rates by level and type of income (1999)
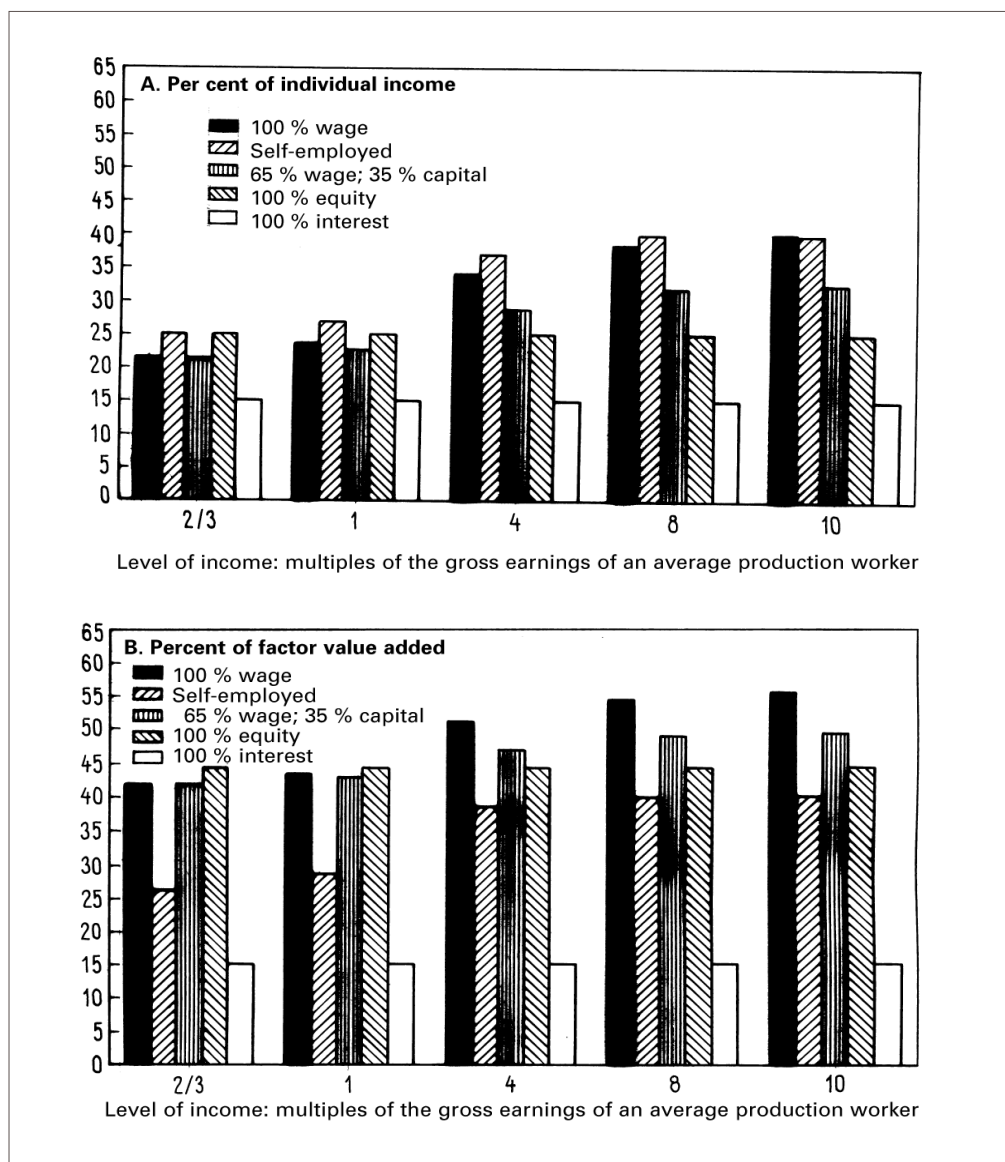
source: OECD

   While Panel A of Figure 4 suggests that on average a self-employed person pays more tax than an employee and that, at all income levels, those whose income is drawn from capital sources would pay the least, in fact the chart tells only part of the story. Because employers (and employees) pay high social security taxes and firms pay corporate income tax, the total "all in" tax paid on labour and capital inputs is different. In *Panel B of Figure 4* all of these factors are taken into consideration, illustrating that at all levels of income the total tax paid on the earnings of the self-employed is substantially lower than that of the employee. The difference stems principally from the smaller base on which the self-employed make social security contributions as well as the contribution ceiling from which they benefit. Indeed, it is not immediately obvious why only 35 per cent of self-employed earnings are subject to social security contributions. Economically, one could argue that only the salary portion of their operating surplus should generate social security – but in that case 35 per cent would appear to be far too little. Within the economy at large, 65 per cent is closer to labour's share in value added. The third column in each group of histograms in Panel B of Figure 4 illustrates

FIGURE 5   Average statutory "all in" tax rates
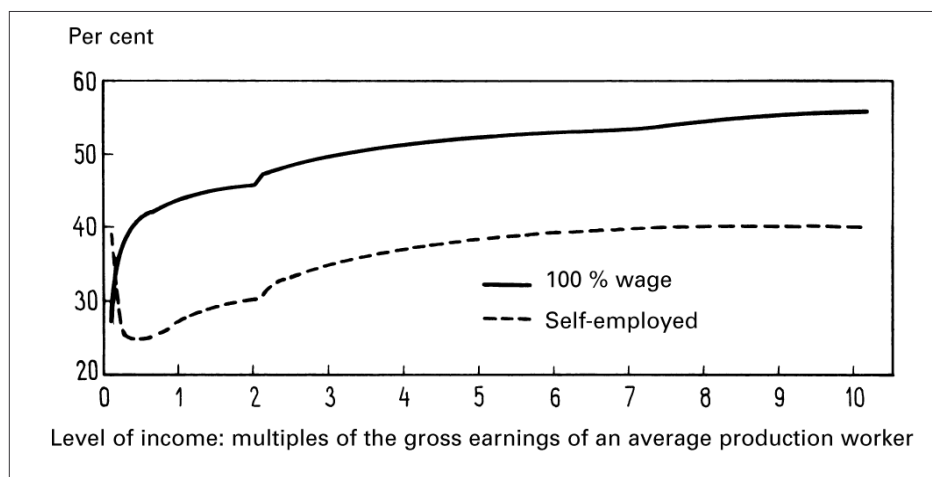
the impact on the "all in rate" of tax of imposing SSC on 65 per cent of a self-employed person's net revenue. Clearly such a change would substantially equalise the overall tax burden faced by employees and the self-employed.

The existing tax bias in favour of the self-employed is presumably the reason that it is commonplace for senior employees of Czech firms to set themselves up as independent consultants. Companies can afford to pay them substantially more at no additional cost, while they remain in what is effectively a dependent-employee relationship with a single employer. Indeed, on a *per capita* basis, the self-employed pay in income tax and compulsory social security payments only half of what employees pay, even though their earnings are twice as high.[14] A feature that is partially explained by the substantial difference between the all-in rates of taxation on self-employed over a wide range of earnings (*Figure 5*).

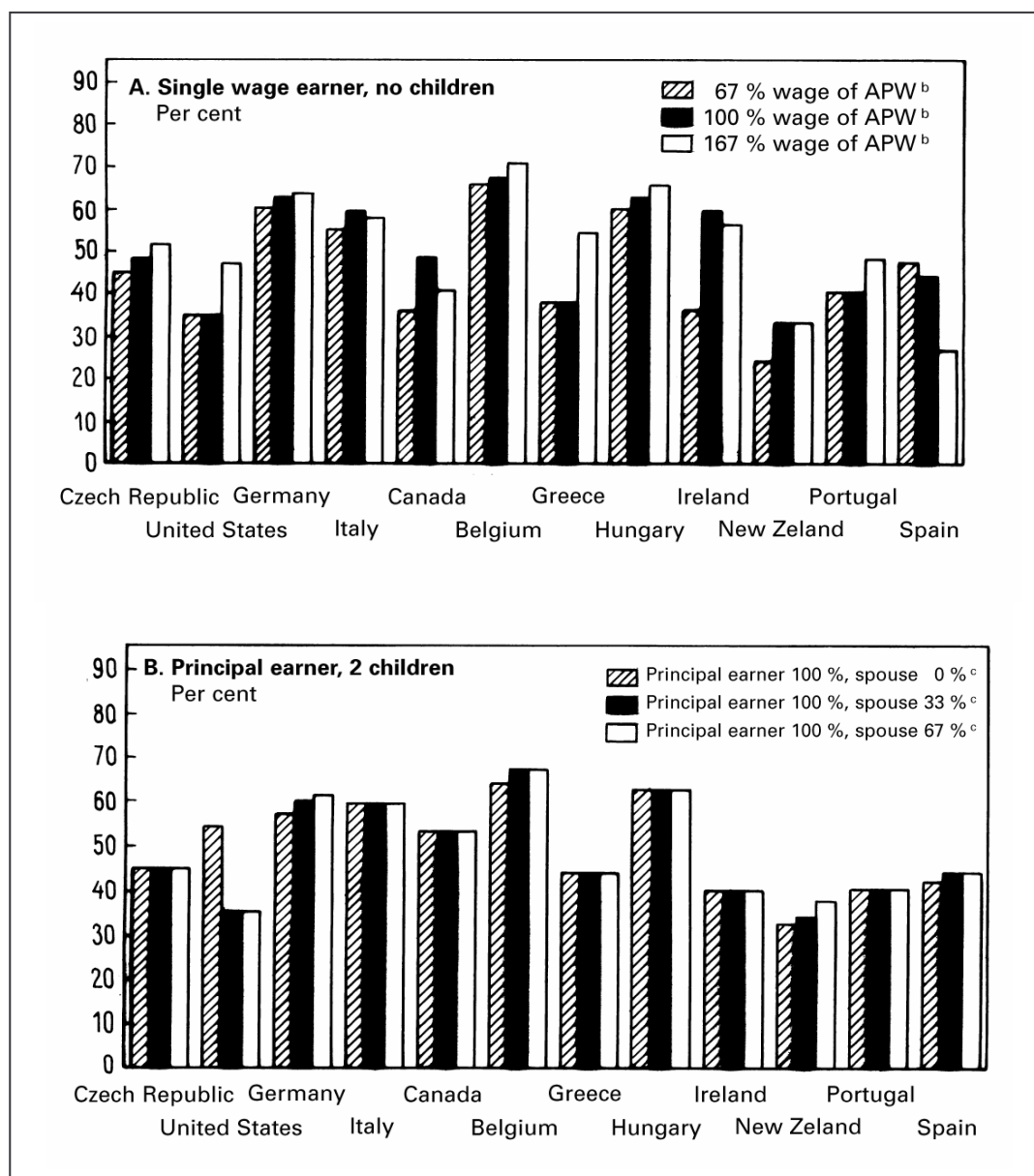### 3.3 Implications for the labour market

The combination of high social security contributions and personal income tax rates on labour income means that statutory marginal tax wedges on labour in the Czech Republic are high, although they are broadly in line with those observed in many European OECD countries. The total labour tax wedge[15] for a single person is 48 per cent for someone earning a little over the earnings of an average production worker (APW) and then rises to above 50 per cent for someone with 1.7 times APW earnings (*Figure 6*). The wedges for married couples with two children are somewhat smaller and also less than in some OECD countries (such as Belgium, Canada, Germany, Hungary and Italy) but are much larger than in a number of other countries with which the Czech Republic competes directly (i.e. Greece, Ireland, Portugal and Spain) and the United States.

The *OECD Jobs Study* (1994) and a number of follow-up studies have shown that a high overall tax wedge – and especially – high social security taxes tend to raise the cost of labour which is associated with high rates of unemployment among the less-skilled and lower rates of employment.

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[14] OECD, calculations based on Table 9.8 of the Czech Statistical Office (1998).

[15] These include income taxes, social security contributions, and cash transfers.

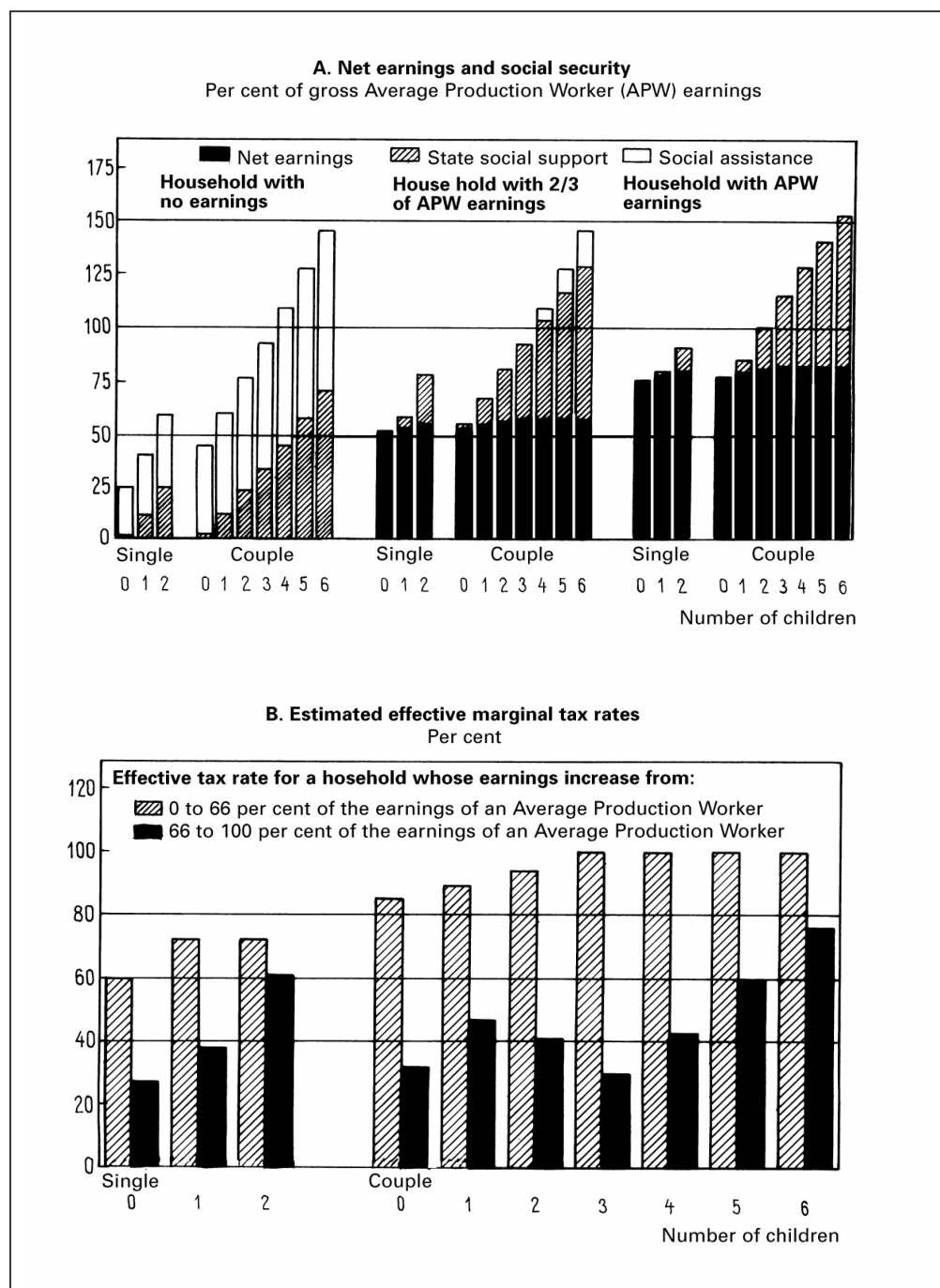FIGURE 6   Marginal tax wedges by family type and wage level (1)

While to date the Czech Republic retains a relatively high level of employment, the recent up-surge in unemployment suggests that these kinds of effects could be materialising now. As discussed both in OECD (1998*a*) and OECD (2000), the disincentive effects of these high tax rates in the Czech Republic are greatly magnified because benefits form an effective floor, below which net wages of low-productivity workers cannot fall. Indeed, the combination of higher taxes and generous benefits for households with children creates serious unemployment and poverty traps with marginal tax rates (inclusive of benefit withdrawal) close to or in excess of 100 per cent in many cases (*Figure 7*).

FIGURE 7   The interactions of taxes and transfers

A. Net earnings and social security
Per cent of gross Average Production Worker (APW) earnings

- ■ Net earnings ▨ State social support □ Social assistance

Household with no earnings · House hold with 2/3 of APW earnings · Household with APW earnings

Single 0 1 2 · Couple 0 1 2 3 4 5 6

Number of children

B. Estimated effective marginal tax rates
Per cent

Effective tax rate for a hosehold whose earnings increase from:
- ▨ 0 to 66 per cent of the earnings of an Average Production Worker
- ■ 66 to 100 per cent of the earnings of an Average Production Worker

Single 0 1 2 · Couple 0 1 2 3 4 5 6

Number of children

Source: Ministry of Labour and Social Affairs, OECD

4. Summary and conclusion

The preceding review reveals a tax system in the Czech Republic that is broadly similar to those operated in other OECD countries. It exhibits a number of non-neutralities, some of which reflect the economy's command and control past. But most of them, like those observed elsewhere, reflect compromises between, on the one hand, the desire to minimise economic distortions and, on the other, the need to implement a system that is administratively and politically practical while maintaining at least some redistribution of personal incomes. Reform should continue in this vein. While radical changes are not called for, there is nevertheless considerable scope for reducing the distortions and inefficiencies that the tax system currently introduces. Moreover, with Czech living standards at only

60 per cent of the OECD average, designing the tax system so as to support a rapid and sustainable rate of productivity growth is necessarily a critical policy objective.

In this context, the tax system cannot be looked at entirely in isolation from the expenditures that it is required to finance. Here, strong consideration should be given to attempting to streamline the benefit system. As it is the case in Hungary and Poland, expenditures and especially transfers constitute a much larger share of GDP than they are in other member countries at similar or even higher levels of economic development. A first attempt to undertake an examination of the redistributive impact of the tax-benefit system as a whole was done by Schneider (2001). This study suggests that as a whole the tax-benefit sector achieve little net redistribution, as is the case with the implicit VAT subsidy, while requiring substantial sums of money to flow through the government's coffers. Focusing aid more on those most in need might be able to achieve the same redistribution but with much lower financing costs and less potential damage to overall economic efficiency. In the absence of savings on expenditures, the available evidence on the relationship between the overall tax burden a country faces and economic growth suggests that the high overall tax rate in the Czech Republic could threaten the pace of convergence with the rest of the OECD.

Without reducing the level of expenditures, the overall tax burden cannot be cut. Nevertheless, there appear to be opportunities to widen a number of tax bases and reduce some of the higher and more distortive tax rates by rebalancing the overall tax mix and eliminating certain anomalous characteristics of the system. In particular, there is opportunity to broaden the base of the personal income tax (only Greece derives a smaller share of total revenue from this source) and the VAT and to increase revenues collected from real-estate property (second lowest in the OECD), while at the same time lowering social security contributions and payroll taxes (only France and the Netherlands rely more heavily on this source). A re-balancing of revenue sources could be engineered so as to have a number of beneficial impacts.

Lowering payroll taxes and transferring some of the tax burden currently carried by these involuntary contributions to both labour and capital income would also serve to reduce the serious work disincentives that they generate. With the exception of health-care, these contributions are not earmarked taxes and most of the services paid for are universal in nature and not related to a recipients' work history. Budget neutrality under the current dual personal income tax system, could be ensured by increasing the rates in the progressive income tax schedule as well as the withholding taxes applied to distributed capital income. In addition to improving the functioning of the labour market (see OECD, 2000) and reducing the risk of rising structural unemployment, such a reform would, by lowering social security contribution rates, go a long way to reducing the present bias in favour of self-employment. However, more might be done in this regard and the reform should be complemented by raising the share of self-employed earnings subject to social security charges. Not only would this allow rates to be lowered, it would serve to further reduce the bias in favour of this work form and diminish the tax advantage that unincorporated firms currently enjoy, potentially resulting in less tax evasion. Finally, to improve horizontal equity, the ceilings placed on the contributions of the self-employed should be eliminated or also be made available to employees. Of the two options, the first is to be preferred in so far as the existence of such ceilings contributes to the overall regressivity of the tax system.

The benefits of lowering social security contribution charges would be enhanced if capital income were also made to carry at least part of the burden currently borne by labour alone. Here an adjustment in the distribution of the tax burden could be accompanied by measures to remove non-neutralities in the existing taxation of capital income. At the moment, returns to capital distributed in the form of interest payments and capital gains are taxed at much lower rates than other sources of capital income resulting in a bias in favour of these forms of savings. The government's plan to further lower the corporate tax rate and to decrease the withholding tax on dividends to 15 per cent would reduce the extent to which interest income and, to a lesser extent, capital gains are privileged. However, by lowering the rate of tax on capital income in general, the relative tax burden on labour income will increase, while the bias in favour of interest income will not be eliminated. An alternative solution that would preserve the advantages of the current system's reliance on easy-to-administer withholding taxes might be envisioned. One possibility, which has been applied in some OECD countries

(including Norway and Finland), would equalise the all-in-tax rate on capital income by setting the withholding tax on interest income equal to the corporate income tax rate and eliminating the withholding tax on other forms of capital income. In this way, all three forms of income from savings (i.e. dividends, interest and capital gains) would be taxed at precisely the same rate.[16] Further, the base widening implicit in such a reform might also offer the possibility of lowering rates.[17] Although other reforms could be implemented, they would tend to be administratively more difficult to put into practice.[18]

Economic efficiency could be further enhanced by reducing the unusually large number of goods and services subject to the reduced VAT rate and using the increased revenue to lower statutory tax rates. Two options recommend themselves. The first would see the government use the additional revenue to lower social security contribution rates which would simultaneously reduce the distortions produced by this tax and serve to lower the economy's dependence on labour taxes for revenues. The second option would be to lower the standard VAT rate. By proceeding in a revenue neutral manner, the impact on inflation could be eliminated and domestic resistance kept to a minimum, while the distributional impact of the change would be small. Given that EU accession will require that a number of these services and goods (in particular central heating) be taxed at the standard rate, the timing would appear to be near ideal. Indeed, with domestic activity and inflationary pressures at an all time low, the probability that firms would fail to pass on the savings from the lower VAT are small.

Most observers indicate that tax evasion is not as serious a problem in the Czech Republic as in some other transition countries or even as compared with a number of western European OECD economies. However, the dramatic accumulation of tax arrears is cause for concern and there is some indication that firms and workers are under reporting earnings. While implementation of the kind of reforms discussed in OECD (2000) to improve the capacity of the government to enforce its claims on delinquent debtors will certainly help, more needs to be done to ensure that firms do not get behind in their taxes. Indeed, a clear definition of compliance and the prompt implementation of a regular programme to measure it are essential first steps. In addition, efforts should be extended to improve the tax administration's data systems so that additions to arrears from penalties on old unpaid taxes can be distinguished from new delinquencies. More generally, the government should avoid adopting a relaxed stance to collections in cases where firms are performing poorly. Rather, it should pursue restructuring or other payment solutions, as would any other creditor. Failure to do so would just encourage these firms and others to continue using the government as a lender of last resort.

Finally, in the context of the creation of a new level of government, the authorities might wish to increase the importance of property taxes. As compared with most OECD countries, funding from this source is relatively low in the Czech Republic. Increasing funding would provide greater flexibility to local officials to manage the substantial programmes for which they are responsible and to compete effectively for investment. On the other hand, care should be exercised to ensure that increased own-tax revenues for municipalities do not result in an undesirable increase in the variance in the quality and quantity of services that municipalities can afford to offer.

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[16] The first two are taxed by the corporate income tax rate, while interest payments (which are deductible from the firm tax base) are taxed in the hands of recipients with a flat tax rate identical to the corporate income tax rate.

[17] The extent to which a lower rate would be feasible will depend on the relative importance of the offsetting revenue impacts of a higher tax rate on interest income and the lower all-in-tax rate on dividend income implied by the reform.

[18] An alternative solution would reduce vertical and horizontal inequity by subjecting all income (both capital and labour earnings) to the same progressive income tax schedule and offering tax credits to individuals to the amount of taxes withheld at the firm level. While such a reform would widen the tax base of the personal income tax system it would also increase the "all-in" tax rates on capital income requiring that these be reduced either by giving firms corporate income tax credits in proportion to dividend payments and realised capital gains, or by adjusting the various withholding tax rates. While perhaps technically superior, this would be much more difficult to administer. In contrast to the current scheme where firms need only report the total amount of each income distributed, under this revised scheme both they and the government would have to record such information for each individual recipient.

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SUMMARY

This paper discusses the tax system and its effect on individuals in the Czech Republic and offers some specific suggestions for reform. Viewed in an international context, the Czech system is broadly similar to those of other OECD countries. Like them, it exhibits a number of non-neutral features, some of which reflect the economy's command-and-controlled past, and others which reflect the compromises between the desire to minimise economic distortions and the need to implement a system that is administratively and politically practical. The evidence, reviewed in this paper, suggests that the main priorities for reform should include: eliminating the present tax bias in favor of self-employed substantially reducing the number of goods and services subject to the reduced VAT rate; and lowering social-security contributions and increasing the system reliance on the personal income-tax system.

Czech Social Security and Tax System and Their Impact on the Income Distribution[*]

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1. Introduction

In this paper we analyze the impact of the Czech social and taxation system on income distribution. We examine in detail the part of social system intended to reduce poverty. We do not discuss the old-age pension system, which we consider to be a unique issue with different problems and solutions.[1] Our goal here is to show the impact of social benefits and income-tax-deductible allowance on income distribution in the Czech Republic. Toward this we use a regular household budget survey for 1999, as organized and published by the Czech Statistical Office (CSO).

The Czech Republic is a country with a historically rooted commitment to social justice, as recently evident during the country's economic transition of 1990–99, when policy-makers cherished "social peace". Nevertheless, profound economic and social changes have resulted in higher inequality of income distribution.[2] After a long time otherwise, Czech society is again experiencing relatively high unemployment, and increased and observable poverty.

Those social changes occurred during a time when the new social system (post communist) was being constructed. The main goals of this new system included protection against poverty and the creation of a mandatory insurance system that would ensure "protection" against loss of income due to illness, disability, or old age. Despite proclaimed liberal principles, the new system is concentrated on the development of a comprehensive social-security net toward minimizing the impact of poverty. The new system was designed in such a way that it allows relatively easy adjustment via one variable, i.e., a "minimum living standard", which is the bedrock foundation of the whole system. The social system was established during the Czech transformation euphoria of the early 90s when unemployment was below 4 %, at which level it was expected to stay according to the authors of the social reforms. These factors affect the system to the present; poverty has been quite successfully fought, but the system on the whole seems financially unsustainable.

The Czech tax system, which went through profound reform simultaneous to the social system, is criticized for being too complex. But it is still a rather simple one compared to different tax systems in Europe, not to mention the US. Every tax system significantly influences income distribution, of course. The same holds for the Czech Republic's: the system includes progressive taxation and so-called deductible items, of which three main types are meant to "support family".

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[1] Pension-system analysis can be found, e.g., in (Schneider, 1998a) or (Jelínek – Schneider, 1997).

[2] For more, see Večerník (ed.) (1998).

Such could be considered as a budget expense comparable with traditional social benefits. As our analysis shows, their effect on income distribution is quite different.

In this paper, we find that the Czech social-security system is rather progressive and is heavily biased toward the poorest two deciles of the population[3]. The system is thus rather specifically targeted but also features a rather comprehensive "poverty trap", which effectively deters the poorest from seeking increased income via employment. The impact of the three main tax credits is much less redistributive in relative terms, as tax credits rise with household income as richer deciles enjoy tax credits from a higher marginal tax rate.

This paper is organized as follows: after a description of the main components of the Czech social-security system, we illustrate the system functioning vis-à-vis a "typical" family. The fourth chapter supplements our analysis with a description of the tax system's impact upon income distribution. In subsequent chapters we analyze statistical data and we study the impact of the social and tax system on income distribution. Chapter nine proposes some measure of increased effectiveness for social programs. The last chapter briefly overviews our main conclusions.

2. Social Security System in the Czech Republic

The social-security system is designed as a safety net for those in need and to cover a wide range of causes of social necessity. As such, it is composed of three major subsystems: the first – social assistance – enables, through a variety of entitlements, income support for those who are in a financial or social need and are unable to raise adequate income themselves or otherwise; the second – state social support – provides family benefits, in particular, benefits for families with dependent children; and the third – social insurance – provides social security through a pension system, and includes the provision of income during periods of illness and work-related injury. [4]

In analyzing social security we concentrate on the following social benefits: child allowance, social supplements, parental allowances, so called "other social benefits", unemployment benefits, and sickness benefit as they are included in the household budget survey. (More detailed analysis can be found in (Průša, 2001)[5].) The analyzed benefits account for state expenditures in excess of 55bn CZK (more than 3 % of GDP in 1999). The first four items of the list above are formally part of the social-support system, while unemployment benefit and sickness benefit are part of social-security system. The social-support system has as its intended goal to increase the income of the poorest groups in society and is thus naturally a subject of our concern.

2.1 Social Assistance (Sociální péče)[6]

2.1.1 The System

The social-assistance system is the least transparent and least researched component of Czech social security, yet it is an important tool in fighting poverty. Under this, local municipalities distribute around 9bn CZK (0.5 % GDP) either via direct payments or services. There were 400,000 participants in this program in 1999, of which some no doubt participated oftentimes, so it is difficult to estimate how many Czech citizens received help. Social assistance is designed as a last resort when household income is supplemented to the minimum living standard (MLS) level if the former social

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[3] The only exemption is child benefit, as we show bellow.

[4] In order to limit the scope of the analysis, we have left out most of the Social Insurance system, such as old-age and invalidity pensions, and the whole range of benefits for disabled persons as these involve many specific features and aims.

[5] The paper by Průša (2001) was published in the same 2001/12 issue of *Finance a úvěr* as this paper. It is not, however, available in an English version and so we include an extended discussion of the main characteristics of Czech social security in this version of our paper.

[6] This part draws heavily on (Erbenova – Sorm – Terrell, 1996).

programs (i.e., social support and social insurance) are not sufficient. If members of such household get, e.g., part-time employment, that income is deducted from the social contribution and there is not any net income effect for the household.

The system is the prominent government policy tool targeted to the poor and is based on the notion of the MLS, which was established in 1991. The system of social assistance lifts household (and individual) income to the MLS threshold when other incomes are not able. This "parameter-rization" of the system makes it more transparent, but it also makes it more expensive, as we show later. Czech law establishes the right for everyone who is in material need to "assistance as is essential for ensuring the basic living conditions with the proviso set by law". Thus, anyone whose income is established as below the MLS is eligible for social-assistance benefits equal to the difference between their income and the MLS level. When establishing eligibility for the benefits, the household income of the previous six months is tested. A household has to re-apply every six months and in principle is entitled to these benefits as long as its income falls short of the MLS. All unemployed members of the household must be registered at the district labor office in order for the household to be eligible for social-assistance benefits.

Even though the social-assistance activities are organized at the local level (municipalities), the MLS is uniform nationwide despite the presence of significant regional differences in the cost of living, namely as regards accommodation. As a general rule, the living costs are lower in high-unemployment regions and tend to be higher in metropolitan areas. The MLS is composed of two parts: individual and household "needs", and MLS is computed on the basis of these two components. Individual benefits (to cover nutritional and other personal needs of an individual) are a function of age and household minimum (related to necessary household expenditures), which is a function of the number of individuals living together as a household.

MLS levels are indexed on a regular basis – see also table 1. They were previously revised, until 1995, when inflation (as measured by the CPI) had risen by more than 10 % against previous indexation; since January 1995, the threshold of inflation was decreased to 5 %, reflecting the fall of the aggregate inflation level in the country. According to the law, indexation should "take into account the extent of the cost-of-living increase", but no exact guidance is provided. The size of the increase is thus the discretion of the government.

Table 1 shows the historical development of MLS in the Czech Republic since its establishment (the last adjustment took effect October 2001). Table 1 illustrates that, while individual benefits have not kept up with rising consumer prices, the benefits addressing "household" costs have grown faster than prices. This shifting balance was provoked by seemingly too high importance given to household size in 1991 and 1992. This introduced a bias towards larger families and discriminated against smaller families and individuals.

TABLE 1 Minimum Living Standards 1992–2001

	1992	1993	1994	1995	1996 January - September	1996 since October	1997	1998	2000	2001	*2001/1992 (price level: 236 %)*
< 6 years	900	1020	1120	1230	1320	1410	1480	1560	1600	1690	*188 %*
6–9 years	1000	1130	1240	1360	1460	1560	1640	1730	1780	1890	*189 %*
10–14 years	1200	1360	1500	1620	1730	1850	1940	2050	2110	2230	*186 %*
15–26 years	1300	1470	1620	1780	1900	2030	2130	2250	2310	2450	*188 %*
> 26 years	1200	1360	1500	1680	1800	1920	2130	2130	2190	2320	*193 %*
1 member	500	600	660	760	860	970	1020	1300	1580	1780	*356 %*
2 members	650	780	860	1000	1130	1270	1330	1700	2060	2320	*357 %*
3–4 members	800	960	1060	1240	1400	1570	1650	2110	2560	2880	*360 %*
> 4 members	950	1140	1260	1400	1580	1770	1860	2370	2870	3230	*340 %*
2+2 family (2n adults, 6 and 15 years old kids)	5500	6280	6920	7740	8360	9000	9680	10350	11030	11860	*216 %*
Average gross wage	4644	5817	6894	8172	9676	9676	10691	11693	13481	14740	*317 %*
Estimated net wage	3622	4537	5377	6374	7547	7547	8339	9121	10515	11500	*317 %*
MLS for 2+2 family as % of net wage	152 %	138 %	129 %	121 %	111 %	119 %	116 %	113 %	105 %	103 %	*n.a.*

Note: Both the individual and the household minimum are changed by government decree whenever consumer inflation exceeded a pre-specified level since the last increase. See text for more details.

2.1.2 Proposed or Discussed Changes

The concept of a minimum living standard fulfills two major functions in the Czech social-security system: first, it is meant to keep everyone above the poverty level and at the same time, the MLS is the key parameter of the whole system. These conflicting roles rapidly convey any adjustment to MLS into higher social-security costs. Therefore, whenever the government ups the MLS in order to maintain the real level of benefits for the poorest families, it rises the thresholds for all social benefits, which often go to families well above the poverty level (see below).

The construction of the MLS also makes it rather difficult for larger families to achieve higher labor income than is their MLS. The MLS for a typical family consisting of two adults and two children (one aged 6 and the other 15 years, i.e., one enrolled in elementary school, the other in high school) is CZK 11,860, i.e., it is higher than the net average wage and has been since the beginning of the Czech transformation in 1992 – see *Chart 1*. For larger families, the MLS may easily reach double the average wage, i.e., eliminating employment incentives for more than 60 % of the population[7]. There is currently no upper limit for the MLS[8] and there is no penalty or conditional drop in the MLS in a case when households evidently shrink away from searching for a job.

The Ministry of Labor and Social Affairs (MOLSA) is aware of the dual function of the MLS and presently is considering several proposals that might change the current situation. Most importantly, MOLSA is discussing a proposal to no longer count 30 % of the work-related income of poor families in their "official" income used for calculating benefits.[9] According to MOLSA, this would encourage the acceptance of waged work among those benefit receivers who want to get out of the system.

The ministry also proposes to separate housing costs from the MLS equation, so the total social assistance would be a combination of non-housing needs, uniform nationwide, and housing-related benefits that would be regionally (or community) specific and would be covered through regional and municipal budgets. In a certain sense, this is movement toward the repeated recommendation of the OECD to "regionalize" MLS. The MOLSA wants to introduce an upper limit to the MLS that would cap the amount payable to a family, disregarding how many children the family has. However, the proposal is vague and calls for further studies. MOLSA is also considering separating the MLS concept from the social benefits calculation. Benefits could be then based on another "parameter"; average wage, average income, or even an absolute number with no link to economic variables are mentioned. Also here the notion is vague.

Apparently, MOLSA would also like to consolidate state social assistance, currently distributed by regional and municipal authorities, under its umbrella. MOLSA officials seem frustrated that they "do not know" how the social-assistance money is spent and they have only scarce information on the neediest families. Therefore, a new centrally controlled and financed system for disbursing social assistance currently provided by communities is envisaged by MOLSA. While there are obvious advantages and returns of scale if the social assistance were merged with state social support (see below), it is questionable whether such centralization would not undermine the current system of close relationships and detailed information represented by community social workers. Also, regional differences will mount and it remains to be seen whether a centralized system would be better able to cope with widening differences in living standards and income levels than the more decentralized system.

CHART 1 Minimum Living Standard for Some Family Types, average net wage

Source: MOLSA, calculations by authors

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[7] Approximately 60 % of employed workers receive wage that is equal or lower than the average wage.

[8] At least theoretically, every additional child increases the family's MLS by CZK 1600.

[9] The MOLSA published a modified proposal in March 2001 in which it would "tolerate" (and not cut benefits) if benefit receivers worked at most 20 hours a week and the income were at most 50 % of the minimal wage. The proposal, however, has never been implemented by the government.

2.2 State Social Support (Sociální podpora)

The second and principal pillar of the social-security system in the Czech Republic is state social support, which was created in 1995. It consists of nine different benefits, three means-tested, five are not, and one is combined (see below). The system paid out CZK 32 bn (1.7% of GDP) in 1999 and employs 3000 social workers as employees of MOLSA. The benefits might be separated into two main groups: those to support families (child allowances, parental allowances, social allowance for childcare) and those specifically aimed at poor families (social supplement, various housing benefits). Besides, there are two untested benefits, as to illustrate the cradle-to-grave approach of the Czech social-security system: birth and funeral benefits. From a fiscal point of view, child allowances are easily the biggest scheme, with annual costs in 1999 reaching CZK 12.5 bn, followed by the parental allowances (CZK 7.7 bn) and social supplement (CZK 6.3 bn). The remaining schemes are marginal in fiscal terms, but perhaps substantial in social terms. The whole construction of the social support allowances is based on the legal minimum living standard. The minimum living standard serves as a basis for both the determination of income levels up to which an allowance is due, and the determination of the amount of allowance (in terms of the fixed multiples of the minimum living standards). This way, both the levels of benefits and the eligibility criteria are automatically indexed whenever minimum living standards are changed. However, as it is shown in Prusa (2001), social support spending as a percentage of GDP has been quite stable since 1996, at around 1.7 % of GDP.

2.2.1 Means-tested Family Benefits

i) *Child allowance* – supplementary income toward the raising of a child. The cost in 1999 were CZK 12.5 bn. Since January 1993, the amount of the monthly allowance per child has been a function of the age of the child, ranging from 340 CZK (for a child less than six years of age) to 490 CZK (for a child over 15 years of age).[10] Since October 1995, the size of the benefit depends also on household income.

Families with income of up to triple the minimum living standard for their family type are eligible for some allowance. If the total income is less than 1.10*MLS for their family type, the benefit equals 0.32*MLS per child for each dependent child. Families with income in the range of 1.10–1.80*MLS are eligible for 0.28*MLS per child for each dependent child. Families with income in the range 1.80-3.00*MLS are eligible for 0.14*MLS per child for each dependent child. Entitlement lasts as long as the child is dependent. A parent has to re-apply each year and the income of the preceding year is tested. A dependent child is defined as any unmarried child under the age of 26 years as long as he/she is a student in a defined type of secondary or higher educational institution or cannot (due to reasons of long-term sickness or disability) earn any income. Until the age of 18 a registered unemployed youth not in receipt of unemployment benefits is considered to be a dependent child. A married person can be a dependent child only if married to another dependent child.

ii) *Social allowance when caring for a child* – additional supplementary income for the purpose of raising a child paid to a family with at least one dependent child and having an income below 1.6*MLS. The cost in 1999 was CZK 6.3 bn. Entitlement: a parent has to re-apply quarterly, and the income of the preceding quarter is tested. The level of the benefit is defined as follows:[11]

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[10] Before 1993 the allowance was a function of the total number of children in the family, where the marginal increment was positive.

[11] The benefit is scaled up further when either the children or the parents are sick with a long-term illness or disabled, or when the household is formed by a single parent (the scaling coefficients are different for each situation).

$$SA = MLS1 - \frac{MLS1 * I}{MLS2 * 1.6}$$

where: *SA* = social allowance when caring for a child

MLS1 = sum of individual minimum living standards of all dependent children

MLS2 = minimum living standard of the family (sum of individual standards and household minimum)

I = family income

iii) *Housing allowances* – A household is eligible when the joint income of all persons permanently residing in a unit falls below 1.4*MLS for this type of household, irrespective of the ownership of the unit (inhabitants of a self-owned residence are also eligible) and irrespective of the actual housing expenses. A household has to re-apply quarterly and the income of the preceding quarter is tested. The level of the benefit is scaled to three income bands, i.e., whether family income falls below 1.0, 1.2 or 1.4 MLS. Since July 1997, this benefit was supplemented by two similar benefits: "social compensation of rising rents" and "social compensation of rising costs of heating". Both benefits were adopted to cushion poor families from scheduled price deregulation. The "rent benefit" ceased as of June 2000, and the "heating benefit" was discontinued at the end of 2000. In our analysis below, however, we take these two benefits into account as we analyze the 1999 data. The annual costs of the three related schemes were 2.4 bn CZK in 1999.

iv) *Transportation benefit* – is a benefit introduced after subsidies for student transportation were phased out, and it is partly means tested. The cost of the benefit scheme was CZK 1 bn in 1999. Any dependent child studying in a municipality other than his/her municipality of permanent residence is eligible. Families where children did not complete compulsory schooling (9 years), are eligible for the benefit irrespective of family income. If a dependent child studies at a secondary or higher educational institution, only a family with an income below 2.0*MLS is eligible. The calculation of the benefit level is based on the price of public transport and the resulting sum depends on the type of school attended and the regularity of the need for transportation (daily, weekly, etc.). Entitlement is established yearly.

2.2.2 Non-tested Family Benefits

i) *Parental allowance* – a payment to a parent caring full-time for a child four-years old or younger or for a handicapped child under the age of seven who is not placed in a nursery, kindergarten or any other institution for otherwise preschool children. A parent is eligible for the benefits unless he/she is receiving health insurance, unemployment benefits or maternity-leave benefits. The parent may also earn a sum lower or equal to his/her personal minimum living standard. The size of the benefit is defined as 1.1 times the personal MLS of the parent, i.e., as of January 2001 the benefit was 2,409 CZK, or 50 % of the minimum wage. The annual costs of the scheme were CZK 7.7 bn in 1999.

ii) *Benefit at the birth of a child* – is a one-time benefit provided upon the birth of a child. The size of the benefit is a multiple of the individual MLS of a newly born child and depends on the number of children born simultaneously, rising nonlinearly.[12] The costs of the program were CZK 0.6 bn in 1999.

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[12] 4.0*MLS when one child was born, 5.0*MLS per child when two children were born and 9.0*MLS per child when three or more children were born.

iii) *Foster-care benefits and benefits for families of conscripts* – Children of military conscripts and their spouses caring for a child below the age of four are eligible for a benefit of 0.67*MLS for their respective individual needs. Costs in 1999 were negligible at CZK 20 mil.

iv) *Lump*-sum funeral benefit* – is paid to a person that organized a funeral and is fixed at 5,000 CZK.

All of the social-support benefits are non-taxable but are included in the income of a household applying for income support under Social Assistance.

2.2.3 Proposed or Discussed Changes

The child allowances are formally means-tested but in reality 90 % of families qualify for a benefit and roughly 50 % for the highest of benefits. They are also unnecessary long in terms of child age – until 26 years if a child keeps studying. The child allowances are often combined with a social supplement that is more often targeted at the poor, yet it is unclear why there are two programs. These two programs together cost almost CZK 19 bn (1 % of GDP) in 1999.

The parental benefit is particularly long (four years) and its costs were almost CZK 8 bn (0.4 % of GDP). The long tenure of the benefits was meant to shield women from high unemployment but as any deformation of the labor market disadvantage women who often find it difficult to return to the labor market after raising one or even two children?. Therefore, the system reduces the labor force and at high costs to the taxpayer.

The transportation benefit is seen as the most administratively complicated and is arguably not well targeted (no data is available as the benefit is not addressed in household surveys – see below). Thus, the costs of the scheme – almost CZK 1 bn in 1999 – are difficult to gage against any measurable outcome.

2.3 State Social Insurance (Sociální pojištění)

Social insurance, which covers unemployment, sickness, health, injury and old-age insurance, is the most dynamic part of the Czech social-security system. Pension payments increased from 128 bn CZK (8.1 % GDP) in 1996 to 186 bn CZK (9.7 % GDP) in 2000. Sickness benefits rose from 20 bn CZK (1.3 % GDP) in 1996 to 28 bn CZK (1.5 % GDP) in 2000. Unemployment benefits experienced the smallest increase in nominal terms, from 2 bn CZK in 1996 to 5.7 bn CZK in 2000. We do not analyze this subsystem of social security in depth; we limit our description to a very brief overview. The subsystem is ostensibly based on the insurance principle, and, although this might be disputable,[13] we left the pension system outside our analysis of social-security efficiency.

2.3.1 The Unemployment Compensation System

The unemployment compensation system (UCS) was put into effect January 1, 1990, and it has undergone several changes since. It began as a generous one until reforms put into place on January 1, 1992 made the level of benefits (based on wage replacement rates) and eligibility criteria more restrictive. In January 1996, new reforms increased the replacement rates for the new entrants and certain other groups of unemployed and widened again the eligibility criteria.

Only a job seeker registered at a district Labor Office qualifies for the benefits.[14] In 1990–1991, basically the only additional condition was a minimum of 12 months work within the previous

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[13] The Czech old-age pension system is all but insurance based. Note that while contributions are 2 % of wages with no ceiling, the benefits are rather uniform, and higher incomes are discounted heavily (by a factor of 90 %).

[14] A person can be registered only if available for work and cooperating with the labor office in job-search activities.

three years, and this period could be substituted with a number of different situations. Prior to January 1, 1992, the unemployed were entitled to receive benefits for 12 months; since then, the entitlement period is six months. Periods of sickness, maternity leave or participation in government-subsidized job-placement programs (during which benefits are replaced by other sources of income) are not deducted from the entitlement period.

In 1990–1991, the replacement rate varied depending on the reason of the layoff (up to 90 % for the first six months for those laid off for organizational reasons). From 1992 to 1997, the replacement rates were unified on 60 % of the previous net wage for the first three months and 50 % for the next three months. Since 1997, the rates were cut further to 50 % and 40 % respectively. Those in training programs receive 60 % of their previous net average wage during the first three months of participation in the program and 50 % the subsequent three months. From 1992 to 1995, the maximum level of benefits was set at 1.5 times the minimum wage (1.8 times for those in retraining). In January 1, 1996, the base for the maximum changed to the minimum living standard for an adult in a one-person household, and currently the ceiling is 2.5 of the MLS (2.9 of MLS for unemployed in a retraining course). Since 1992 there is no minimum benefit.[15] Benefits are not indexed to inflation, nor are they taxed.

2.3.2 Sickness Benefits

Sickness benefits supplant lost income during periods of short illness. They are financed from a special surcharge on the payroll tax and are redistributive in nature, as their level is topped. An ill worker is entitled to benefits from the first day of illness and there is no cost sharing by employers. It is no surprise, thus, that the system is often used for the short-term off-loading of unneeded workers. On average, 6 % of workers claim illness on any given work day in the Czech Republic.

The benefit formula is rather complex, as it calculates the daily benefit level from the average gross income of the previous three months. While the first CZK 360 of daily income is effective in the formula, only 60 % of income at CZK 360–540 is, and income above CZK 540 daily (CZK 16,000 monthly, or 150 % of the 1999 average wage) is forfeited completely when sickness benefits are calculated. The benefit is then equal to 69 % of the adjusted income (50 % for the first three days). The sickness benefit system consumed CZK 19 bn in 1999, or 1 % of GDP in that year.

3. Effects of the System

It is not easy to assess the combined effects of the two systems, social assistance and social support, as they are tailored to individual needs and the value of benefits is often means tested and always depends on family size. However, in order to understand the system's efficiency and impact on the Czech labor market, it is necessary to model its operation.

We have thus (statistically) constructed "a typical family" consisting of two adults and two children, one in elementary school, the other in a secondary school.[16] We may construct more types of families, but the "2+2" family best shows the effects of the system. However, as shown in chart 1, the system effects do not change dramatically when we analyze a 2+1 family (with one child only). Also, the authorities acknowledge that the system distorts labor incentives most for families with more children.

A two-children family is entitled to a series of benefits: first it receives children allowances if the family's income is not above 3 MLS. If the family income is below 1.4 of MLS, it is entitled to the social supplement and housing benefit. Family income to 1.6 MLS entitles it to a further "housing supplement," and until 2000 it was entitled to a "compensation benefit" for hikes in regulated rents

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[15] Unemployed are eligible to the minimum living standards, as discussed above.

[16] These details are important as some benefits depend on the school which children attend.

and heat prices. The younger child is entitled to a transportation benefit no matter what the family income; the older child, however, receives this benefit only if the family income is lower than 2 MLS. Altogether, the family could receive as many as seven different benefits of the social support (we leave aside social insurance). Of course, if the social support benefits are not enough to lift the family above the minimum living standard, its income is topped by social assistance to reach the MLS. *Chart 2* illustrates the system:

CHART 2 Social Benefits of a Family of Four (CZK for multiples of MLS)

Note: The table does not reflect the "top-up" component of the social system that tops the income of this model family to CZK 11,030.

The complexity of the social benefits deform incentives to work, as raising the family income above some of the thresholds above eliminates some social benefits. The "imputed tax rate," i.e., the rate at which social benefits are withdrawn when work income rises, is as high as 100 % for income up to 50 % of the family MLS, i.e., in this case, roughly 50 % of the nationwide average wage in 1999. In other words, all work income below 50 % of the family MLS is "100% compensated" by withdrawing social benefits.

Only after this threshold is reached the family may actually boost its income by accepting a job. The average "withdrawn rate" remains high, however, and gets to 50 % when the work income reaches MLS, or, for this family type, the average wage. Then, various benefits are withdrawn at 1.2, 1.4, 1.6, 1.8, 2.0 and finally at multiples of 3 of MLS, with the marginal rate often as high as 80 %. The average "withdrawn rate" hovers around 50 % well until the labor income reaches 2 MLS and then slowly declines further – see *Chart 3*.

CHART 3 Withdrawal "Tax" Rates for a Family of Four (% for multiples of MLS)

It seems, thus, fair to say that the effects of social assistance and social support are quite detrimental to work incentives, especially for bigger families who face drastic "withdrawal rates" when they seek a job. Please note that we consider the wage in net terms, i.e., after income tax and social contributions were paid. While low wage may be tax-exempt (see below for more on tax credits), social contributions are paid from each wage and reach 47.5 % of the brutto wage (out of which 12.5 % is paid by the employee and 35 % by the employer) – see below. This further complicates the employment of low-skilled workers.

4. Tax Deductible Allowances

The Czech tax code is often criticized for its complexity and its loopholes. However, compared to other more developed countries' tax codes, the Czech code is still in its infancy. Also, compared to other OECD member countries, the Czech tax system is, in fact, less complex and provides fewer deductible allowances. This significantly improves the system's transparency and lowers its explicit and implicit costs. At the same time, more of the perceived "government social functions" must be met by the social-security programs described above.

Moreover, all social transfers in the Czech Republic are tax-free. The state also extends tax-deductible allowances to some preferred activities – interest paid on mortgage is tax deductible, and some fringe benefits are tax free (transport subsidies, catering, pension insurance and, since 2001, life insurance). There are various income groups that qualify for a tax allowance; however, from the point of view of social security, only a few make any impact.

Most important are tax-deductible allowances: on own "needs" on children and dependent spouses, summarized in *Table 2*. These benefits are, as the whole Czech tax system, exclusively individual, i.e., any member of a family can claim them, but on his/her income only. Their fiscal costs

are substantial, though are available as estimates only. According to the Ministry of Finance,[17] individual tax-deductible allowances totaled CZK 44 bn in 1999, and child tax-deductible allowances and dependent-spouse tax-deductible allowances a further CZK 16 bn in 1999. Since then, the tax system's progressivity (and thus tax deductible allowance impact) was lessened in 2000 when the top marginal tax rate of 40 % was abolished. The highest tax rate now applied to personal income is 32 % and it is applicable on incomes approximately equal to two times the average wage. Nevertheless, tax credits are similar in fiscal terms to the social support system and clearly dominate the social assistance system. It is, thus, important to look at their distributive aspects as well.

TABLE 2 Main Tax Allowances in the Czech Republic (CZK annually)

	1997	1998	1999	2000	2001
Individual deductible allowance	28 800	32 040	34 920	34 920	38 040
Child deductible allowance	14 400	18 000	21 600	21 600	23 520
Spouse deductible allowance	16 800	18 240	19 884	19 884	21 720

Source: Ministry of Finance

Clearly, these tax-deductible allowances are regressive in nature, but their distributive impact has not previously been studied. Given the fact that the Czech tax system is progressive, with a marginal rate rising from 0 % to 32 % (until 2000 up to 40 %), the tax credits distribute disproportionate benefits to the well off. Their administration, it is claimed, is cheaper than the social security's and they do not discourage from accepting a formal employment. However, there has been no analysis as to what extent these tax credits fulfill government goals in social policy.

5. Data Description

In order to get representative data on household income we use the household budget survey, a regular and long-term panel study of more than 3,000 Czech households conducted by the Czech Statistical Office. Though this survey was mainly concerned with household consumption, we believe that it can be used for analyzing the income distribution of Czech households. The CSO also conducts a specialized survey on household income as part of a population microcensus, but the last data available from this are from 1996. As our goal is to formulate some recommendations for current social policy we have decided to use more contemporary data from the household budget survey even though we are aware that they are not strictly representative. The household budget survey, for example, does not include households where the head is unemployed or where the head is retired but other members are employed.[18]

The household survey is conducted on a monthly basis and, for our purposes, we used the 1999 results, the latest available. The survey is representative with respect to income, age, social status, and number of children. Thus, it is very likely representative with respect to many social benefits, as they are mostly based on family income status/number of children. The one benefit that should be treated carefully is the sickness benefit, as there is no apparent link to characteristics targeted by the household survey. However, as *Table 3* shows, approximately 50 % of households received sickness benefits in 1999. Moreover, the beneficiaries were evenly distributed among all deciles, so the sickness benefits seem to be widespread and thus the survey covers them in a proper manner. We have excluded, however, one variable: "other social assistance", which was received by a mere 63 households (3 % of the sample) and which was almost non-existent in some deciles. While the benefit had little impact on overall distribution, it was nevertheless important for the families who received it.

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[17] As quoted in OECD (2001).

[18] According to some researchers – e.g. J. Večerník (1998) – the household budget survey does not reflect proper income differentiation in Czech society. For our analysis, it would have been appropriate to compare results of Microsencus 1996 and household budget survey from 1996; unfortunately, we did not have the relevant data for such a comparison.

TABLE 3 Main Social Benefits, Number of Recipients and Average Benefits

	Child allowances		Social supplement		Parental allowances		Other social support		Unemployment benefits		Sickness benefits		Tax allowances	
	Number	Av. benefit	Num-ber	Av. bene-fit	Number	Av. benefit	Number	Av. benefit	Number	Av. benefit	Number	Av. benefit	Number	Av. benefit
D1	185	4205	147	4004	94	8780	135	2470	33	4751	117	5615	226	5413
D2	160	3843	96	2389	63	9269	93	1850	31	5016	102	5648	207	5704
D3	144	3690	58	1916	44	9102	64	1258	22	4728	97	4832	206	6008
D4	149	3609	33	1001	31	7528	57	1561	16	2614	114	4379	218	6192
D5	110	3481	20	1133	21	6274	49	1267	13	2950	99	5391	204	6260
D6	111	3167	8	343	10	7324	28	1059	15	4811	115	3883	212	6476
D7	81	2568	3	562	8	6628	16	1804	13	3527	114	3558	208	6724
D8	42	2203	2	1250	2	11597	15	1797	11	4229	107	4263	203	6767
D9	29	2040	2	2512	9	6004	11	3135	12	2798	96	5075	203	6927
D10	7	2211	1	1678	3	8796	5	2616	3	3059	90	2949	202	7944
	1018		370		285		473		169		1051		2089	

Note: Average benefit is calculated as an average from those households actually receiving the benefit.

As we were mainly concerned with the distributional impact of social security (and tax-deductible allowances as well), we used a constructed "market income" as a base for splitting households into ten deciles. The "market income" is calculated from the household survey where the reported net income is adjusted for received social transfers and for paid taxes. The resulting "market income" would simulate income that the household would have exclusive of taxation and transfers (see *Table 4*). Table 4 also shows the respective impact of transfers and taxes, and the resulting disposable income. We should note, though, that taxes paid include, in our construction, social contributions as well. In this respect, we had to recalculate social contributions paid by employees, as they report only a part of the social contributions as the bulk is "paid for" by employers. In fact, though, the whole tax burden is employees', so we have increased their paid taxes by the amount of social contributions paid by their employees.[19] Table 4 shows that the lowest decile is the only beneficiary of the combined tax and transfer system, as its disposable income is 20 % higher than its "market income". The rest of distribution loses, and the higher the income the greater the loss: 5 % for the second decile but 36 % for the richest.

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[19] Note, that self-employed pay (and report) the total amount of social contributions, so we needed no adjustment in those cases where the household head was self-employed.

TABLE 4 Main Decile Characteristics

	Number of house-holds	Market income	Market income minus paid taxes	Market income plus trans-fers	Dispos-able income	Mean age of the head	Number of children	Number of mem-bers	Dispos-able inc/mark et inc.
D1	238	57250	43225	82694	68 668	38.9	1.7	3.6	120 %
D2	215	84495	59580	104971	80 055	39.4	1.4	3.4	95 %
D3	210	101643	71080	115273	84 710	40.2	1.3	3.1	83 %
D4	220	118267	80527	130105	92 336	40.5	1.3	3.1	78 %
D5	209	133602	89568	143947	99 913	41.9	1.1	3.0	75 %
D6	218	149920	99037	159617	108 735	43.0	1.0	3.0	73 %
D7	213	171349	109676	179203	117 530	43.1	0.8	2.7	69 %
D8	205	194731	123282	200837	129 387	44.9	0.5	2.4	66 %
D9	208	226867	142235	233358	148 726	46.0	0.4	2.4	66 %
D10	206	314639	196869	318626	200 855	46.4	0.3	2.2	64 %
	2142								

The survey covers households (as opposed to individuals), but as it also provides extensive demographic and income statistics, income distribution on an individual basis is easily constructed, especially as we assumed that all family members have the same share in the family income. It is often argued that larger families enjoy "returns to scale" as some household expenses are similar for a one-member family as for larger families. To that extent, the CSO provides a "weighting" to reflect family size: while the first member counts for one unit in the measurement, the remaining adults for 0.7 and children aged 0–13 for 0.5 of a unit. We used this "adjusted consumption scale" in our calculations.

While this survey probably under weighs both the richest (that have little incentive to cooperate with the CSO) and the poorest households (that are difficult to reach and that may find the CSO questionnaires too complicated), it does provide the most comprehensive and complex set on information on household income and expenditures. The bigger and more intriguing survey is the microcensus; however, it is conducted in ten-year intervals, the last being in 1996.

6. Redistribution Effects of the System

In our analysis we tried to show (a) the efficiency of various social programs in lifting the net income of households, and (b) the costs. *Table 5* summarizes our results concerning an increase in the net income of ten deciles of households. The household survey distinguishes six social-security schemes: child allowance, social supplement, parental allowance, unemployment benefits, sickness benefits and a group of other social support. We also calculated tax-deductible allowances, although this is treated separately.

As the following table shows, in general terms the Czech social security system is rather well targeted at the poorest decile, whose income is boosted by a massive 33.8 % (CZK 14,600 per person, i.e., USD 385 annually). The system is less generous to the second poorest decile that gets "only" a 19 % increase in income (CZK 11,400 per person, i.e. USD 300 per month). The third decile gets a 12% boost (CZK 8,500 or USD 220). The boost then uniformly decreases to 5 % for the sixth and less than 1 % for the richest decile. In nominal terms, the medium deciles get CZK 4,000–6,000 (USD 105–160) a year and the richest decile gets the least in absolute terms as well: CZK 1,600 (USD 45) annually.

TABLE 5 Income Boost Received by Different Deciles from Various Schemes per Individual and per Year (in %)

	Child allo- wances	Social supple- ment	Parental allowan- ces	Other social support	Unem- ployment benefits	Sick- ness benefits	**TOTAL**	Tax deduc- tible allo- wance
Decile 1	7.6	6.1	8.3	3.6	1.8	6.4	**33.8**	11.8
Decile 2	4.7	1.7	5.3	1.3	1.3	4.8	**19.2**	9.0
Decile 3	3.4	0.7	3.1	0.5	0.6	3.6	**12.1**	8.2
Decile 4	3.0	0.2	1.4	0.5	0.2	3.0	**8.4**	7.6
Decile 5	2.2	0.1	0.7	0.3	0.3	3.0	**6.6**	6.8
Decile 6	1.7	0.0	0.4	0.1	0.4	2.0	**4.8**	6.4
Decile 7	0.9	0.0	0.2	0.1	0.2	1.9	**3.4**	6.0
Decile 8	0.4	0.0	0.1	0.1	0.2	1.9	**2.7**	5.4
Decile 9	0.2	0.0	0.2	0.1	0.1	1.7	**2.3**	4.8
Decile 10	0.0	0.0	0.1	0.0	0.0	0.6	**0.8**	3.9

The best-targeted social program is clearly the social supplement that advances the income of the poorest decile by 6 %, largely unaffecting the rest. Perhaps surprisingly, the parental-allowance scheme is also well targeted: it increases the income of the poorest decile by more than 8 % and the second decile's income by 5.3 %, making little impact elsewhere. Child allowances are the most problematic of the schemes: they are ineffectively distributed to the poorest decile (increasing income by little more than 7 %), but they boost the income of all income groups, which makes them unnecessarily expensive (see below). Other social programs have relatively limited impact on the redistribution pattern, but, generally speaking, they target the poorest deciles well and then "tail off".

Sickness and unemployment benefits are allegedly "insurance based", but due to the severe ceilings on these benefits, they resemble standard social-security schemes. That is why we can assess their redistribution effects. Table 5 shows that unemployment benefits are the better targeted of the two: they boost income of the two poorest deciles by 1–2 %, and largely ignore the rest of income groups. Sickness benefits are much wider spread (and expensive – see below), as they enhance the poorest income by more than 6 %, and the rest of population gets a 2–3 % enhancement as well.

The following charts graphically illustrate the redistributive effects of various social-security schemes. *Chart 4a* shows how the income transfers to various deciles are structured, i.e., how much is contributed per various social schemes. The chart also illustrates the impact of tax credits, which will be discussed separately.

CHART 4a Income Increases from Various Social Schemes (in %)

Chart 4b shows the same effect, but this time in absolute terms. The increase is less steep, as the denominator used in calculating the percentage gains in Chart 4a increases for each decile, thus lessening transfers toward the richer deciles. The impact of tax credits is remarkably different then in Chart 4a, as in nominal terms they are highest for the richest decile.

CHART 4b Income Increases from Various Social Schemes (in CZK)

7. Budget Costs of Social-system Redistribution

The Czech social-security system has considerable costs that burden the public budgets. *Table 6* shows that the costs of various social programs run as high as 3 % of GDP (CZK 55 bn in

1999). Tax-deductible allowance represents tax expenditures of a further CZK 60 bn in 1999. It is thus of utmost importance to analyze what impact these costs have on income redistribution. We assess this issue by breaking up the total costs of various programs as distributed to the ten deciles of households. Funds spent on the lowest decile should have the highest "social marginal utility", while funds distributed to well-off deciles are thought to be less significant. Of course, this is not to say that all money distributed to, say, the five upper deciles are wasted. Some of the money will always end up with the rich. Also, in some cases comprehensible means testing would be administratively unattainable or too expensive. However, some of transfers to the well off can be eliminated or scaled down without any apparent loss of welfare.

The most expensive scheme in table 6 is sickness benefits, on which CZK 19 bn was spent in 1999. The scheme is mandatory, and though it contains severe limitations for high earners, it is the least progressive of all the schemes (see above). The poorest decile gets most of the money distributed via the scheme (CZK 2.6 bn, i.e., about 14 %), but significant sums go to well-off deciles and even to the richest decile. A radical reform of the system, perhaps based on private insurance, could save at least 50 % of the costs (which go towards the six richest deciles that surely do not need state assistance). The reform would, though, require a shift in the government policy and would be administratively difficult.

The second most expensive program is the child-allowance scheme. We discussed its arithmetic in chapter 2, and table 6 only underlines the arguments raised there: the program spends CZK 2.6 bn on the wealthier half of Czech households. These funds may be saved without much complication, as the program is already (poorly) means tested, so by changing the coefficient of eligibility the government would save billions.

Other programs are less costly and generally better targeted. Both parental allowances and social supplements are concentrated on the poorest decile and funds spent on wealthy households are probably an unnecessary consequence of the programs' administration. Similarly, unemployment benefits go predominantly toward the poorest (the two poorest deciles receive 50 % of all benefits).

Taken together, the poorest decile receives CZK 14.5 bn. from all social programs, i.e., 25 % of the total costs. The two poorest deciles, an alternative target group, receive CZK 25 bn., i.e. almost one-half of the total costs. Should we target three deciles, as the 1.8 MLS threshold would suggest, the share of funds spent on these three deciles is 57 % of the total CZK 56 bn. Whether this share is appropriate remains an open issue.

TABLE 6 Budget Costs of Redistribution to Different Deciles from Various Schemes (CZK bn.)

	Child allowan-ces	Social supple-ment	Parental allowan-ces	Other social assistance	Sick-ness benefits	Unemploy-ment benefits	**TOTAL**	Tax deductible allowance
Decile 1	2588	3757	2424	1661	2655	1482	**14567**	3138
Decile 2	2206	1427	2057	764	2625	1382	**10461**	3098
Decile 3	1777	662	1345	350	2147	867	**7148**	3061
Decile 4	1883	226	777	383	2001	322	**5592**	3339
Decile 5	1394	135	388	281	2144	477	**4819**	3082
Decile 6	1310	22	241	141	1578	730	**4022**	3333
Decile 7	750	13	150	100	1681	340	**3034**	3170
Decile 8	351	23	63	107	1626	292	**2462**	2779
Decile 9	190	21	166	172	1675	322	**2546**	2878
Decile 10	50	15	88	41	869	80	**1143**	3121
TOTAL	12,500	6,300	7,700	4,000	19,000	5,800	**55794**	31,000

8. Tax Deductible Allowance as a Tool of Income Redistribution

Tax-deductible allowance, i.e., different items deductible from the tax base, are referred to as "tax expenditures" in the economic literature because through this mechanism a tax payer is paying less to the treasury. We could get the same result if the total income is taxed and if the "tax-deductible allowance" would be paid directly from the state budget. But the tax-deductible allowance is considered to be a more efficient and administratively friendly tool. Besides the tax-deductible allowance there is also a tax credit, which is deducted directly from prescribed taxes. Both mechanisms impact only on families, which pay some taxes. Tax credits are less regressive than tax-deductible allowance, because they deduct a fixed amount from the prescribed taxes and this has a greater impact on lower income groups. Tax-deductible allowance brings a higher nominal gain to higher income groups, because it lowers their tax in higher tax brackets.[20] A tax-deductible allowance scheme is used in the Czech Republic. For our analysis we use three basic deductible items (in 1999 values): for a working individual (CZK 34 920), for a child (CZK 21 600), and for a non-working spouse (CZK 19 844). According to the Finance Ministry, annual deductions for working individual were CZK 44 bn and deductions for children and spouses were CZK 16.5 bn in 1999.[21] So, the tax-deductible allowance program is comparable in size with other social programs analyzed in the previous chapters.

Table 5 shows the distributive impact of three basic tax-deductible allowances (individual, child, and spouse) on Czech households. Tax credits are rather progressive as well: the poorest decile gets a little less than a 12% boost, while income in the middle decile is raised by about 6%. The richest decile's gain falls to 4%. In absolute terms, though, the richest decile is the winner as the average gain from tax credits per person in this decile is almost CZK 7,800 (USD 205) per year. The gain then monotonically falls to about CZK 6,000 (USD 150) for the middle deciles, which drops further to CZK 5000 (USD 130) for the poorest decile; see also chart 5b.

The budget costs of the tax-deductible allowance is distributed rather equally across all income deciles and oscillates around CZK 6 bn. The fourth and sixth deciles have the highest cost while the eighth and ninth deciles are at the minimum, see table 6.

9. Measuring Efficiency of Social Programs

The efficiency of individual programs is very difficult to measure, because social projects have different goals and are devoted to different social groups. The commonly used approach, which is also adopted in this paper, is to concentrate on the budgetary cost of individual programs and its distribution across income groups. This approach yields interesting information about individual programs but it does not provide a tool toward comparison.

We have tried to construct a unique efficiency measure for all social programs. Our basic assumption is that the main objective of social policy is to help the poorest groups of the population, i.e., the lowest group income decile. We look at how much it costs to lift the income of a respective target group by one percentage point. If, for example, child allowance, with total costs of CZK 12.5 bn in 1999, lift income of the poorest decile by 7.6%, the cost of a 1% increase is CZK 1.64 bn. If, on the other hand, parental allowances, with total costs of CZK 7.7 bn, boost income of the poorest deciles by 8.3%, the costs of a 1% increase is a little less than CZK 930 mil (see *table 7*).

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[20] If each individual can deduct CZK 34 920 from the labor income, an individual in the highest tax bracket saves little less than CZK 14 000. An individual in the lowest tax bracket of 15% would save only a little more than CZK 5 000.

[21] See the Table 20 in (OECD, 2001).

On this measure, parental allowances are the most efficient: it costs less than 1 billion CZK to lift the poorest decile's income by 1 %. The social-supplement program needs a little more than 1 billion CZK to deliver the same boost. Child allowances fare even worse, with costs of CZK 1.65 bn. Programs based on "social-insurance" concept are less efficient at increasing the income of the poorest deciles. Unemployment and sickness benefits need about CZK 3 bn to increase the income of the lowest decile

TABLE 7 The Costs to Raise Target-group Income by 1 % in CZK billion

	Child allowances	Social supplement	Parental allowances	Unemployment benefits	Sickness benefits	TOTAL	Tax deductible allowance
1st decile	1.643	1.028	0.924	3.167	2.969	0.951	5.125

The high efficiency of the parental-allowance scheme follows from the fact that families with children usually have below-average income. When one parent with dependent children remains at home, thus eligible to receive the parental allowance, the family income falls to the lowest income groups. This program mainly helps needy families.[22]

10. Conclusions

Our analysis of the main impact of social benefits and tax credits on the distribution of household income, as calculated by household budget surveys, offers a few main results. The first result seems to be that the targeting of the majority of social programs is quite effective. More than one-fourth of all expenses in relation to the six social benefits studied (child allowance, parental allowance, social supplement, other social support, sickness benefits, and unemployment benefits) is received by households in the lowest income decile. Three-fourths of all expenses are received by households in the lower half of the income spectrum. If we take as an example probably the best-targeted program, the social supplement, targeting could be improved in a way that the upper half of richer households would receive 10 % of the social benefits rather than the 25 % they receive at present. This change would save the state budget about 0.5 % of GDP (CZK 9 bn) annually.

However, as we show in the chapter 3, the dark side of effective targeting is the poverty trap. The more social payments are targeted to the poor, the more their incentives to work are lessened. We can hardly assume that, given a 100% "withdrawal tax", household members would be led to seek employment as their labor income would thus be totally "compensated" by the decrease in social payments. To find a solution for the poverty trap is not easy. One possibility, which is used in the Czech Republic now, is an aggressive minimum-wage increase. But this strategy works only at one extreme edge of the income spectrum, because even households with average labor income would be vulnerable to the poverty trap. A non-feasible solution would be the extension of social payments toward raising household income, so that labor income would not be penalized.

The experience of some OECD countries offers a better solution. For example, it would be possible to introduce a two-tiered system of MLS as proposed in the World Bank report on the fiscal stability of the Czech Republic (World Bank 2001). The standard level of MLS as it is at present would be applied for a limited time period, e.g., for six months, following which the MLS would be lowered. This seems to be a very brave proposal, which would be politically difficult. A variant of this principle is social reform in the US as begun by President Clinton in 1996. A family has the right of social benefits for a maximum period of five years. This regulation should assure the end of "dependence culture" among the US poor. It seems to be working according to the results from the first five years of the reform: The amount of beneficiary families decreased from 5 million in

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[22] However, in reality some families report only one income while there may be other.

1995 to 2 million in 2000. At the same time, the income of the poorest families increased as more of their members found employment. Also, the amount of children classified as poor decreased from 22 % in 1994 to 17 % six years later.

The Czech tax system could be reformed in the direction of higher labor incentives if the present system of tax-deductible items would be replaced with a tax-credit system, i.e., items deductible directly from paid taxes. Those tax credits would be fixed for all taxpayers and they would deliver more benefit to lower-income households. According to OECD estimates, published in an OECD report on the Czech Republic in 2001, tax expenses could prospectively be decreased by CZK 20 bn and the benefit for the half of lower-income households would not change. An even more progressive approach would be to use the US system of earned tax credits or the UK system of working family tax credits, which motivate families to accept even low-paid, part-time jobs.

We can conclude that our analysis describes several possibilities of how to save resources in the social benefit and tax systems. However, it would be naïve to expect that the saved costs would be high or easily achieved. The most we could expect is that lowering expenses of the social-support system and two social-insurance payments would save 0.5 % of GDP without affecting households with lower-than-average income. About 1 % of GDP could be saved as regards tax-deductible items. However, the main sources of potential savings, which we do not discuss here, are in the pension system and in health care. Those two programs are the largest, totaling CZK 190 bn and CZK 100 bn, respectively. They also present the greatest potential for future growth. Their reform will remain the most important task for future Czech budgetary policy.

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SUMMARY

Paper analyzes the Czech social security and tax system as their redistribution aspects are concerned. On a basis of individual data, authors find that social security programs are usually properly targeted but that the tax breaks favor richer households. A microanalysis of tax expenditures is carried out as these expenditures are allocated to different households according to their social and demographic characteristics. Authors also analyze budgetary costs of individual programs and construct a measure of their efficiency.

The Redistribution of Income through Taxes and Benefits in the Czech Republic: Changes and Perception after 1989

Jiří VEČERNÍK[*]

The aim of this article is to demonstrate the changing redistribution of household income in the Czech Republic. In the first part, statistical income surveys are used to document systemic change in the redistribution of household income and their determinants from 1988 to 1996. In the second part, the context of social structure is elaborated upon, and the attitudes of people toward taxation and social benefits are documented, portraying the low — but apparently rising — tax awareness of Czechs. In the third part, comparisons with other OECD countries serve to establish the extent as well as the perception of the Czech distributional system in a broader context. In conclusion, the author addresses the limits of disposable data sources and potential analysis traps in studying redistributional flows.

Although the attention paid to income redistribution has increased in the Czech Republic since 1990, it remains disproportionately low compared with Western countries. A wider economic and political debate is still lacking here, especially as to how taxes and benefits interact in shaping household income, whether progressive redistribution weakens incentives to work and entrepreneurial activity, and to what degree the present system corresponds to conceptions of social justice. That taxes should be viewed as a financial instrument (as revenue for public budgets) and as an instrument of will between government and citizenry is not widely accepted. As for social benefits, it is necessary to consider not only the currently redistributed means, but also the institutionalization and internalization of claims for state support, which will impact upon budget expenditures in the long term.

The journey from the extensive and hidden communist redistribution of wealth to restricted and more transparent redistribution in a market economy involves, on the one hand, more-efficient means of redistribution, and, on the other, inequality in redistribution (with the intention of strengthening progressivity in the case of taxes and targeting in the case of social benefits). Income redistribution in the Czech Republic has been considerably lessened since 1989, achieved first by a great leap (related to the privatization of the economy), and later by small steps (by bringing some economies into state expenditures). In a democratic society, citizens, through their elected representatives, allocate public resources. It is, however, altogether understandable that a government attempts to manage its discretion in this regard toward increasing its own expenditures, whether directly or indirectly.

While macroeconomic data on the Czech Republic documents a systematic decrease in the rate of redistribution (the share of state expenditures as a portion of GDP) to 1997, according to household surveys, perceptions are that taxation increased while the share of income transferred decreased in the last decade). Even if this is due to the development whereby taxation has become more transparent, the situation is perceived as unfavorable for households, especially during periods of economic stagnation or slow growth in real income. Household surveys, however, do not disclose the full extent of redistribution; unfortunately, the hidden portion can be less equally distributed than the visible channels.

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It is not sufficient, however, to speak only of averages and aggregates. It is important to simultaneously show the redistributive flows along with the social identities of taxpayers and benefit recipients. The intention of this paper is to document quantitative change in the redistribution of household income. In the first part, income surveys are utilized to analyze redistribution change and factors since 1989. The second part deals with social structure, in which contextual attitudes toward taxes and benefits are described. In the third part, the Czech Republic is compared with other OECD countries in terms of redistributive flows and attitudes toward taxation. In the conclusion, the limits of disposable data sources are discussed, as are certain snares to avoid when analyzing redistribution.

1. Distribution of taxes and benefits in households

To follow the effects of reform, data sets of income surveys (microcensus) and family expenditure surveys (FES) were utilized in this paper. The advantages of income surveys are in their considerable size and their representativeness, while a disadvantage lies in their infrequency So far, it was every four years, but the survey planned for 2001 was postponed to 2003. It is another disadvantage that information on taxes and certain social benefits is not solicited from households nor collected from official bodies. Instead, they are imputed by statisticians using data on household income and composition. Such information is important if one seeks to investigate systemic change, but less relevant for an assessment of the system's functioning in a given context.

Table 1 presents taxation and social benefit levels according to household income deciles.

TABLE 1 Relative Taxes and Social Benefits and Their Effect on Income Distribution by Deciles (%)

Decile	Taxes		Social benefits		Summary effect	
	1988	1996	1988	1996	1988	1996
Disposable household income						
1	16.1	16.6	17.0	17.9	-2.1	-2.2
2	14.1	16.0	23.4	22.0	6.8	2.8
3	13.6	16.3	24.2	21.8	8.5	2.5
4	14.4	17.2	21.2	18.3	4.5	-2.4
5	14.9	18.0	18.5	15.4	1.1	-6.6
6	15.2	18.2	16.6	13.6	-1.2	-9.4
7	15.3	19.7	15.6	11.2	-2.5	-13.3
8	15.7	20.2	14.7	9.9	-3.9	-15.4
9	16.0	21.4	13.8	7.8	-5.2	-19.3
10	16.1	24.1	12.4	4.8	-6.9	-25.9
Total	15.3	20.0	16.7	11.9	-0.1	-8.9
Income per capita						
1	10.3	11.9	30.1	30.5	18.3	17.7
2	11.9	14.8	24.0	22.0	9.4	4.7
3	13.0	16.4	20.4	17.6	4.3	-1.9
4	13.7	17.4	18.0	15.5	1.6	-5.6
5	14.1	18.3	16.6	14.1	-0.5	-8.3
6	14.8	18.8	15.3	13.8	-2.8	-9.4
7	15.4	19.8	14.4	11.7	-3.9	-12.9
8	16.0	20.4	14.2	10.1	-5.3	-15.5
9	17.2	21.6	14.1	7.8	-6.7	-19.7
10	17.4	24.6	15.4	4.4	-5.9	-27.2
Total	15.3	20.0	16.7	11.9	0.8	-7.8

Source: Microcensuses 1989 and 1996.

Note: Only households of non-agricultural employees included. Household income is adjusted to an equivalent unit which is computed as root square of the size of household. Relative tax is computed as the percentage of income tax and social contributions in gross household income. Relative social benefits are computed as the percentage of social benefits in net household income. Summary effect is computed as benefits minus taxes in percentages of net household income.

Only direct taxes were considered, i.e., wage tax valid until 1992, and, beginning in 1993, personal income tax together with compulsory contributions to health and social insurance paid by employees (about one-third of the entire tax burden). All household income coming from state and public funds, i.e., pensions and family benefits (which comprise one-third of disposable household income), was assessed under the "transfers" heading. The analysis compares total disposable household income and income per capita, which reveals interesting differences. Because old-age pensions have a specific character (they should be considered not as welfare benefits but as mandatory social-insurance payments), we mostly analyze the households of economically active persons, of whose incomes the share of pension benefits is very small.

The compared systems of redistribution differ greatly; the first falls under the communist regime, and the second begins to reflect the impact of systemic changes in taxes and mandatory payments after 1989. For 1988, we only assess the effect of wage tax, which concerns the largest category of employees in the state sector. Various other income-tax categories for individuals, e.g., self or independently employed, were not included in the survey. Contributions to social and health insurance were included, partly via wage tax, but the greater portion was paid by employers in aggregate payments (50 percent of the wage fund). One summary variable of personal income tax and contributions to social and health insurance was composed for 1996. As in 1988, other forms of taxation were not involved in the 1996 survey.

Average taxation in employee households from 1988 to 1996 rose by about 5 percentage points. The post-communist system made taxation steeper. In 1988, the tax rate, according to total disposable household income per tax bracket, was nearly uniform, and, according to per capita income, the ratio of the first and tenth deciles by rate of taxation was only 1:1.7. In 1996, this ratio already reached roughly 1:1.5 according to total disposable household income, and 1:2 according to income per capita. As compared to the earlier system, which was extremely flat, taxation turned more progressive. This despite that the majority of the population was, until that time, within the two lowest income-tax brackets.

The share of transfer income in the net income of all households decreased by about 1 percentage point; however, in employee households (which Table 1 covers) it decreased by 5 percentage points. Today's distribution of transfer income is also much more differentiated than previously; the lower income categories are drawing the greater part of their income from social benefits, while the higher income categories are drawing less than previously. Well-off households receive less transfer payments (though still not negligible). This is not only due to greater targeting, but also due to the changing demographic composition of upper-income categories, in which fewer children and pensioners are present.

The summary effect of redistribution has thus changed considerably. Figuratively speaking, while in 1988 the lower half of households were recipients of income transferred from the upper half; in 1996, somewhat more than 90 percent of the means taken from the wealthy were given to the lowest-income households. This indicates that the degree of redistribution deepens intensively according to income, so that the "loss" in the highest decile reaches up to a quarter of income, compared with a mere 6–7 percent of income in 1988 under communism. Consequently, incomes after redistribution are much more equitable than before it, thus the system has a stronger equalizing effect; however, because gross (market) household income is now more differentiated, income distribution is less equal than it was at the end of the communist regime.

In *Table 2*, systemic change is documented via a comparison of the distribution of earned and disposable household income. While in 1988 the reduction in income inequality was insignificant, and households falling into the lowest decile had only about 10 percent higher income after transfers, in 1996 the income distance between the highest and lowest income deciles per capita had narrowed from 7.4 to 4.8 (i.e., approximately by one-third), and the position of the lowest decile had improved by more than 20 percentage points. The steepness (progressivity) of redistribution before and after taxes is cumulatively measured by Gini coefficient of income distribution, which shows that the increased progressivity is striking, particularly as regards distribution according to total disposable household income, the level of which became a more significant factor of redistribution.

TABLE 2 Household Income before Redistribution (Gross Market) and after Redistribution (Net Disposable) (%)

Decile	Disposable household income				Income per capita			
	1988		1996		1988		1996	
	Before	After	Before	After	Before	After	Before	After
1	41.9	41.6	34.7	38.5	43.3	53.4	33.2	45.2
2	55.4	60.3	49.0	57.1	59.2	66.1	48.5	57.5
3	67.4	74.5	58.3	67.6	70.0	74.1	59.7	66.2
4	80.6	85.5	69.2	76.4	78.7	80.9	69.8	74.8
5	92.3	94.5	80.5	85.4	87.2	87.9	80.2	83.8
6	102.8	102.9	92.0	95.1	97.5	96.1	90.3	93.4
7	112.6	111.3	106.4	106.3	108.8	106.1	104.6	104.7
8	124.4	121.3	122.8	120.4	123.2	118.5	121.2	118.7
9	140.6	135.5	149.4	141.6	143.7	136.4	147.8	139.6
10	182.5	173.1	238.0	212.0	188.6	180.8	245.0	216.3
Average	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Gini	0.212	0.207	0.277	0.257	0.212	0.198	0.277	0.253
Difference		2.358		7.220		6.600		8.665

Source: Microcensuses 1989 and 1996.

Note: Only households of non-agricultural employees included. Household income is weighted by persons. In last row, there is reduction of Gini coefficient between gross and net income in percent of original distribution.

Data sets of statistical surveys can be used also for an analysis of the main factors determining taxation levels and benefits. We would expect changing determinants for household income according to the number of dependent children and the age of the household head – i.e., that the importance of life-cycle characteristics will diminish and the importance of household income itself should increase (Večerník, 2001). Regression analysis in *Table 3* distinguishes factors such as size and composition of households and individual wage differentials. The expectation mentioned above is only partially fulfilled in tax determination, where the influence of income has increased. Conversely, in the case of social benefits, the effect of income and number of children has diminished. Because of multicolinearity (particularly between the number of wage earners and household income), the results must be viewed with some reservation.

The above-mentioned findings seem to contradict the application of targeting. An explanation of this surprising state of affairs lies in the altered ratio of old-age pension benefits and family allowances within the framework of transfer income. While the share of pensioners and dependent children in household composition has changed slightly (in both cases there has been a slight decrease, with an increase of economically active persons in households), the share of pension benefits in the overall transfer income rose from 40 to 50 percent. This is a result of changes since 1989, when pensions began to be regularly valorized, while family benefits stagnated. The comparison of 1988 and 1996 thus does not counter indicate the application of targeting, but rather, it indicates restructuring of social transfers.

Microcensus data enables a more detailed view into income structure, but as was noted, only periodically. If we want to create a continuous time series of changes, we can use family expenditure surveys, though with some caution. If the advantage of conducting Czech FES is their yearly periodicity, their disadvantage is their limited representativity due to quota sampling according to social groups and household types. Also, the requirements on households involved in the survey to keep detailed diaries leads to under representation in higher income categories. Income inequality and rate of redistribution reported are thus underestimated in Czech FES. The change in redistribution since 1989 appears thus smaller according to family budgets than according to income surveys.

In *Figure 1*, we present the resulting distribution of taxes and benefits according to FES by income quintiles in households of employees. We observe that inequality in the distribution of taxes according to income categories is, on the whole, steadily increasing. The main factor behind the decreasing share of taxes paid by the lowest fifth of households is the smaller tax burden levied

TABLE 3 Regression Analysis of Relative Taxes and Social Benefits

Factor	Taxes		Social benefits		Summary effect	
	1988	1996	1988	1996	1988	1996
Pearsons corelation coefficients						
Household income	0.72	0.85	0.19	-0.03	-0.19	-0.32
No. of active earners	0.65	0.40	-0.15	-0.22	-0.42	-0.37
No. of children	-0.07	-0.01	0.25	0.11	0.25	0.12
Age of the head	0.14	0.13	0.12	0.08	0.01	0.01
Standardized regression coefficients						
Household income	0.60	0.88	0.36	0.16	0.02	-0.12
No. of active earners	0.30	-0.03	-0.39	-0.35	-0.45	-0.36
No. of children	-0.27	-0.10	0.31	0.15	0.34	0.18
Age of the head	-0.07	-0.03	0.25	0.20	0.24	0.17
R^2	*0.64*	*0.73*	*0.24*	*0.12*	*0.30*	*0.25*

Source: Microcensuses 1989 and 1996.

Note: Only households of non-agricultural employees included. Relative tax is computed as the percentage of income tax and social contributions in gross household income. Relative social benefits are computed as the percentage of social benefits in net household income. Summary effect is computed as benefits - taxes in percentages of net household income. All coefficients are significant on the level <0.001.

on the lowest income earners. Otherwise, the normal as well as so-called cold progression (the shift of income rising in line with inflation only to higher tax brackets due to inflation) contribute to an increased share of taxes paid by the highest fifth of employee households from their overall volume—this amount was one-third in the year of tax reform (1993) and rose to 36 percent by 1999. Unfortunately, the tax burden on self-employed, which is lower than that of employees, is not observed in family expenditures surveys (Pelc, 2000).

Also, the inequality of transfer income has increased, which is especially striking at both extremes of income hierarchy. The share of the highest category which was 25 percent in 1989, lowered to 14 percent in 1993; afterwards, it rose to 18 percent in 1999. In contrary, the share of the lowest categories increased from 15 to 22 percent in 1993 and to 24 percent in 1999. Rising contributions to health and social insurance replacing previously hidden redistribution led to a situation whereby employee households are receiving less than what they pay to the state budget and corresponding funds. The rate of redistribution has remained roughly the same since 1993: employee households belonging to the highest income quintile pay at least four times more than what they receive.

2. Taxes and benefits in the public opinion

The extent and type of redistribution is related to the social structure of a society. While the above relationship is far from deterministic, the features of redistributive channels are still a consequence of the political will of certain social groups, and have a feedback effect on their social position. There is no simple polarity where one simply gains and another simply loses. In fact, a polarized society enables charity, not solidarity. Solidarity cannot be accomplished in a steeply stratified society and may appear only after a certain degree of social homogeneity is reached. "The triumph of solidarity measures in Britain and Scandinavia, supposedly the classic example of change from the bottom up, was in fact equally a victory for the middle classes. Not until otherwise privileged groups discovered that they share a common interest in reallocating risk with the disadvantaged was a real redistribution of burden possible" (Baldwin, 1990:292).

The interaction of both opposing channels of redistribution, i.e., tax payment and state expenditure, forms the twofold character of the middle classes: they contribute considerably to state revenue, but also gain substantially from its expenditures, particularly in other-than-cash income channels through the financing of public (or semi-public) goods: education, transportation and telecommunications. These represent goods that cannot be precisely quantified, so we must be

FIGURE 1 Distribution of taxes and social benefits by quintile groups of equivalent income

Distribution taxes

Distribution of social benefits

Quintile share of equivalent income   ■ 1   ▨ 2   □ 3   ▥ 4   ▧ 5

(%)
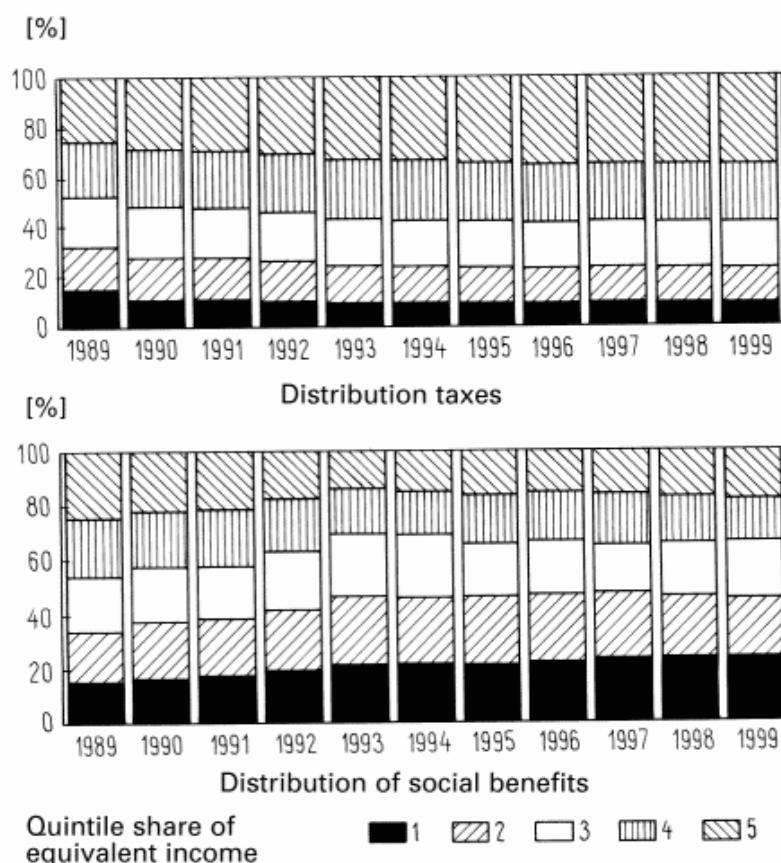
Source: Family Expenditures Surveys 1989–1999.

Note: Equivalent income is household income divided by the number of equivalent units and equivalent units are computed as the square root of the number of household members.

satisfied with a combination of statistics and guess work. Methods and arguments often used in this area are inspired by the study by R. Goodin and J. Le Grand (1987), which documents that redistribution in British society occurs not only from the top down, but also from the bottom up, i.e., from the poor to the rich, or rather, to the middle class.

Income redistribution is not exclusively a financial or economic matter. It involves a tacit social agreement between the government and its citizens, which is better fulfilled the more transparent it is and the clearer its goals. On the government's side, this means prevention of waste, open information about expenditures, and effectiveness and impartiality during the redistribution process. Citizens, in turn, should cultivate their "tax consciousness," i.e., an understanding of how much of one's income goes to the state, of the degree of expenditures for public goods and social transfers and what is returned to individuals and society. This is, of course, only possible in outline, especially for public goods, which, by their nature, are indivisible.

Awareness of how much redistribution there is, and of what type, is important for the formation of citizens' relationship with the state. Hungarian researchers have demonstrated that if citizens are better informed about state expenditures, they exhibit less extravagant expectations. Because such awareness is usually found among better-educated people with higher incomes, social hierarchy clearly comes into play in these attitudes. During reform time, expectations were lessened. The level of solidarity and corresponding agreement with the extent of redistribution does not exhibit a significant relationship with either education or income level. More educated and higher-income people are, however, generally critical of methods of redistributive methods and they wich to change them (Csontos, Kornai and Tóth, 1997).

Assessments of redistributive flows differ considerably according to point of view. On the one hand, citizens have considerable requirements of the state, yet they want to pay out as little as possible. It is rather understandable that as much as one-third of households observed in FES were unable to hypothetically choose between higher expenditures for social programs (and correspondingly higher taxes) or lower taxes (with a corresponding decrease in social expenditures). Of those who were able to state a preference, a majority (60 percent) chose "higher expenditures for social programs, even if that would mean higher taxes" (ISSP-1996).

Figure 2 illustrates changes in the opinion that "taxes should be higher so there will be more money for social benefits." The acceptance of higher taxation, documented since 1992, yields a somewhat U-shaped curve. At the beginning, a kind of liberal euphoria dominated, whereby people resisted higher taxes and preferred lower state expenditures. Later, however, tolerance towards higher taxes rose, again reflecting a general shift from liberal (less state) to socialist (more state) attitudes. The acceptance of higher taxation in the interest of greater social expenditures peaked in 1998. Afterwards, a mild reverse tendency began. Other views that correlate with this indicate that, except for the exceptional situation around 1992, the desire for lower taxes does not derive from conservative notions regarding restricted state expenditures and redistribution but from people's pragmatic fears for their own money.

FIGURE 2 Taxes should be higher for financing social measures (%)
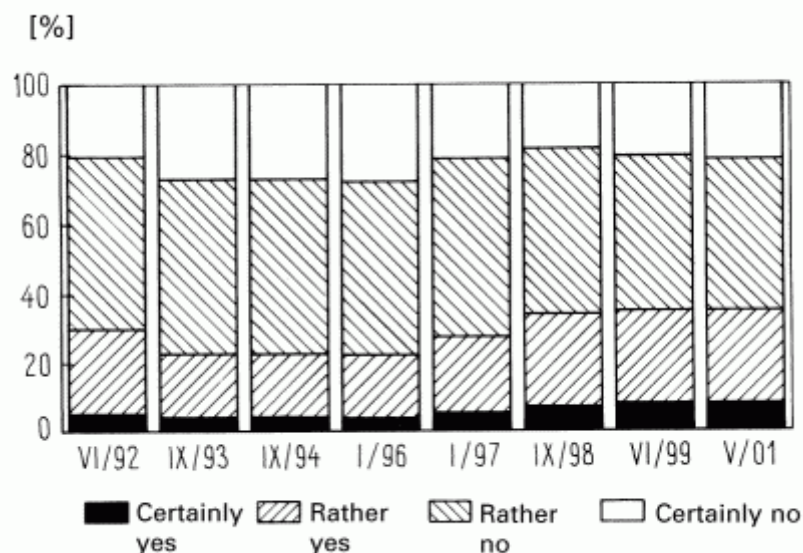
Source: Economic Expectations and Attitudes (until 1998) and STEM-Trends.

The shift away from higher taxation might be also ascribed to a crystallization of "tax consciousness" and to greater public attention paid to state expenditures. However, respondents' perceptions of actual taxes are accurate only as regards lower income levels, and perceptions are skewed downwards at higher income levels. Surveys show that for higher income rates, real marginal tax is even higher than the level proposed by respondents as optimal. Concretely, the difference is about 4 percent at an income level of 20,000 CZK per month, and about 8 percent at 40,000 CZK per month (ISSP-1996). Once we ask for a more concrete guess of proposed tax liabilities for higher income categories, the generally held opinion (three-quarters of respondents) that the wealthy should remit more to the state is not supported by concrete estimate of tax amount supposed to be paid (ISSP-1999).

TABLE 4 Opinions about Tax Levels for High, Medium, and Low Incomes in 1992 and 1996 (%)

Taxes are	In 1992 for incomes			In 1996 for incomes		
	high	medium	low	high	medium	low
Too much high	5.0	6.2	30.7	3.9	5.2	27.9
High	11.6	43.3	44.4	10.5	26.6	41.2
Adequate	24.6	41.2	18.0	28.5	49.2	17.7
Low	32.3	3.4	1.8	29.1	5.2	1.4
Too much low	11.7	0.0	0.3	11.8	0.5	0.3
Do not know	14.8	5.9	4.9	16.2	13.2	11.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: ISSP–1992 and ISSP–1996.

Table 4 compares respondents' evaluations of current taxation rates, i.e., whether they regard current taxes as high, reasonable, or low for people with high, medium or low incomes. Opinions collected between 1992 and 1996 have not considerably changed. Taxes are on average generally evaluated as low for higher income groups and as high for lower income groups. The requirement of greater progressiveness in income taxation has not significantly increased. A clear shift, however, has occurred concerning opinions on taxes for middle-income categories, which are more often evaluated as reasonable. On the whole, then, opinions expressed in 1996 were more tolerant towards taxation rates than those expressed in 1992. More recent data are not available.

Evaluation of taxation adequacy differs according to respondents' income. Lower income respondents perceive their level of taxation as high, and conversely, taxes on the wealthy as low. People with higher incomes perceive their taxation as excessive, and lower-income taxation rates as inadequate. The desire of lower income groups to shift taxation toward higher income categories is stronger than vice versa, even when the differences between these "social perspectives" are not great. While in Western European countries criticism of taxes is strongly correlated with respondents' position in the social hierarchy (the sentiment in favor of higher taxes for the wealthy is especially prevalent among the lower classes), the Czech Republic is similar to Great Britain in that this critique is correlated with political orientation (greater tax burden on higher incomes is articulated by left-of-center parties, but not necessarily by low-income earners).

3. Redistribution of incomes: a cross-national comparison

Income redistribution as measured by the share of taxes and contributions in the GDP (the tax quota) is increasing globally. From the beginning of the 19th century, when the tax quota reached one tenth of GDP in Western Europe, it has grown in developed Western countries to the current 30–50 percent. The lowest levels of redistribution are found in the US and in Japan (though on the rise in the latter). Meanwhile, the highest rates are found in social-democratic Scandinavian states such as Denmark and Sweden. The fastest growth in redistribution is taking place in less-developed southern European countries, such as Spain, Greece, and Portugal. Income redistribution, however, is also rising in Italy, where it is already proportionally high.

The above comparison indicates how much aggregates and mere cross-sections can conceal. While southern European countries belong, according to S. Leibfried (1992), to the "fourth type" of welfare state, with an underdeveloped social-security system, a similarly low rate of redistribution occurs also in Great Britain. In that case, however, it is the result of the building of a "residual" social system, connected with a deliberate decrease of redistribution. On the whole, however, the rate of redistribution generally correlates positively with the economic and social level, at least on the European continent (Arjona, Ladaique and Pearson, 2001). However, the stagnation or even the decline of this rate over time can be observed in Austria, the Netherlands and Sweden (OECD, 2000).

In the transition countries of central-eastern Europe, a substantial decrease in the extent of redistribution has taken place, in connection with market transition and economic reforms. While

the change is statistically prominent, the data does not capture the whole truth. The communist system was extremely redistributive, in which even wages were not purely of economic nature. The available data speaks of considerable differences among post-communist countries even before the political and economic transition began: while in the former Czechoslovakia the rate of redistribution as a percentage of GDP (according to back estimates) exceeded 70 percent, in Hungary and Poland it was 50-60 percent. Economic reforms contracted the tax quota to under 50 percent in all of these countries (Newbery, 1995).

The Czech tax structure has particular features (Burns and Bronchi, 2000; see also their contribution in *Finance a úvěr* no. 12/2001). Compared with the EU average, individual income taxes are lower in the Czech Republic, despite higher social and health contributions. From this point of view, the country is closer to France, Germany and Austria, having analogous corporativist traditions. The proportion of direct and indirect taxation, however, is reversed in comparison with western Europe: 42:58 in the Czech Republic and 56:44 in EU countries. The change of the above relationship in the past years left the Czech Republic outside the European norm, and there are proposals for even more indirect taxation. The reason is that indirect taxation's displays greater collection efficiency, and— according to some politicians — it is also more just if final consumption is burdened instead of primary income.

Unlike comparisons on an aggregate level, a view into the details of redistribution mechanism is not frequent. Michael F. Förster has analyzed unique data based on questionnaires filled by experts in 21 OECD countries (Förster, 2000). In *Table 5* we reproduce the distribution of family and pension benefits in households according to income decile. We have added Czech data, which shows the country as having a very low – although not the lowest – share of family benefits in comparison with other countries. Their distribution is, at the same time, rather unequal, even when we find an analogous ratio (roughly 1:10) in France, Germany, and the US, for example. It is necessary to note here that the collected data may not be entirely reliable; for example, figures from Hungary correspond with total transfer incomes for a given type of household, rather than with family benefits only.

The share of public old-age pensions in household income of persons of post-productive age (thus not necessarily pensioners) is high in the Czech Republic, though not the highest. The data are distorted by the uneven taxation of pension benefits among the sampled countries (which applies in particular to Sweden). From this point of view, the Czech Republic is akin to socially oriented countries like Germany, where the share of benefits in gross household income is similar. In contrast, in countries with liberal economies (Great Britain, US), not only is the share of pension benefits in household incomes low, their distribution is highly unequal. For example, in the highest income category it is only one quarter of income. Those proportions obviously depend also on the relation of incomes of households with members in productive and post-productive ages, which is more advantageous in the liberal countries.

National systems of taxes and benefits differ considerably, and it is not easy to grasp their summary effect on household income. Furthermore, the approach we take and the methods we use also matter. Most often, so-called tax equations are used, from which the redistributive effect of taxes and social benefits for typical household situations is derived according to family composition and wage level. As a starting point, an industrial worker with an average wage is used, with variations in family situation, such as economic activity, spouse's earnings, and number of children. This approach is also frequently used in the Czech Republic (see the contributions of Ondřej Schneider and Ladislav Průša in *Finance a úvěr* no. 12/2001),

A better approach than the typological one are the analyses of data sets of representative surveys. Most such comparative analyses have been conducted or commissioned by the OECD. One method was such that local experts compiled standardized tables based on national income surveys (Burnieux et al., 1998; Oxley et al. 1999; Oxley et al. 2001; Förster, 2000). Another has the researchers themselves analyze redistributive flows comparatively, taking advantage of the databases of national income surveys archived and standardized in the *Luxembourg Income Study* (LIS) (Atkinson, Rainwater a Smeeding, 1995; Ervik, 1998; Bradbury a Jänti, 1999).

TABLE 5 Share of Transfer Income in Disposable Household Income in Selected OECD Countries (%)

Country	Households with economically active persons				Households with the retired persons			
	three lowest deciles	four middle deciles	three highest deciles	total	three lowest deciles	four middle deciles	three highest deciles	total
Czech Republic	16.2	5.9	1.9	6.0	98.3	97.1	60.1	78.8
Belgium	39.9	17.1	6.6	15.6	96.7	99.2	90.4	94.7
France	33.0	13.0	4.0	11.7	80.8	83.4	85.0	83.8
Ireland	53.9	15.3	3.0	14.0	65.8	67.2	28.8	47.3
Italy	12.6	6.7	2.9	5.4	69.5	74.2	55.3	63.8
Hungary	40.9	21.7	9.3	18.5	64.5	74.7	54.1	63.4
Germany	10.3	2.8	1.0	3.0	90.5	83.5	67.7	77.1
Netherlands	50.4	16.0	6.4	16.9	92.7	68.2	35.3	57.4
Greece	2.3	1.7	0.8	1.3	74.6	70.6	49.6	59.0
Sweden	62.7	29.8	14.3	27.9	96.2	113.9	112.3	109.7
Great Britain	42.0	9.2	2.0	10.1	71.0	49.4	24.4	40.6
USA	19.7	4.4	1.8	4.8	80.6	52.5	25.3	40.9

Source: (Förster, 2000)

Note: Household income is adjusted to an equivalent unit which is computed as root square of the size of household.

The first studies in this field were descriptions of income distribution in their various stages, which used various equivalence scales for adjusting household income. Later studies applied advanced methods like decomposition analysis to track the effect of individual income sources and their changes on aggregate inequality or, specifically, on estimates of poverty. Such is the work of Michael F. Förster (2000), which shows the influence of taxes and transfers on changes in the extent of poverty. The analysis uses the so-called standard method, founded on the counterfactual assumption, namely, that if there were no state redistribution of wealth, no other (family, extended-family, or charity) such redistribution would exist, and a considerable part of the population would be thus existentially threatened, if not completely without means. Because the standard method does not have any easily quantifiable alternative, it is widely used and the comparative results generated by it are fairly interesting.

As the comparison of selected OECD countries in *Table 6* shows, more than one-third of the population in some countries would, hypothetically, live in poverty given no formal redistribution. In the Czech Republic, however, it would be one-fifth, due to the closer proximity of low incomes to the mean. This is similar to the situation in other countries like Germany, the Netherlands, and Denmark; in all of which wage bargaining occurs, having an equalizing effect on the distribution of market income. State redistribution generally reduces poverty on 5–15 percent, though the rate of this "reduction" varies. Italy and the US are exceptions, where poverty remains high even after redistribution, especially as regards family size. More specifically, poverty remains disproportionally high in the southern region of Italy, and among Afro- and Hispanic-Americans in the US. In the Czech Republic, poverty after redistribution falls to four percent, which is the comparatively lowest value.

Finally, we show the perception of taxes cross-nationally. *Table 7* compares a subjective evaluation of taxes as per various income levels (as in Table 4) with their actual levels. The relationship between higher taxes and their evaluation is not simple, but is mediated by the national institutional system as well as by the socio-political climate. For example, in Ireland, where public opinion clearly favors a politically advocated radical lowering of taxes, their evaluation on all levels is criticized as high. In contrast, in Sweden high taxes are perceived as acceptable, despite

that they are amongst the highest in Europe. In evaluations of taxes, the spectrum of public goods and services the state provides is naturally important, as their extent legitimizes higher taxation.

TABLE 6 Poverty Ratio before and after Social Transfers in Selected OECD Countries (%)

Country and year	Total population			Economically active			Dependent children		
	before	after	difference	before	after	difference	before	after	different-ce
Czech Republic (1996)	24.3	4.3	-20.0	14.3	4.7	-9.6	13.8	4.5	-9.3
Belgium (1995)	34.7	7.8	-26.9	22.7	6.6	-16.1	14.9	4.1	-10.8
Denmark (1994)	25.3	5.0	-20.3	16.8	3.8	-13.0	15.4	3.4	-12.0
France (1994)	35.9	7.5	-28.4	25.0	6.9	-18.1	26.0	7.1	-18.9
Ireland (1994)	34.0	11.0	-23.0	19.8	14.1	-5.7	34.9	13.4	-21.5
Italy (1993)	29.4	14.2	-15.2	19.8	14.1	-5.7	18.0	18.8	0.8
Germany (1994)	26.2	9.4	-16.8	13.3	9.4	-3.9	12.5	10.6	-1.9
Netherlands (1995)	24.0	6.3	-17.7	17.3	7.0	-10.3	17.9	9.1	-8.8
Sweden (1995)	35.4	6.4	-29.0	23.5	7.2	-16.3	21.7	2.7	-19.0
Great Britain (1995)	29.9	10.9	-19.0	23.6	11.0	-12.6	32.2	17.4	-14.8
Canada (1995)	23.2	10.3	-12.9	18.4	11.4	-7.0	22.7	14.2	-8.5
USA (1995)	26.4	17.1	-9.3	21.4	16.5	-4.9	29.2	23.2	-6.0

Source: (Förster, 2000); Microcensus 1996.

Note: Poverty line is defined by half-median of incomes per equivalent unit when equivalent units are calculated as root square of the size of household.

TABLE 7 Opinions about Tax Levels in Selected Countries (Index) and Tax Characteristics (%)

Country	Income taxes			Average 1-3	Ratio 3:1	Paid by employee			Paid by em-ployer
	low (1)	middle (2)	high (3)			Income tax (1)	Insuran-ce pay-ment (2)	Total 1+2	
Czech Republic	3.96	3.31	2.65	3.31	1.49	7.5	12.5	20.0	21.6
Hungary	4.11	3.56	2.52	3.40	1.63	15.1	11.5	26.6	26.6
Poland	4.28	3.68	3.14	3.70	1.36	17.4	0.0	17.4	28.0
Slovenia	4.26	3.24	2.35	3.28	1.30	.	.	.	
West Germany	4.11	3.59	2.60	3.42	1.58	13.5	20.2	33.7	11.1
East Germany	4.22	3.39	2.17	3.32	1.94	13.5	20.2	33.7	
France	3.95	4.05	2.84	3.59	1.39	4.9	18.9	23.8	23.4
Ireland	4.36	4.14	3.47	3.99	1.26	19.1	4.9	24.0	7.6
Italy	4.58	4.00	2.73	3.77	1.68	16.0	9.9	25.9	23.6
Sweden	4.10	3.45	2.43	3.30	1.69	27.9	5.0	32.5	17.8
Great Britain	3.92	3.92	2.69	3.25	1.46	15.0	8.1	23.1	6.6
USA	3.87	3.67	2.87	3.39	1.35	15.6	7.7	23.3	5.4

Source: ISSP–1996; OECD, 1997.

Notes: Index ranges between 1 (taxes too much low) and 5 (taxes too much high).

Data on taxes and contributions are taken from tax equations (OECD, 1997), when as representative type of households serves family of average production worker with an average wage and spouse employed having wage on 67 percent of the average wage, with two dependent children.

In this comparison, the Czech Republic appears as a country with relatively low rates of personal income tax (even less than rates in Great Britain), and with a relatively favorable public's evaluation of taxes (at the Swedish level). As *Figure 3* shows, a considerable part of the population would support higher taxes with the intention to strengthen social measures. Such perception might be due to employees' unawareness of considerable payroll tax, which exceed the level of compulsory payments not only in liberal economic countries (Great Britain, Ireland, USA), but also among countries with corporativist-based systems, like Germany and Austria. However, this occurs also in the transition countries of central and eastern Europe, what undoubtedly contributes to the expansion of an informal economy.

FIGURE 3 Trade off between higher taxes and higher social benefits (%)
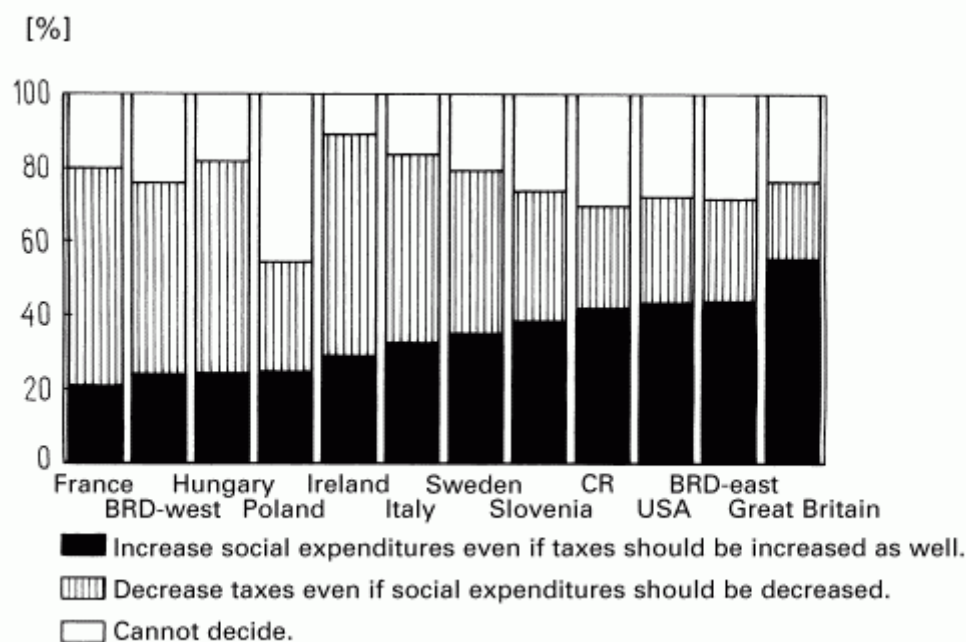
Support for progressive taxation is considerable in the Czech Republic, though personal income tax is are comparable to rates in Hungary, Slovenia and East Germany. This corresponds to findings that the actual progressiveness of taxation is not that high full offer of *tax brackets* offers, because only a small part of them is actually used. The reduction in the Gini coefficient in the Czech Republic, from 0.264 to 0.244 (according to the 1996 microcensus), is analogous to Germany or Finland (Wagstaff et al., 1999). Cross-national comparisons do not indicate any clear relationship between higher taxation and critical perception. An exception to the otherwise low correlations is the negative relationship between the progressivity of taxation and its evaluation: support for progressivity is lower in countries with higher progressivity of taxation (Aalberg, 1998).

4. Conclusion and discussion

Taxes are one of the many areas where we may be utterly sure about the incompleteness and distortion of data, especially if we back away from aggregate level. If data from revenue offices are not available, only sample surveys, we must be aware that taxes are often imputed by statisticians according to incomes reported by respondents, or even estimated by regression models (as in the US). In some countries, national fiscal data are accessible (for example in Sweden, Finland, Spain, Switzerland and France), but other problems emerge, such as the variety of tax subjects and

incomplete coverage of the population. Thus, survey data are usually chosen for analysis despite that calculated taxes correspond to reality only for people whose earnings come exclusively from wages.

Procedure similar to the one used for employees cannot be applied to entrepreneurs and the self-employed because of unknown tax-deductible costs. Respondents' reports are also unreliable due to the underestimation of income. As for data from national revenue offices, we must admit that taxes collected do not necessarily represent those liable. Many business-license holders attempt to "optimize" their taxes through under-reporting income and inflating expenses. This behavior is indicated by aggregate tax data according to which contributions to social and health insurance paid by employees are about three times higher compared with the self-employed (Pelc, 2000). We can only hope that, despite all the problems, the actual situation is still better than what people tkink: only one percent of respondents believe that others are not cheating on their taxes, 12 percent suppose that everyone does, 54 percent say many do, and 33 percent say that only some do (EVS, 1999).

The evidence regarding social benefits is better, as their figures are usually imputed according to entitlements derived from the composition and economic situation of a household. There are, however, other factors which distort the data set according to "how it should be." On the one hand, there is the fraudulent receipt of benefits; on the other, the non take-up of benefits. According to the EVS study, only 3 percent of respondents believe that there none who would request state benefits without entitlement and, in contrast, 2 percent believe that everyone would request it. From the remaining majority, 42 percent of respondents believe that many would and 53 percent believe that some would. In a Czech survey conducted by the Public Opinion Institute (IVVM), close to one-third of low-income households report that they do not know how to seek individual benefits. While payments of child benefits exceed 90 percent of entitlements, payments of social contributions and housing contributions have much lower shares (Mareš, 2001).

However incomplete and distorted our data are, the main finding is valid: the change brought about by the reform of taxation and benefit provision in the Czech Republic has been substantial. Moreover, it brought about more-progressive redistribution, though income disparities continue to rise. Such objective change, however, was until now not significantly perceived by the public. From this we may conclude that "tax consciousness" was not very strong, which is altogether understandable in light of profound economic transition. However, surveys indicate that although Czechs are not focusing on tax issues like in Western countries, the awareness of the state as a "redistributor" (as opposed to the state as a money producer) continues to strengthen.

Also, tax policies underwent important changes, though not consistently leading to the strengthening of the "political transparency" of the tax system. On the contrary, the share of direct taxes has declined relative to indirect taxes. Nobody has reacted to calls for the inclusion of employers' payroll tax among gross wages. According to Joseph E. Stiglitz, preferable are taxes where it is clear who pays; therefore personal income taxes are fair, but corporate taxes are not, because it not clear who pays them, whether shareholders or consumers. According to Stiglitz, the government should also be prevented from obscuring the real costs of services provided, for example, social insurance paid into by employees and by employers (Stiglitz, 1988:396–398).

Citizens' tolerance towards taxes may soften due to the increasing burden on family budgets of financial payments as well as a consequence of the crystallization of "tax consciousness." We have also to take into account attitudes towards taxes that are not expressed verbally but manifested in actual behavior, which no survey is able to register. Against state incursions on income, citizens may protect themselves either with the legal instruments of political democracy (i.e., voting) or illegally by abandoning the sphere of the formal economy. While the first method is protracted and uncertain (pre-election promises are not often fulfilled in post-election acts), the second is quick and guaranteed, though risky and punishable.

The principles of taxes are unequivocal in theory only. In reality, this sphere is politically supercharged; greater tax transparency and simplicity are not, despite being obviously desirable, unanimously shared requirements, mostly due to strong interests which stand to profit from a system's complexity. This concerns the social system to an even greater extent, as is not only an instrument of social protection for citizens, but is also highly contentious electoral issue. In an assessment

of systemic changes, social values must be take into account alongside fiscal criteria. Different systems can be equally efficient, though they commonly need to be perceived as legitimate in the given social structure. Qualitative evaluation can be thus performed only within the wider context of economic, political, and social spheres. Even with all the limitations of data sources, empirical analysis may contribute to such evaluation via knowledge on factors of income distribution and redistribution.

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Data sources

Statistical surveys:

Microcensus surveys started in 1958 as income surveys based on 1–2 percent sample of households with wages confirmed by employers and pension benefits confirmed by post-offices. They were regularly repeated every 3–5 years. Here, we use especially three last surveys:

Microcensus 1988 was conducted by the Federal Statistical Office on a 2 per cent random sample ($N = 69912$) in March 1989 including yearly incomes in 1988.

Microcensus 1992 was conducted by the Czech Statistical Office on a 0.5 per cent random sample ($N = 16234$) in March 1993 including yearly incomes in 1992.

Microcensus 1996 was conducted by the Czech Statistical Office on a 1 per cent random sample ($N = 28148$) in March 1997 including yearly incomes in 1996.

Family Expenditure Surveys (FES) started in 1958 on a quota-sample basis, separately for households of employees, farmers and pensioners, after 1990 also self-employed. Sample size decreased after 1990 on 3000–3500 households (about 0,1% of all Czech households). Aiming to increase the number of poor households (which are of special interest of social policy), families having income below or close to official living minimum are over-sampled.

Sociological surveys:

Economic Expectations and Attitudes (EEA) is a semi-annual (1990–1992) or annual (1993 onwards) survey organized by the socio-economic team of the Institute of Sociology of the Academy of Sciences headed by Jiri Vecernik. The samples involve between 1000 and 1500 adults selected by a two-step quota sampling procedure, whereby the region and size of the locality were defined in the first step and gender, age and education in the second. Collected by the Centre for Empirical Surveys STEM.

ISSP (International Social Science Programme). Here we use especially the following modules: Social Inequality (1992), Work Orientations (1997) and Social Inequality (1999). Czech data collected by the Centre for Empirical Surveys STEM.

European Value Study (EVS) started already in 1978 and the first large empirical survey was organized in 1981. Former Czechoslovakia and eight other post-communist countries joined the project in its second wave in 1991. Here, we use the third and last wave conducted in 1999 in 27 countries. Czech data collected by agency SC&C on a representative sample of 1908 adult persons.

SUMMARY

The article documents changes in the income redistribution of individual households in the Czech Republic in the 1990's. In the first part of the paper, statistical income surveys are used to document systemic changes in the redistribution of household income and the determinants of these changes in the period 1988 to 1996. In the second part, societal attitudes toward taxation and social benefits are discussed, showing the low — but apparently growing — tax awareness of Czechs. In the third part, a comparison with other OECD countries serves to identify the extent of the Czech distributional system as well as its perception in a broader context. In conclusion, the author discusses the limits of disposable data sources and the traps of analysis encountered in the study of redistributional flows.

The Legitimacy of Redistribution: the Czech Republic in an International Comparison

Tomáš SIROVÁTKA – Marie VALENTOVÁ[*]

1. The Goals and Legitimacy of Redistribution

This article examines the important problem of the legitimacy of redistribution in Czech society. In a democratic society, the legitimacy of redistribution and the consequent government economic and social policies (along with other factors) buttress the legitimacy of the social and political system. The legitimacy of redistribution is thus necessarily reflected in political programmes and in the distribution of political forces that promote, or promise to promote, these programs.[1] In the widest sense of the term (the process of collecting and spending public financial resources), redistribution may be seen as a key element of political programmes, one that forms the foundation upon which the definitions of the "right-left" dimension of the political spectrum are built.

Modern capitalism, a mixed system of the market and the public sector, is sometimes referred to as the "welfare state."[2] In addition to the market-driven allocation of resources, redistribution represents the main instrument of the welfare state. "These policies aim, for example, to redistribute market income after the market has done its job" (Ringen, 1987, p. 4). On one side it imposes taxes on private resources generated in the market, and on the other it offers public goods, welfare programmes, social services and welfare benefits. The welfare state provides people in certain situations with vital resources and means that are, to a great extent, independent of their success in the competitive arena of the market. Esping-Andersen (1990) uses the general term *de-commodification* to describe this aspiration of the welfare state. According to Esping-Andersen, within the system of modern capitalism, de-commodification serves to fulfill important functional requirements: it is essential both for the survival of individuals and for the very existence of the social system as such since it allows for the reproduction of the labor force (and dependants) in cases of insufficient income and, at the same time, establishes the legitimacy of the social system.

There is a significant conflict inherent in redistribution and de-commodification: they must function in such a way that they do not interfere with the functioning of market mechanisms and with principles of meritocracy, resulting in the appearance of a "self-limiting welfare state" (Offe, 1985). Extensive redistribution erodes the economic effectiveness of the market, which in turn decreases the resources available for redistribution.

Moreover, demands on the welfare state change as a result of the (post) modern development of capitalism. In the past, the welfare state reacted to new social problems associated with the rise and development of modern society. The prime purpose was to reduce the impact of "modern" risks (Flora and Heidenheimer, 1981), i.e., risks linked to people depending exclusively on income from paid work and the disintegration of broad traditional family networks and their socially protective functions. Modern risks arose, first and foremost, from situations and events that prevented people from

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[1] However, they do not necessarily realise the programmes – according to Downs (1956), political parties conceive their economic policy in order to win elections rather than to implement the policy.

[2] The term "welfare capitalism" seems more adequate (Esping-Andersen, 1990).

receiving sufficient remuneration for paid work. Another important purpose of the welfare state was to reduce class inequalities.

The consolidation of the welfare state between the 1930s and the 1950s and its subsequent growth between the 1950s and the 1970s occurred as a result of modern risks spreading across society. When the categories of "risk" and "class" ceased to fully overlap, and broader social classes found themselves increasingly more exposed to modern risks, the welfare state, as collective protection against these risks and a sharing of responsibility among all members of society, gained broad public support and legitimacy (cf. Baldwin, 1980).[3] Modern risks began to be regarded as "social risks" in that the society as a whole was seen as thus endangered (see Stiglitz, 1997, p. 392).

In the globalized (post-) modern society of the early 21st century, the nature of modern risks continues to change. Risks globalize, which means that there is an increase in the incidence as well as the scope of more or less unpredictable events, the consequences of which are relevant to all. And, with increasing frequency, the risks are "manufactured" by society (Giddens, 1990). Technological progress, for example, continues to render work with mechanical equipment useless and, combined with toughening competition in increasingly interconnected global markets, it increases the risks of unemployment in periods of economic growth. At the same time, the risks differentiate according to social status and people increasingly find themselves facing these risks as individuals rather than as members of a group or class (Beck, 1992). However, the (post-) modern society is not only a "risk" society, it is also a "more affluent society".[4] The growth of wealth and the improvement of living standards enhance, among other things, the possibility and ability of individuals to protect themselves against social risks on their own.

Two distinct welfare-state approaches to issues of redistribution follow from these considerations. One of them is based on the assumption that, among individuals, concern for sharing protection against social risks is on the decline: the majority of the population no longer considers collective protection against modern risks a chief societal concern. On the contrary, increasing taxation and contributions in favor of the widest possible coverage of social risks, including protection of the less prosperous minority, the poor and the long-term unemployed in particular, is perceived by the majority as a threat to their interests (cf. Galbraith, 1992). Hence the rejection of a welfare-state model that is too restrictive. Frequent abuse of the welfare system, tax evaders and undeserving recipients of welfare benefits have discredited the welfare state in the eyes of many who once placed their trust in it.

Conversely, the second approach assumes that, in a society based on the citizenship principle, and with the claim to equal rights and opportunities attached to this principle, the unpredictability of (post-) modern risks presents an urgent challenge to the sustainability of the collective sharing of risks, both in the interest of individuals and in the interest of society as a whole. This strategy thus results in greater demands on redistribution through taxes and public spending.

In addition to the basic choice between the two approaches above, a number of other questions arise in connection with the extent of redistribution with respect to individual social risks and situations, and thus also with respect to individual social groups. Such decisions about the scope and purpose (the recipients) of redistribution are based on the social consensus on the criteria/principles of social justice according to which relatively diverse situations are judged. The legitimacy of redistribution relates both to these general principles and to concrete decisions about the extent and purpose of redistribution.

2. Questions and Data

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[3] Initially, the members of the industrial proletariat class were most exposed to modern risks. Middle class's interest in the welfare state was influenced importantly by the experience of the crisis in the thirties and by the consequences of the Second World War.

[4] measured by the growth in productivity and consumption (the authors are aware of the limits of such criteria, however, they rely on the importance that is generally attached to them)

We are concerned with four research questions that we consider fundamental for evaluating the legitimacy of redistribution:

1. What are the general criteria/principles upon which the demands of the Czech public on welfare state spending are based?

2. What are the demands of the Czech public regarding welfare state spending?

3. What are the preferences among the Czech public regarding the purpose and the recipients of welfare spending?

4. What are the preferences among the Czech public concerning alternative (private) solutions to protection against social risks?

In discussing and analyzing these questions, we make use of several sources of data which contain information on attitudes to welfare spending and redistribution. We seek international comparisons since these are particularly important with regards to the complex conditions placed on the legitimacy of redistribution by economic, political, cultural and social factors. Six countries were selected for the comparison, representing the liberal (Great Britain), conservative (Germany), social democratic (Sweden) and Southern European (Italy) models of the welfare state, and also the post-communist Central European approach (Hungary and Poland).

The data comes from the following sources:

– "*European Values Study*" from 1999 (1908 respondents from the Czech Republic, a stratified random sample, compared with: Italy 2000, Hungary 1000, Germany 2036, Poland 1095, Sweden 1015, Great Britain 1000);

– International project "*ISSP – The Role of the Government*" from 1996 (CR 1100 respondents, stratified random sample, compared with: Hungary 1500, Poland 1183, Sweden 1238, West Germany 2361, East Germany 1109, Great Britain 989);

– Czech project "*Economic Expectations and Attitudes*" from 1992-1998 (in 1992: 2084 respondents, in 1993: 2071 respondents, in 1994: 1307 respondents, in 1996: 1459 respondents, in 1998: 1380 respondents, quota sample);

– Czech project "*Legitimacy of Social Policy*" from 1999 (1319 respondents, quota sample).[5]

3. Principles of Social Justice and Redistribution

Miller (1976) distinguished three basic principles in the notion of social justice: (equal) rights, needs, and merits. He suggests that the concept of social justice is a consensal, culturally generated concept – and it is the emphasis placed on the individual principles of social justice that varies. In practice, the equal-rights principle in the welfare state is associated with the principle of citizenship, together with claims of universality (or claims derived from the membership of certain categories of citizens) which are to the greatest extent guaranteed within the social-democratic model of the welfare state. The principle of need is associated with residualism and the selectivity of the liberal welfare state, which only covers the very basic needs of the poorest people. The principle of merit is inherent in a notion of reciprocity, primarily advanced by the corporative "insurance" model. In addition, a "mechanical, egalitarian" approach can be distinguished which emphasizes equality in results and redistribution (it is sometimes associated with the social-democratic model and the notion of social justice).

Naturally, these models do not exist in their pure form in the welfare state in practice. Similarly, in concrete institutional decision making about redistribution, there is a mix of the principles of social justice and it is the emphasis placed on one or another that makes

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[5] The authors thank namely the Sociological Data Archive of the Sociological Institute, Czech Academy of Sciences, for the opportunity to use data files from the ISSP, EEA and EVS researches.

the difference. Besides, even differing principles can sometimes dominate within a particular model in relation to different situations and different social-policy areas (Sirovátka, 2000).

TABLE 1 International comparison of the principles of social justice

	Give people equal access to education	Recognize people on their merits	Guarantee that basic needs are met for all	Eliminate big income inequalities
Great Britain	*	1,71	1,39	2,40
Germany	1,36	1,72	1,44	2,16
Sweden	*	1,91	1,46	2,71
Italy	1,22	1,97	1,44	2,24
Hungary	*	1,40	1,27	1,67
Poland	*	1,39	1,32	1,80
Czech Republic	**1,27**	**1,45**	**1,75**	**2,38**

Source: EVS 1999

Note: * The question was not included in the survey in the given country.

Question: "*In order to be considered just, what should a society provide*?" (average values for selected countries, answer categories: 1 = very important, 5 = not important)

In the European Values Study, the principles of social justice were operationalized by means of a series of questions that correspond with the basic purposes of the welfare state (see *Table 1*): the first column refers to equal rights (opportunities), the second column to merits, the third to needs, and the fourth represents the principle of equal results. The response options were not mutually exclusive[6], and thus all of them show a shift of average evaluations towards the positive pole.

Responses to this series of questions suggest that Czechs, like the populations of the other countries, incline most towards the principle of equal opportunities. Together with Poland and Hungary, Czechs also stress the principle of merits more than is the case in West European countries. Conversely, the importance attached to the principle of needs is slightly lower in the Czech Republic. This corresponds to the fact that the extent of poverty in the Czech Republic is lower than in Poland and Hungary: in 1996, when measured against the median income, 4.5% of the Czech population was below the 50% mark, while in Hungary the percentage was 7.3% and in Poland 11.9% (Förster and Tóth, 1999).

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[6] The authors of the EVS have evidently adopted Miller's assumption that decisions about redistribution do not usually derive from a single principle, but that different principles mix together.

TABLE 2 Preferences for individual vs. state responsibility, and for the principle of merits vs. equality

	"Individuals should take more responsibility for providing for themselves." vs. *"The state should take more responsibility to ensure that everybody is provided for."*		*"There should be greater incentives for individual effort."* vs. *"Incomes should be made more equal."*	
	1991	1999	1991	1999
Great Britain	5,16	4,45	4,50	5,40
Germany	4,20	4,74	4,80	*
Sweden	3,29	4,22	4,55	*
Italy	5,50	5,63	5,19	4,98
Hungary	6,22	6,09	5,19	*
Poland	5,60	5,73	3,51	4,91
Czech Republic	**4,37**	**4,89**	**4,68**	**5,51**

Source: EVS 1991, 1999

Note: * The question was not included in the survey in the given country.

Question: "*Now I would like you to tell me your views on various issues. How would you place your views on the scale from 1 to 10?*" The table shows average values. The lower the average value, the stronger the agreement with the first of the two statements.

Preferences become clearer in situations where people have to make a choice among individual principles. The European Values Study makes it possible to study the choice between the responsibility of individuals and reliance on the state (individual responsibility vs. responsibility of the state), as well as the choice between the meritocracy principle and the principle of equality. As regards these two dimensions, data is available for the study of changing preferences in several other countries as well.

With regards to "reliance on the state," the Czech population scores "average" both on a ten-point scale and compared with other countries (see *Table 2*); overall, inclination towards individual responsibility prevails over reliance on the state. Poland and Hungary appear to be more "paternalistic," while the EU countries included in the comparison (except for Italy) seem to be more "individualistic" than Czech society.

It is worth noting that the emphasis placed on the responsibility of the state has increased in this country in the course of the 1990s. The emphasis placed on the principles of equality/merits remains more or less equal. Compared with the other countries, emphasis on the principle of equality is strongest in the Czech Republic. Moreover, it has increased significantly during the 1990s. The somewhat lower stress placed on the principle of equality in Poland is not surprising given the considerable shift towards the principle of merits witnessed there in the early 1990s. The increase in importance citizens with lower socio-economic status attach to the responsibility of the state and to the principle of equality is steeper in Czech society than in the other countries (see *Table 3*).

TABLE 3 Preferences for individual vs. state responsibility and for the principle of merits vs. equality, by socio-economic status

	"Individuals should take more responsibility for providing for themselves." vs. "The state should take more responsibility to ensure that everybody is provided for."				"There should be greater incentives for individual effort." vs. "Incomes should be made more equal."			
	A	B	C	D	A	B	C	D
Great Britain	*	*	*	*	*	*	*	*
Germany	3,84	4,3	5,19	6,06	*	*	*	*
Sweden	3,94	4,42	4,27	4,65	*	*	*	*
Italy	5,04	5,58	5,71	6,22	4,11	4,78	5,43	5,64
Hungary	4,52	5,77	6,42	6,42	*	*	*	*
Poland	5,05	5,17	5,78	6,41	4,24	3,91	5,25	5,42
Czech Republic	**3,78**	**4,55**	**5,39**	**6,43**	**4,41**	**5,08**	**6,22**	**6,47**

Source: EVS 1999

Note: * The question was not included in the survey in the given country.

A = upper and upper-middle class, B = middle class and non-manual workers, C= qualified and semi-qualified workers, D = unqualified workers and the unemployed.

Judging from the international comparison and the trends in the attitude of the Czech public towards the principles that guide decision making about redistribution, it can be concluded that the impact of the "transformation risks," together with greater income and social inequalities, resulted in a greater accentuation of the state's responsibility and a demand for greater income equality.

Nonetheless, it should be noted that, in a number of countries, the Czech Republic included, a discrepancy was observed between attitudes towards the welfare state at the level of general principles on the one hand, and at the level of concrete solutions on the other. Preferences for principles tend to reflect citizens' value, ideological and political orientations. However, the view of and support for concrete measures is guided by citizens' individual interest in the welfare system, i.e., by their social/class membership, as well as their experience with a concrete form of the welfare state (cf. Ringen, 1987, Peillon, 1996, Rabušic and Sirovátka, 1999, among others). Clear conclusions about concrete expectations among the public regarding the level of welfare spending and redistribution thus cannot be derived from findings about preferred principles.

4. Requirements for the scope of redistribution: lower taxes or greater welfare spending?

The comparative analysis of the demands for welfare spending level (contrasted with the level of taxation) is based on the study "The Role of the Government" conducted in 1996[7]. Respondents considered the question: *"If the government was to choose between cutting taxes and increasing welfare spending, which do you think it should choose?"* The respondents chose between two answers: *"cut taxes even if it means cuts in welfare spending as well"*, or *"increase welfare spending even if it means increasing taxes as well."*

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[7] The research project International Social Survey Programme (ISSP) was started in 1983. Since that time it has grown to 38 countries. The annual topics for ISSP are meaningful and relevant for all countries and can be expressed in an equivalent manner in all relevant languages. Here we use data from the module „The Role of Government" realised also in the Czech Republic in 1996 on a sample of 1100 respondents (and initiated by the Institute of Sociology, Czech Academy of Science; data collection carried out the STEM agency). For more details see www.issp.org.

In Hungary and the respective West European countries (except for Great Britain) – sse *Table 4* –, the demand for tax cuts was predominant. This corresponds with the election of left and center-left political parties in Germany, France, Italy, Sweden and Great Britain between 1997 and 1998 which based their electoral campaigns on the pledge to reduce taxes, or at least not to raise them (Bonoli, George and Taylor-Gooby, 2000, p. 72). The Czech Social Democrats (ČSSD) promised similarly in their governmental declaration in 1998, promising instead more-efficient tax collection.

TABLE 4 Demand for welfare spending in selected countries in 1996 (%)

Country	Reduce taxes	Increase welfare spending	undecided	Total (%)	difference: reduce taxes/increase welfare spending
Hungary	57,7	24,2	18,2	100	33,5
West Germany	52,0	24,0	24,0	100	28,0
Italy	51,4	32,4	16,2	100	19,0
Sweden	44,5	34,9	20,6	100	19,6
Poland	29,5	24,8	45,7	100	4,7
East Germany	28,4	43,5	28,1	100	- 15,1
Czech Republic	**27,9**	**41,9**	**30,1**	**100**	**- 14,0**
Great Britain	21,0	55,5	23,5	100	- 34,5

Source: ISSP, The Role of the Government, 1996

Having compared the income-tax level in the respective countries with preferences for tax cuts, we can say that there is no clear link between the preference for welfare spending combined with a tax increase and the real tax or progressive taxation level. Nevertheless, the Czech Republic, Great Britain and, to a certain extent, also Poland belong among those countries where the income-tax level is somewhat lower than in the other respective countries, and these countries' populations tend to prefer increased benefits to tax cuts.

The preference for lowering taxes, though at the expense of restricting welfare spending, is found more often in countries where welfare spending is high, such as in Sweden (about 35 percent of GDP), or where it is average, such as in Germany (30 percent) or Italy (25 percent) (Eurostat, 2000). The greater support for redistribution observed in East Germany can be attributed to the frustration there stemming from a clash with the standard of living in the west part of the country. In the Czech Republic and Great Britain, which contrast with the other countries in terms of greater support for increased welfare spending, the real level of welfare spending is rather low or moderate (about 21 percent of GDP in CR and 26 percent in GB). Even greater similarities between the two countries can also be found in the "direction" of redistribution. Both countries favor "targeted" systems in which the relation of benefits to wages is rather low and benefits are targeted specifically at low-income groups. These welfare systems make extensive use of income testing for the allocation of benefits. Taxation is also highly progressive (cf. Večerník, 1998, p. 86–87). In addition, the first half of the 1990s was marked by a growth in income inequality in each country, as well as with the conservative government of each country intensifying their pursuit of the liberal-welfare-state model and their resignation to fighting the trend of growing income and social inequalities. In the Czech Republic (unlike Great Britain), this was primarily the result of the gradual transformation of formerly distorted income relations on the basis of meritocratic principles.

TABLE 5   Position in the labor market, class affiliation, and preferences for increased welfare spending in 1996 in the CR (%)

position in the labor market and class affiliation (self-identification)[8]	lower taxes	increase welfare spending	undecided	total
employed	33,5	37,9	28,6	100
no regular job	20,4	47,1	32,5	100
upper and upper middle class	36,8	39,5	23,7	100
middle class	33,2	44,2	22,6	100
lower middle class	26,9	41,6	31,4	100
working class	24,1	42,2	33,7	100
lower class	23,7	40,7	35,6	100

Source: ISSP, the Role of the Government, 1996

Note: The category "no regular job" includes the unemployed, students, pensioners, housewives and women on maternity leave.

It follows from *Table 5* that (aside from other factors, including the preferred principles of social justice, for example) expectations regarding the level of welfare spending are linked both to the real scope of redistribution, to the form of redistribution (for example, with progressive tax rates and with the targeting of benefits), and to the current trend in development.

The increase in welfare spending gains more support in groups which take a greater interest in the welfare state, whether it is due to their position in the labor market or to their social (class) status. Differences in the preference for greater welfare spending according to the respondents' class affiliation are not as significant as are the differences in the preference for tax cuts (as well as deviations in the proportion of indecisive respondents). In contrast with the growing support for tax cuts among the middle class (32% of the population), noteworthy is the low support for tax cuts among the working and lower classes (with which 41% of the population identify). Work activity, more than class self-affiliation, influences the interest a person takes in increasing welfare spending and (especially) in cutting taxes.

However, some adjustments need to be made to the findings taken from the *Role of the Government* study, specifically as regards preference for benefits and tax increases: other research shows that the inclination among Czechs towards redistribution is lower. In 1999 (the "Legitimacy of Social Policy" study), 55.7% of the respondents agreed with the opinion "*increase benefits and improve social and health care policies only if this is made possible by means of economizing in other areas of state expenditures, without tax increases*". Of the respondents, 17.4% chose the answer that represented the rationale "higher benefits (better social policy) – higher taxes." The smallest percentage of the respondents (8.5%) favored cuts in taxes and contributions if it meant reducing benefits (and restricting social policy). About 18% were undecided. According to the EEA study, those not wanting an increase in taxes have long been in the majority.

These findings about the preference among Czechs regarding redistribution and welfare spending growth, as well as the relative intensification of calls for redistribution that occurred between 1996 and 1998, could be interpreted as a response to the subjective perception of the trend towards restricting the scope of welfare and its efficiency; more specifically, this refers to the decrease in benefits citizens received from the redistribution by means of benefits and taxes between 1988 and 1998 (see also Večerník, 2002).

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[8] In this case, class/social status was indicated by respondents' self-identification with a social class. The importance of the subjective perception of one's social status in general and specifically with regards to the dynamics of status-defining criteria in the period of transition is emphasised for example by (Matějů and Vlachová, 2000).

On the other hand, the rational-choice hypothesis would suggest that concern regarding public expenditures and redistribution should be on the decline among the middle and upper classes, given that most citizens would be dissatisfied with the increased targeting of social transfers in favor of low-income groups only.

Despite the discrepancies in the conclusions of the different studies – largely resulting from incongruities in the wording of questions and supplied answers – two conclusions can be drawn. There was no case where the majority of the population was in favor of tax increases for the sake of increased welfare spending (the highest percentage of respondents who favored tax and welfare spending increases was 41% in the ISSP research from 1996, after indecisive respondents were removed from the total). Still, support for an increase in welfare spending, even if it were to result in increased taxes, is relatively higher in the Czech Republic than in most of the other countries.

5. The purpose of welfare spending: what benefits? what services?

In order to study the demand for welfare spending in terms of its purpose, we make use of two indicators constructed as indexes. First is an index of "general demands," which consists of answers to the questions/statements: "*It is definitely the government's responsibility to provide: health care for the sick.*" and "*It is definitely the government's responsibility to provide: a decent standard of living for the old*." This index represents a complex of demands of mainstream society: respondents favor or reject government assistance in situations where income stability is at stake, i.e., situations which every citizen may confront (old age, illness).

The "specific-demands" index focuses on government support targeted at specific social groups, such as the unemployed and the poor. It is based on respondents' answers to the questions: "*It is definitely the government's responsibility to provide: a decent standard of living for the unemployed.*" and *Iit is definitely the government's responsibility to provide: decent housing for those who cannot afford it.*" – Table 6.

TABLE 6 The average values of the indexes of general and specific demands on the welfare state (on a scale of 1[highest] to 4 [lowest])

Country	general demands	specific demands	difference
Czech Republic	**1,36**	**2,30**	**- 0,94**
Hungary	1,35	2,17	- 0,92
Italy	1,24	1,86	- 0,62
Great Britain	1,25	1,87	- 0,62
West Germany	1,54	2,06	- 0,52
Sweden	1,34	1,84	- 0,50
Poland	1,33	1,80	- 0,47
East Germany	1,36	1,71	- 0,35

Source: ISSP, The Role of the Government, 1996

Note: The index values range between 1 (definitely yes) and 4 (definitely no). The lower the value, the more the respondents in the given country support the given government interventions.

It can be seen that in all the welfare state models, citizens' requirements addressed to the government tend to be high when it comes to general, universal claims in which most people take personal interest. Compared internationally, Czech respondents demand the least from the welfare state with regards to "marginal groups" (the unemployed and the poor in this case). As the support for general demands is quite high in this country, as it is abroad as well, the difference between the level of general demands and the specific ones is greatest in the Czech Republic (to the detriment of the marginal groups).

Judgments about welfare spending on individual areas (purposes) were studied further, based on more recent data from the "Legitimacy of Social Policy" study conducted in 1999. The analysis

resulted in the following findings: about 60 percent of the respondents assess the overall level of spending on welfare purposes in the Czech Republic as low.[9] Such a critical view does not, however, translate to increasing spending in favor of marginal groups (the poor and the unemployed). Rather, it is in the sphere of general requirements where some room for improvement is perceived. This holds true also for other areas associated with the advancement of human capital and the encouragement of equal opportunities (health, education, access to the labor market, housing) – see *Table 7*.

TABLE 7 Evaluation of the current level of social policy spending in CR

(percentage of negative answers: "*The level of state spending is [very] low.*") area	lower and lower-middle class	middle class	upper and upper-middle class	total
Housing	83	79	64	79
Health care	63	56	54	59
Active labor market policy	76	67	59	71
Sickness, disability and injury compensations	67	60	51	62
Education	62	63	52	61
Family-related benefits	64	57	51	60
Pensions and provisions for the elderly	53	42	42	48
Subsistence minimum guarantee	59	43	32	49
Unemployment benefits	56	39	39	46
Social policy in general	**77**	**65**	**59**	**71**

Question: "*What is the level of the state spending on the following areas…?*"
Source: Legitimacy of Social Policy, 1999 (954 valid answers at minimum – about 10 to 29 percent of respondents were unable to assess the level of spending on the given areas.)

The judgment on the overall level of spending on social policy measures is guided by the interest of each respondent in these measures – for example by their subjective sense of deprivation, self-identification with a social class, and political orientation: those who find themselves poor, those who identify themselves with lower classes and those who support left-wing political parties are more critical about the overall level of social-policy spending.[10] However, the correlation is not very strong. It can be seen, for example, how the opinions of the middle class and the lower class are very similar on most areas of social policy. Nonetheless, middle-class respondents make slightly more modest claims when it comes to providing for marginal groups, specifically in the case of unemployment benefits and the minimum subsistence guarantee.

6. Collective (social) and/or individual (private) insurance?

If the "solidarity-based," collective insurance system is found unsatisfactory – as has been illustrated by the judgments shown in *Table 8* – then the solution can be either to improve this system (by increasing taxes and the corresponding spending) or to introduce private-insurance schemes, possibly restricting the scope of social insurance at the same time. It can be expected that the shift towards private supplementary insurance is advantageous to higher-income groups in particular.

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[9] This represents 70 percent of valid answers.

[10] Spearman correlation coefficient Rho for correlation between the preferred political party on the left-right scale and the opinion on the level of spending on social policy was 0.26 (alpha = .000). In case of correlation with the feelings of deprivation it was 0.22 (alpha = .000) and in case of correlation with social class (self-identification) it was 0.18 (alpha = .000).

TABLE 8 Preferences for private supplementary insurance in CR (%)

Purpose-type of private insurance	Lower and lower-middle class	middle class	upper and upper-middle class	total
Pension				
Is in favor of	28,6	40,9	56,6	35,2
Tolerates, but is not in favor of	49,2	46,5	40,8	47,7
Refuses, wouldn't permit	9,7	3,2	-	6,5
Doesn't know	12,5	9,4	2,6	10,6
	100	100	100	100
Early retirement				
Is in favor of	18,1	27,5	41,6	23,3
Tolerates, but is not in favor of	51,4	46,3	42,9	49,0
Refuses, wouldn't permit	12,5	11,0	6,5	11,5
Doesn't know	18,0	15,1	9,1	16,2
	100	100	100	100
Sickness benefits				
Is in favor of	18,0	23,4	37,7	21,5
Tolerates, but is not in favor of	47,7	53,1	46,8	49,7
Refuses, wouldn't permit	17,3	10,1	7,8	13,9
Doesn't know	17,0	13,3	7,8	14,9
	100	100	100	100
Health care				
Is in favor of	13,7	18,5	30,3	16,7
Tolerates, but is not in favor of	43,5	48,5	44,7	45,5
Refuses, wouldn't permit	28,6	21,0	22,4	25,2
Doesn't know	14,3	12,0	2,6	12,6
	100	100	100	100

Source: Legitimacy of Social Policy, 1999

Question: "*To what extent do you support the possibility to take out private supplementary insurance against certain risks? Such insurance would exist as a supplement to the existing obligatory system of contributions and benefits*".

Private supplementary insurance schemes are rejected only by a very small part of the Czech population (*Table 8*). This is also evidenced by the fact that more than one-half of the economically active Czech population had signed up for supplementary retirement insurance by 2001. For example, in a British study "British Social Attitudes Survey" carried out in 1989, 63 percent of the respondents said that they tolerated private supplementary retirement insurance, and 49 percent tolerated supplementary insurance for better-quality health care (Taylor-Gooby, 1991, p 116).[11]

7. Conclusions

The attitudes of the Czech public concerning the principles of social justice that legitimize the scope and purpose of redistribution are somewhat ambiguous. Nonetheless, they generally correspond with the trend that prevails in advanced market democracies today. This is true, for example, about the location of Czech preferences on a scale from individual responsibility to the responsibility of the state, as well as on a scale from recognizing one's merits to preferring equality. Nevertheless, in the course of the 1990s, the Czech Republic has witnessed a slight increase in the importance attached to the role of the state and to the principle of equality. As regards the demand for the level of public spending and redistribution, Czech society is more in favor of redistribution than most West European countries and more than other Central European economies

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[11] It must be noted that the question wording was slightly different in the case of the BSAS: "*To what extent do you agree with the following statement – people who can afford it should have the possibility to secure better standard of retirement pensions/ health care for themselves*".

undergoing reformation. As we have shown, in addition to the differing emphasis placed on individual principles of justice, a subjective assessment of the social impact of transformation, as well as the consequential perception of individual costs of changes in the redistributive system, play an important role in the formation of such attitudes.

In the Czech Republic, demands for redistribution are highly differentiated according to the purpose of the welfare expenditure. The legitimacy of redistribution intended to protect against specific social risks, namely risks pertaining to marginal groups, seems significantly lower than the legitimacy of redistribution in favor of general social risks. Moreover, this gap is greater in the Czech Republic than it is in the other countries included in the comparison.

Market transition brings about a shift in the nature of social inequalities. Increasingly it is the individual capacity of people to adapt to new situations – their "capabilities" and "functionings" (cf. Sen, 1992) – particularly their capacity to adapt to the demands of a dynamic labor market, that makes the difference. This shift is to a certain degree reflected in citizens' expectations related to the purpose of public welfare spending. When it comes to individual areas of welfare expenditures, it is those measures which sustain and improve the quality of human capital, including the ability of individuals to succeed in the market-driven meritocratic society, that are broadly accepted as legitimate (in addition to the above-mentioned general demands). On the other hand, the majority of the Czech public disfavors the vertical redistribution of resources (targeted at the poor).

Private supplementary schemes are regarded by the majority of society as an acceptable form of protection against social risks. Nonetheless, it is perceived as a supplement to, rather than a replacement for, social-security systems.

Finally, it appears there are two consequences of the social trend towards increasing social differentiation, including a differentiation of the extent to which people are exposed to social risks. First, among different social strata the preferences regarding the extent of welfare spending and redistribution differ. Second, support for welfare spending in terms of its purpose also differ: the upper and middle classes tend to increasingly reject welfare benefits and services targeted at lower classes. We assume that the greater targeting of welfare benefits to lower social classes, enforced in the Czech welfare state since the 1990s, reinforces both of the tendencies above towards different attitudes towards redistribution (according to social strata and redistribution purpose).

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SUMMARY

This paper considers the legitimacy, scope and purposes of redistribution in Czech society. The authors use data from international surveys from the mid-nineties onward, as well as several national Czech surveys. The authors claim that Czech society does not favor extensive redistribution in principle. Nevertheless, redistribution expectations are stronger than in other European countries. This may be the result of the social consequences of economic transition. While improving benefits for marginalized groups are met with little public support, general benefits, according to public opinion, should be increased. Measures to improve human capital and flexibility in the labor market are supported by the majority opinion as well. The Czech population also prefers to combine collective (social) protection with private supplementary insurance.

Using Microsimulation Models for Assessing the Redistribution Function of a Tax-Benefit System

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1. Introduction

Since 1993, the share of social expenditures, including pensions, insurance payments and other socials benefits included in the state budget, has increased from 29 to approximately 39 percent (Czech Statistical Office, 2000, p. 168). In the same period, the Czech Republic has been witnessing an increase in public expenditures, fiscal deficit and state debt. As a result of the regular indexing of the minimum living standard, not only has the average amount of benefits increased, but the number of eligible people has also increased. Although economists recommend a balance between state revenues and expenditures, the government hitherto has not considered the budget imbalance a priority and instead of improving the efficiency of the system has been relatively generous on the expenditure side. Some government policies and policy proposals, such as replacing means-tested child benefits with a universal child allowance, are presented without plausible economic arguments and are instead used as a way of gaining votes.

The generosity of the social system must reflect the capacity of current taxes in order to ensure that there is sufficient money for its financing. However, the effectivity of the Czech tax system, measured by the ratio of real to potential tax incomes, is rather low (Bronchi a Burns, 2000). Changes such as widening the tax base, decreasing the number of goods taxed at the lower value added tax (VAT) rate, increased taxation of self-employment earnings, and changes in the taxation of capital returns could help decrease the tax burden, with a neutral impact on the state budget. To propose a tax reform without negatively impacting work incentives, thus creating an environment that would sustain economic growth, still remains a challenge. To reform taxes without making any improvements in the social system would mean abandoning the synergy associated with the simultaneous optimization of both schemes. This synergy stems not only from the interrelation of taxes and benefits via the state budget, but also from the fact that both affect income distribution.

What is the total effect of redistribution when both taxes and social benefits are taken into account? Do the tax and social policies really lessen the inequality generated by the market? Are they efficient in preventing marginalization and social exclusion? Is most income redistributed within the middle class with the greatest capacity to pay taxes and the greatest political power? (Tullock, 1997). And finally, given its complexity, does the tax–benefit system respect the principles of vertical (higher income tax-payers should pay more) and horizontal equity (tax payers with the same income should pay the same taxes)?

For examining the above mentioned questions we might consult a microsimulation tax benefits model (MSM) dealing with real micro data sets. The basic output from the MSM is changes at the micro-level in individual or household income resulting from policy changes. This provides a basis for the calculation of estimates of the aggregate macroeconomic effects. MSMs allow more reliable forecasts to be made in countries undergoing extensive structural changes. This makes MSMs very attractive forecasting tools for transition countries such as the Czech Republic. MSMs can also be applied to assess

the impact of tax and social policies on work incentives, consumption behavior, savings and look at the deadweight loss Using an ex ante simulation of political reform can be less costly than trial and error method (with every policy measure being implemented before its effect is seen). This enhances the stability of the system, decreases the uncertainty associated with business, and helps achieve better allocation of resources.

The goal of this article is to describe the tax-benefit microsimulation methods and their application for assessing the redistribution function of taxes and social benefits. In chapter 2 this paper examines alternative approaches to the analysis of income distribution and discusses their shortcomings. Chapter 3 describes experiences abroad and the policy issues that were examined using MSM. Chapter 4 is devoted to a more technical description of microsimulation methods, and chapter 5 discusses the basic types of MSM with respect to extrapolating the input database into the future and the attention devoted to modeling behavioral responses. Chapter 6 depicts the advantages and challenges of microsimulation, and chapter 7 points out the contributions microsimulation has made to the income redistribution theory.

2. Tax benefit system and redistribution

While the implementation of social benefits has reflected the need to redistribute income, the redistributive function of taxes has been a secondary consideration. A. Wagner was the first to point out, in 1877 in his book "Finanzwissenschaft", that the tax system can contribute to the elimination of market-generated inequalities (Hamerníková, 1996). Redistribution through taxes might contribute in the same way as does redistribution through social benefits, but they can also work at cross purposes.

Economic theories offer some concepts in which taxes and benefits are integrated into one device such as negative tax or social dividend (every individual gets a share of national wealth) (see Večerník, 1991). Attempts to radically simplify tax-benefit systems, however, have failed. Consequently, there are still many policies whose real effect is different from what was intended. Pechman (1984) found that social transfers affect the final income distribution more than taxes. Kwon (1997), on the other hand, analyzed Korean and Japanese data and concluded that income taxes together with mandatory insurance payments can have a greater impact on income distribution than social transfers. The final income distribution is determined not only by the policies in place, but also by the environment in which the redistribution is realized, by the age profile of the population, the economic activity of the individual members, household composition, and institutional factors such as the dissemination of information in the society, the extent of the shadow economy, and corruption.

The effect of policy measures on income distribution is usually examined by comparing the income variables before and after implementation of the policy. This approach has several shortcomings (Redmond, Sutherland 1995). If the inequality generated by the market is increasing, a feature typical of transition and post-transition periods (Večerník 2001), the results obtained by this method will be skewed. Such an approach mixes the effects of the examined policy and other exogenous changes in the socio-economic environment (increase in unemployment, aging of the population, changes in household compositions, etc.) that influence the income distribution generated by the market.

A better approach is to compare gross and net disposable incomes at the same point in time. This, unfortunately, requires an unrealistic assumption: that the primary income distribution is independent of the current system. However, in reality there are, in addition to state tax and social transfers, also private transfers inside the family or between generations. Some of them, for example additional pension insurance, are mediated through the financial sector and thus serve as a complementary redistributive mechanism. Nevertheless, the introduction of social benefits results in a decrease in the amount of money redistributed via private channels, and the calculated total effect based on a comparison of gross and net income will be overestimated. Obviously the most serious shortcoming of the above-mentioned approaches is that the policy must be implemented first in order to assess its effect. This does not conform

to the stability principle and brings more uncertainty into the economy, uncertainty that affects the conduct of economic actors. The cost of such trial and error is obviously high.

An ex ante analysis of income redistribution, focusing on people with different characteristics, can be conducted using a set of hypothetical households or individuals. Unfortunately, the likelihood that this will cover all real household types is very small. To illustrate, if we are interested in 10 characteristics and each of them has four possible categories (which, compared to reality is quite a simplification), there are more than one million combinations. Analyzing all of them would be a waste of time because not all possible cases are found in reality. Moreover, the analysis of hypothetical households does not provide us with information about the macroeconomic effects of redistribution.

Microsimulation can provide the advantages of the methods described above and, at the same time, can solve some of the problems. MSM allows an analysis of tax and social policies before their implementation and can help to quickly assess the impact of various proposed reforms on the same population while controlling for exogenous factors. Moreover, it works with a real microeconomic database; in other words, it takes into account the economic environment and its changes. Nevertheless, microsimulation must also cope with some challenges, especially data requirements and the accuracy of the algorithms used with respect to the modeled reality.

3. History of microsimulation methods and experiences abroad

The first attempts to develop microsimulation models were undertaken in the late 70s and early 80s with more widespread use of more efficient computer technologies that were capable of performing simulations within an acceptable length of time. At the beginning MSMs were common in countries with access to suitable micro-databases and looking at a tax or social system reform. Currently all EU and most OECD countries have some MSM at their disposal. MSMs are constructed either by ministries or some other governmental or non-governmental organization and financed by public funds. Given the fact that redistribution is a very sensitive political issue, MSMs developed by an independent organization might ensure more objectivity. When testing the reliability and robustness of the micro-simulated results it is very useful to have at least two different microsimulation models. The statistical department of the Canadian government has developed several MSMs and provides them to other both governmental and non-governmental potential users who could find possible errors in the algorithm of the model and help to improve it.

MSMs have a long tradition in Scandinavian countries. The Danish Ministry of Economic Affairs has the *Law Model Office*, the aim of which is to analyze legislative norms that are in place and also new proposals. Scandinavian MSMs are unique in that Swedish law permits them to use data from central registers containing information on all households. Moreover, the register data has identification numbers enabling data from several registers to be joined together, thus creating a complex data set offering details on social benefits, taxes, housing allowances, unemployment, pensions, car ownership, and also details about heat consumption and derived subsidizes. The completeness of the registers guarantees that the data is representative and the microsimulation can thus yield more precise estimates of aggregated financial costs and the total effects on income distribution (Souček et al., 1996).

Some countries from central and eastern Europe have also built national MSMs. Since the middle of the 80s, Hungary has devoted considerable effort and resources to construct the MSM TARSZIM (Szivós, Rudas and Tóth, 1997). The model was developed at Tarki, a private research institute. The most recent version of the model is based on three main databases: household panel, family expenditure survey and tax register data. The household panel has been collected by Tarki and provides income and demographic variables; family expenditure survey enables the imputation of the data on consumption and tax register allows the imputation of income taxes. All the input databases were joined by dynamic

imputation based on regression models. The rich database allows the modeling not only of income taxes and social benefits but also VAT and excise taxes.[1]

The research department with the greatest experience is the *Microsimulation Unit (MU), Department of Applied Economics, University of Cambridge*. They deal not only with technical aspects of the simulation but also attempts to apply their MSMs to redress a wide range of economic and social problems. They devote much attention to data clearing and improving data quality. Researchers from the MU are also seeking the optimal ways to apply the old models to new data to test the MSM and assess its reliability. Without a doubt, the most important project coordinated by the MU is EUROMOD, an integrated benefit-tax model for 15 EU countries. In addition to analyzing changes in income distribution on the national level, EUROMOD is also capable also of analyzing redistribution among states and can thus be used for assessing harmonization policies. The significance of such analysis on the supranational level will increase as the process of globalization continues. Examples of issues investigated with the EUROMOD are presented in *Table 1*.

TABLE 1 Problems that have been analyzed with the EUROMOD

Child poverty and child benefits in the EU	Sutherland (2001b)
Poverty benchmarking and social transfers	Atkinson (2000)
European Minimum Pension and its impact on the income of poor pensioners in the EU	Atkinson et al. (2000)
Tax and social policy and its impact on the income of poor households in Benelux countries	Berger et al. (2001)
Social benefits and work incentives: changes in net replacement ratios	Immervoll and O'Donoghue (2001)
The effects of means-tested social support in southern Europe	Albuquerque et al. (2001)

Source: EUROMOD Final Report (Sutherland, 2001a)

4. Microsimulation method

The core of the MSM is a statistical program set up using several algorithms describing the logic behind the investigated tax and social policy. The program is applied to a set of micro data, and the output is the impact of the examined policy (e.g. increase in social insurance contributions, change in the minimum living standard, changes in tax rates) either on individual or household level according to the interest of policy makers.

At this stage we are already able to identify the winners and losers as a result of the reform. In the next step the individual effects are aggregated to obtain macroeconomic effects: changes in the disposable household income distribution, income inequality, changes in the poverty rate, financial costs of the reform, changes in total employment, unemployment, or consumption, and other aggregated variables, depending on the type of MSM.

The simple static model can be described in the following way. The model works with three types of variables: parameters associated with the tax and social policy (P); variables depicting environment or population (Z) such as economic status, family size, age of household members, and gross incomes; and variables including targets for the output characteristics such as disposable income, tax incomes, social expenditures, and the poverty rate. The relation between the variables is the following:

$$Y = T (P, Z)$$

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[1] More information available at http://www.tarki.hu/research-e/microsim/micro1.html

Function T describes the dependence of the output on the environment and policies. Usually we compare two policy proposals P_1 and P_2; in other words, we compare $Y_1 = T (P_1, Z_0)$ and $Y_2 = T (P_2, Z_0)$, where Z_0 is a vector of characteristics for a given population at time 0. Replicated microsimulation applied on every household yields the distributions $f (Y_1/P_1, Z_0)$ and $f (Y_2/P_2, Z_0)$, from which we can derive the marginal distributions:

$$f(Y_1|P_1) = \int f(Y_1|P_1, Z_0) f(Z_0) dZ_0 \qquad f(Y_2|P_2) = \int f(Y_2|P_2, Z_0) f(Z_0) dZ_0$$

It is also possible to calculate conditional distributions with respect to some basic characteristics Z. These distributions show the marginal effects on disposable income and other output variables caused by change in the current system. We can provide a quite accurate estimate of the population share that will move from one income decile to another as a result of changing from policy P_1 to P_2. This is, however, only a basic set up of the MSM. Most models are capable of making projections into the future about the microeconomic database and estimate the impact of current policies in the case that the characteristics of the population change Z'_0 $Y' = T (P, Z'_0)$. For updating the microeconomic data we can employ several different methods. The choice of the updating procedure helps us to distinguish between static and dynamic MSMs.

5. Types of microsimulation models

5.1 Static models

MSMs are usually based on large cross-section data sets such as budget surveys or family expenditure surveys. Cross-section data means data certain period in time. However, we also need to simulate the policy effects for periods for which data is not available. For this purpose the MSM includes special modules for extrapolating the micro database into the future.

Static models extrapolate the microdata set collected at time t to time $t + v$ *in* the following way. The demographic variables of the individuals such as age, education, and economic status do not change. Nevertheless, we have to take into account that the share of households with given characteristics may change. Therefore, the micro-data collected in time t should be weighted in order to correspond to the population structure in time $t + v$. The nominal variables of income, pension, and assets are usually adjusted to inflation and the average growth rate of income variables. To better capture the structural changes in population, we can specifically model the growth rate for different categories, e. g., the different wage growth for men and women, for different occupations, sectors, etc.

Static extrapolation of the microdata set from time t to time $t + v$ is not appropriate if the population in time $t + v$ contains cases that were not present in the population and sample at time t. Static models seem to be reliable for forecasts with a short- or middle-time horizon of 1–4 years. The Socioklub project (1996) aimed at comparing the microsimulation model of income distribution with an alternative probability model used for predicting changes in income distribution. Their research showed that both models were quite accurate in the short-term horizon of 1–4 years. In the longer term, discrepancies between the micro-simulated results and estimates provided by the probability model increased and the reliability of forecasts decreased. The static model is described in *Figure 1*.

FIGURE 1 Static model

MSM changes the characteristics of every observation according to the algorithms incorporating the institutional rules and behavioral assumptions.
<u>Ageing of the sample:</u>
Demographic variables weighted to be representative for time $t+v$.
Nominal variables are indexed.

Cross-section data
n observations at time t

Cross–section data
n observations at time $t+v$
$v = 0,1,2,3..$

5.2 Dynamic model

Dynamic models allow for more realistic assumptions regarding macroeconomic data updating because in the dynamic MSM individuals' characteristics do change. Individuals can change their marital status, economic activity, etc. In a dynamic context we are able to model, for example, the exit of the labor force such as the maternity leave. A static model would reflect this change by giving greater weight to individuals on maternity leave. In other words, the static models allow certain changes in household characteristics, but the probability of the given changes remain the same for all individuals. In dynamic models, different individuals face a different probability of changes (Nelissen 1994:30) and as a result the number of individuals with certain characteristics in dynamically updated database may change. The probability of changes can be estimated using the Monte Carlo method.

A dynamic simulation can be either longitudinal or cross-sectional. The former takes every individual household and its members and simulates the whole life cycle for the time $t + v$. The number of cases in time $t + v$ is smaller because some of the households vanish. Such an approach is suitable for analyzing changes in lifetime income distribution or for examining the effects of a policy on lifetime income. These dynamic models often apply when assessing pension reforms. The cross-sectional MSMs update data incrementally, first to time $t + 1$, then to time $t + 2$, up to $t + v$. This permits the observation of interactions among agents not only at the end of the period but also during the period. Cross-sectional dynamic modeling is more realistic, but it is also more expensive and thus rarely used.

FIGURE 2 Dynamic longitudinal simulation

MSM changes the characteristics of every observation according to the algorithms incorporating the institutional rules and behavioral assumptions.
<u>Life-cycle ageing.</u>
The MSM models the life cycle of every household starting at time t up to time $t+v$ all at once. The interactions between t and $t+v$ are neglected.

Cohort including k households

Cohort including k households' life-time cycles

FIGURE 3 Dynamic cross-section microsimulation

Cross-section data
n observations at
time *t*

MSM changes the characteristics of every
observation according to the algorithms
incorporating the institutional rules and
behavioral assumptions.
<u>Sample ageing:</u>
The sample is aged in steps to *t* + 1, than to *t* + 2
etc. using the empirical survival probabilities.

Cross-section data
n observations
in *t* + 1
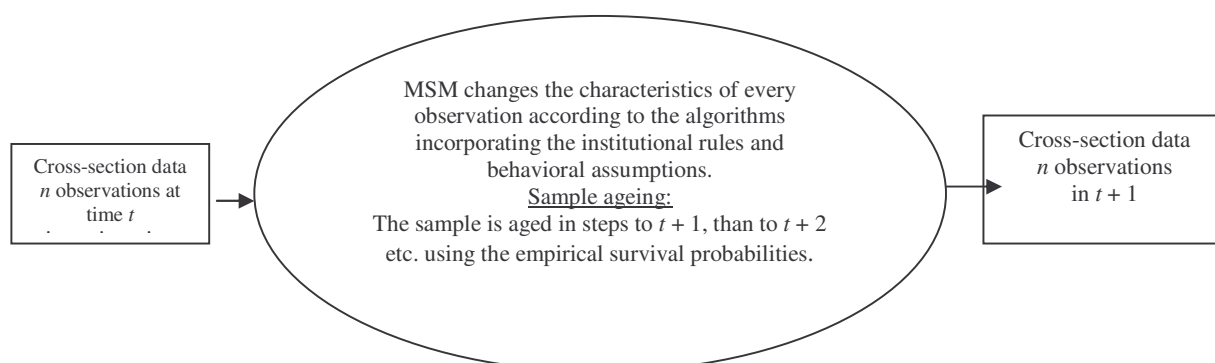
5.3 Behavioral changes: second-order effects

Redistribution affects disposable income, the costs and the benefits, both directly (first-order effects) and indirectly in bringing about changes in the behavior of individuals (second-order effects). Social transfers and high taxes imposed on labor influence the incentive to work or to search for a job. Generous social support for families with children can increase the natality rate and affect the supply of women on the labor market; indirect taxes can change the structure of the consumption expenditures of the household. These behavioral adjustments result in changes in employment, in total paid social allowances, tax revenues, and other macroeconomic variables. If the behavioral changes are indeed significant it would be reasonable to control for them in the MSM in order to achieve more accurate estimates.

Given the complexity of MSMs, the literature suggests modeling behavioral changes using static microsimulation models. Klevmarken (1997) recommends modeling only the behavioral changes that arise in the short-term. This recommendation reflects the nature of the cross-section data that is input, data which is implicitly assumed to characterize long-term equilibrium. This assumption is correct only if the adjustment processes in the economy occur fast enough. However, if the economy needs some time to adjust, then the estimate of the behavioral changes based on the cross-section data will be biased. We can check if the cross-section data describes the long-term equilibrium by comparing several cross-section surveys. The instability of the survey data indicates that economy is not in the equilibrium and in this case the prediction of the second-order effects based on this data will be less reliable.

The second-order effects most often modeled include changes in consumption (British TAXBEN2) and savings. The MSM used for checking them are useful for investigating VAT and excise taxes. British POLIMOD simulates the negative impact of taxes and social benefits on the labor supply. Using mathematical language we can describe a static MSM with behavioral changes with the equation $Y = T(P, Z_0, Z_p)$, where $Z_p = C(P, Z_0)$. Z again means the characteristics of households and of individuals. Z_0 are exogenous characteristics (e.g., age) that are independent of policies. Z_p are endogenous characteristics, e.g., labor supply, marital status, number of children, number of jobs, etc. The redistributive effect on income and other output variables and on Z_p is given by the distributions $f(Y_1, Z_{p1}/P_1, Z_0)$ and $f(Y_2, Z_{p2}/P_2, Z_0)$. *The* direct policy is given by the marginal distributions $f(Y_1/P_1, Z_0)$ and $f(Y_2,/P_2, Z_0)$ and can be compared to the total effect, taking into account the second-order effects $f(Y_1/P_1)$ and $f(Y_2/P_2)$.

The main shortcoming of the inclusion of behavioral changes in MSMs is the inability of the models to predict when the changes take place. This is a problem for assessing the accuracy of the estimate. Should the expected change in labor supply be compared with the real impact one year after the tax or social policy was implemented? Two years? More? Since there is no simple answer to this question, it is better to focus on modeling short-term adjustments such as changes in the consumption

of goods and services. For modeling long-tem adjustments such as migrations, decisions to retire, investments into human capital, or decisions about the number of children, it is better to work with a dynamic MSM. The next issue is the cost advantage of a MSM with behavioral changes. Is the cost of including behavioral changes justified, or can we obtain sufficiently reliable estimates with a less complicated model? Pudney and Sutherland (1994) compared a simple MSM to a MSM incorporating behavioral changes in labor supply, and they concluded that a more intricate model does not necessarily increase the precision of the forecasts, but can instead lead to greater uncertainty regarding the results.

6. Benefits and challenges of the microsimulation

The social and tax policy is targeted at individuals or households, however most analyses o policy proposals is made n the aggregate level. The technical literature (Nelissen, 1994; Sutherland, 1995; Klevmarken, 1995; Merz, 1991) stresses that microsimulation models simulate the policy effects on the same level as the decision are made. Using microsimulation we do not lose any available information on what happens on the aggregated level, and we can conduct both macroeconomic and sociological analyses. Microsimulation reflects the idea that the main goal of redistribution is not only to achieve higher growth and consumption but also to ensure that all the members of society will benefit. Microsimulation allows us to focus on a specific social group without losing sight of the fact that this social group is not an isolated unit but part of society, and that there are interactions between them.

Before setting down the MSM algorithms we have to understand perfectly, in all aspects and details, the logic of the simulated policies. Translating the tax and social rules into the programming language can thus easily reveal ex ante possible inconsistencies of the policy proposal being investigated. Creating the algorithms requires the deep inquire into the logic of the policy proposals and thus can prevent the reform's possible failure. For purely technical reasons, it is not possible to run a MSM on data that includes a case that is neglected by the reform, which can help to identifyany neglected categories or exceptions specified incorrectly. According to Atkinson (1995), the ability to see the rationality behind policy proposals makes the MSMs unattractive to politicians because it sheds more light on issues which politicians may wish to remain more in the shadows, thus allowing them to push through the interests of their lobbies instead of increasing the common welfare.

The key variable of the MSM is disposable income, including employee earnings, sickness benefits, self-employment income, profit, property revenues (dividends, income from property renting, interests), and other monetary income (regular transfers, alimony payments without occasional payments), as well as social allowances without income taxes and social and health insurance contributions (Sutherland, 2001a). Most sources of income, such as self-employment earnings and income from second jobs, is available in surveys, but there are some other sources that cannot be simulated perfectly because some of the necessary details may be lacking. For instance, we can simulate changes in the level of unemployment benefits, but because we have no information about the previous wage received and time spent at work, changes in eligibility to unemployment benefits cannot be modeled.

The biggest challenge associated with microsimulation is the quality of the input data. The MSM requires three kinds of data: first, data about individuals, households and their characteristics; second, additional statistical data describing the average growth of incomes, inflation, and the cost of living index; and third, detailed descriptions of examined policy proposals and rules determining eligibility, benefits and tax amounts and exemptions. The accuracy of MSM predictions is determined by how representative the input microeconomic data is and by the range of available variables.

Three types of data sets can be used for the microsimulation. The best would be the panel data on households offering the observation of the household in several time points, but we can also employ the statistic surveys on incomes. Registers provide very accurate official data covering the entire population. For the purpose of microsimulation in the Czech Republic we can employ the Family Expenditure Surveys (FES). Unfortunately, the sample in the FES is not random but is based on quotas,

and income is one of the variables used for calculating quotas. Therefore, it cannot be employed to simulate income distribution. Moreover, the FES does not include information about households in which the head of the household is unemployed or retired but do contain other working members. In view of the lack of better data, the FES is used for assessing the State Social Support System (see the article by O. Schneider and T. Jelínek (2001)). However, for the complex model of taxes and social benefits, FES is not suitable because it is not representative and the resulting estimates of aggregate variables would be skewed (Sutherland, 1995).

Apparently the only data sets that can be used are household income surveys, i.e., Microcensus. The more income sources the survey provides, the better. Moreover, it is an advantage to know the exact income each person in the household receives so we do not have to arbitrarily make decisions about rules for sharing. All these details make simulations simpler and results more precise (Dlouhý, 1995). In some cases it is necessary to impute (artificially add) some variables. Household consumption expenditures are imputed most often because most surveys on income do not provide them but they are necessary for modeling VAT.

Regarding the Czech Microcensus we could impute the consumption expenditures from the FES providing information about household consumption, although it is somewhat inaccurate for both poor and very high-income households. The imputation can be done in four steps.

1. Estimate the relationship between the total consumption C, the disposable household income Y, and other characteristics X (such as age, sex, marital status, economic activity, education of the head of the household, residence, car ownership, household size, number of children, etc.). The variables must meet one requirement: they must be included in both data sets:

$$lnC = \alpha + \beta \ln Y + \chi X$$

2. In the second step we used the estimated regression in step 1 to predict the total consumption of households in the Microcensus.

3. Run the following regressions for several commodities from the FES data:

$$w_i = \alpha + \beta \ln(C) + \chi (\ln C)^2 + \delta X$$

where w_i is the share of expenditures on commodity i in the total expenditures.

4. Use the estimated coefficients from the regression in step 3 to predict expenditure shares for households in the Microcensus

Such a method allows, for example, the calculation of the total expenditure on spirits and simulation of the excise tax levied on this item.

To assess the representativity of the data set we should check that all social groups are included in the sample. Given the way surveys are conducted, the collected data does not provide information about: homeless people; people that spend extended periods of time in hospitals, senior houses, or prisons; orphaned children; or persons living abroad and receiving social benefits. This might be a shortcoming when analyzing measures targeted at these groups. A good indicator of the representativity of the data is the non-response rate and the characteristics of people that refused to answer the questionnaire. Besides this, in some cases the information provided about household members is incomplete. In these case there are two options: we can either omit such cases or impute the missing information. Including incomplete information would lead to skewed results. (Sutherland, 2001a, p. 29).

Microsimulation models usually neglect tax avoidance and tax evasion and assume a complete take-up of social benefits. The exemptions are some national parts of the EUROMOD. For example, the Italian model deducts part of the tax base in order to control for tax avoidance: the amount deducted reflects the aggregated tax evasion as estimated by the central statistical office. German, British, Swedish, and Irish teams have attempted to model non-take-up behavior. The German example illustrates that

the assumption about a zero non-take up rate of benefits is important; analysis of German data has shown that if all the eligible households were really receiving social transfers, poverty would decline by 3 percent and the Gini coefficient would decline from 0.03 to 0.25 (Sutherland 2001a, p. 57).

7. The contribution of microsimulation methods to the redistribution theory

Microsimulation methods allow the linking of two basic theories of income redistribution: functional and personal (Krupp, 1978). The functional theory addresses how income is distributed among production inputs, especially labor and capital, and how this redistribution reflects the inputs as a share of the total production (Bronfenbrenner, 1971). From this point of view we are interested in the diversity of household income sources. How large is the share of income from dividends, investments, and other forms of capital as compared to the share of work earnings. The personal theory of income redistribution focuses rather on income brackets and investigates the distribution of households among these brackets. The most typical methodological tool serving this theory is the Gini coefficient. The relatively high number of parameters that enter the MSM allow us to control simultaneously all the main goals of redistribution:

1. To achieve income distribution that will adequately reflect the productivity of individuals (to avoid exaggerated tax progressivity).

2. To eliminate socially unacceptable poverty.

3. To decrease inequality (especially inequality associated with access to various goods and services).

4. To decrease fluctuations in income during the life-cycle.

According to Krupp (1978), it is necessary to approach the individual goals on several levels, and good theories should respect this. The measures to achieve the first goal must be assessed with regard to individual income distribution. The three other goals are more closely associated with the household level. However, economists and sociologists treat the family as a black box, which means that no outsider can understand the redistribution of financial means and consumption within it. In some cases, we are not sure if the consumption or incomes of the household members are complements or substitutes. Moreover, we have to take into account economies of scale(the implication being that a five-member family can achieve the same utility with less than quintuple of the individual income) The definition of the basic unit of observation is not as trivial as it seems, and it determines the shape of income distribution curves and the scope of inequality (Večerník, 2001). Tax and social policies can be efficient in decreasing inequality at level of the individual and yet at the same time fail at the household level, and vice versa. MSMs allow simultaneous analysis on various levels to be conducted.

In addition to the decision about the unit of analysis, the time dimension for which the analysis applies has to be considered. With the exception of the debate on pension system reform, policy makers often ignore the effect of redistribution policy on lifetime income accumulation. Empirical studies support the hypothesis that some social benefits crowd out alternative private transfers (Cox, Hansen, Jimenez, 1999). This weakens the inherent mechanisms capable of decreasing inequality such as intergenerational transfers and private pension savings. We also have to distinguish between income at a certain point in time t and lifetime income. The Harding simulation (1993) shows that if we focus on the lifetime rather than the average monthly income, the Gini coefficient declines by 30–50 percent. This implies that the redistribution goals must reflect the characteristics of the population. The more diverse the population ceteris paribus (with respect to age, for example), the more inequality in society can be accepted.

8. Conclusion

The tax-benefit system is not the only redistribution mechanism, but it is very important. Therefore, it is necessary to examine it to see if it performs its redistributive function well. In other countries, the effects of various tax and social policies on income redistribution are often examined using microsimulation models. MSMs are employed not only for assessing national policies, but recently they have also been used to examine harmonization policies at the EU level. The MSM can help measure poverty and locate the best way to combat it and prevent the social exclusion of endangered social groups. The most significant and recent microsimulation project is probably the EUROMOD: an integrated European benefit-tax model coordinated by *the Microsimulation Unit at the research department of the University of Cambridge.*

The core of the MSM is a statistical program describing the rules of the tax and social policies. The program is applied to microeconomic data and yields estimates of the effects on individuals and also macroeconomic effects. The MSM can include a module that extrapolates the input microeconomic database into the future. This can be done either in a static way through weighting, or dynamically through explicit modeling of transition probabilities. Thanks to extrapolation we can also obtain information about income distribution for time periods for which no micro data on incomes is available. The MSM is a way to estimate possible behavioral adjustments that may result from the implementation of various policy measures. Changes in labor supply, consumption behavior, tax evasion and the non-take-up of social benefits are examples of the behavioral adjustments that are most often simulated.

There are many challenges associated with using MSMs. First, microsimulation is very demanding with respect to the quality and availability of the micro-databases used as input, and they should contain all the variables necessary for tax-benefit calculations. Moreover, the accuracy of the aggregated variables depends on how representative the sample is. The quality of the micro-simulation can be enhanced by using more precise and detailed information about all income sources and the taxes paid. Unrealistic assumptions such as complete take-up of social benefits and zero tax evasion can lead to biased results.

Microsimulation of taxes and social benefits has contributed to the theory of income distribution because it links the functional and the personal approach to redistribution. It allows the simultaneous investigation of several dimensions of redistribution: the effect of redistributive policies on income from different sources, the impact on the individual versus household incomes, and the effect on total aggregated income. We can compare the elimination of inequalities from the point of view of individuals or from the point of view of households, and also compare the changes in inequalities of income at specific points in time or over the course of a lifetime. The application of microsimulation methods in the Czech Republic still remains a challenge.

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SUMMARY

Understanding the effect of tax and social policy on income inequality is important as the comparison between gross and net income distribution shows how efficient and equitable (horizontally and vertically) the tax benefit system is and whether redistribution is not a mere waste of resources. Microsimulation models (MSM) seem to be a very useful tool for such analysis as they are used by policy makers in many European countries. Microsimulation of taxes and social benefits means the use of data on individuals or households on micro-level to simulate the effect of changes in policies or the economic environment. It allows for both the calculation of the individual effects of policy changes and shows the implications for income distribution and public finance. Using microsimulation we are also able to make projections using either weights or dynamic techniques and provide information about income distribution during periods for which no real data is available. Some models also simulate behavioral changes resulting from the tax and social policies. For the microsimulation to provide valid results the micro-data must be representative and must contain detailed information about various income sources. In addition to its practical contributions, the MSM also enriches economic theory since it links the functional and proportional approach to redistribution.

The Term Structure of Interest Rates and Monetary Policy in a Small Macro Model

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1. Introduction

The forward-looking character of monetary policy, that is due to "long and variable lags" in transmission, combined with uncertainty about future economic development, ideally requires that some kind of intermediate policy target or forecast be employed. Recently, however, many central banks have changed their policy strategy to direct inflation targeting, thus the weight placed on intermediate targets (e. g. money stock in monetary targeting) has lessened considerably. At the same time, this has led to a marked increase in the importance of macroeconomic forecasts for monetary policy.

While there is no alternative for a central bank's own structural model-based inflation forecast in the conduct of monetary policy through inflation targeting, various indicators may serve as a useful supplementary policy guide. We think of indicators as variables from which it is possible to extract agents' expectations about future economic development, though they do not necessarily cause this future development. Apart from reflecting market expectations, indicators have other favorable properties that distinguish them from macroeconomic forecasts: they are usually available with greater frequency, and they are not subject to data revisions.

Various authors have shown that one of the most successful indicators is the term structure of interest rates. The whole term structure is usually approximated by a single variable, the *term spread*, calculated as the difference between long-term and short-term interest rates. What can the term spread tell us? There are basically two lines of research in this area. The first tests the predictive power of the term spread for future inflation. Mishkin (1990a, 1990b, 1991), Fama (1990), Jorion-Mishkin (1991), Ragan (1995), Estrella-Mishkin (1997), Day-Lange (1997), Breedon-Chadha (1997) or Kozicki (1998) argue that a positive current term spread is associated with positive future inflation or its dynamics, and vice versa. The second line of research is aimed at examining the predictive power of the term spread for future real economic activity. Hu (1993), Plosser and Rouwenhorst (1994), Cozier and Tkacz (1994), Bernard and Gerlach (1996), Estrella and Mishkin (1996), Haubrich and Dombrosky (1996), Bonser-Neal and Morley (1997), Kozicki (1997), Smets and Tsatsaronis (1997), Estrella (1997), Attna-Mensaha and Tkacz (1998) or Berk and Van Bergeijk (2000) show that a positive current term spread is associated with an increase in real economic activity in the future, and a negative term spread a decrease. A summary of the results of the studies above that take a multi-country approach can be found in *Table A1* in the Appendix. In the context of the small open Czech economy, similar research has been conducted by Kotlán (1999a, 1999b), testing, respectively, the ability of the term spread to act as an indicator of future inflation and future real economic activity. In these studies, the term spread has been found to indicate inflation six quarters in the future, and real economic activity three quarters in the future.

The empirical methodology of the above-mentioned studies is usually based on standard reduced form regressions, or VARs, without much discussion of the underlying theory. We argue that the results based on such an approach are subject to three types of criticism. First, it is unclear whether a changing term spread at any moment in time indicates future changes in inflation or in real economic activity, or both, and what the future values of these variables should be. Second, even though monetary policy is conventionally believed to affect the term spread considerably, the approaches

mentioned do not explicitly take the role of monetary policy into account. Third, the reduced-form techniques applied are, by themselves, not well suited to evaluate the predictive content of the term spread or any other indicator. The idea behind this crucial argument was put forward by Woodford (1994) and further refined by Bernanke and Woodford (1997). Let us provide a simple informal exposition of the argument. Suppose a central bank whose only objective is to keep inflation at the level given by its inflation target uses a certain variable called X as the only indicator of future inflationary pressures. Suppose a positive X indicates future inflation above the target and a negative X indicates future inflation below the target. Since the bank's goal is to keep inflation on target, it will — based on what the indicator suggests — take such measures so as to reach the target in the future. In the end, if X is used for setting monetary policy and if the policy is successful, what shall we see in the data? We will most likely see that while X has fluctuated, inflation has stayed at the target level. Reduced-form econometric techniques might then lead to a false conclusion that there is no relation between indicator X and (lagged) inflation.[1]

These critiques can be avoided if the predictive power of the term spread is examined from the perspective of a macroeconomic framework. The idea of analyzing the term structure of interest rates from within a broader range of macroeconomic relations is not new. Mankiw and Miron (1986), McCallum (1994), Rudebusch (1995) and Roley and Sellon (1996) use simple two-equation systems, consisting of the rational-expectations-hypothesis (REH) based term structure equation and the central bank's reaction function, to improve the empirical results of testing the REH. More complex macroeconomic models, however, have been used in this context in only a few studies. Turnovsky (1989) examines interactions of various macroeconomic policies and the term structure using a simple macro model. In their seminal study, Fuhrer and Moore (1995) look at the observed correlation between the Fed Funds rate and real economic activity by following interest rate transmission along the yield curve. Eijjfinger et al. (2000) discuss the implications of the REH for inflation targeting. Finally, Estrella (1998), whose approach is closest to ours, analytically solves a simple macroeconomic model with an emphasis on directly linking the term spread with the indicated variable (inflation, real economic activity).

Although we take this body of research as our starting point, our aim and approach differ. In this paper we re-examine the relationship between the term spread and future inflation and/or future real economic activity from within a model framework. Our goal is to find out whether the proposed relationship is structural or monetary policy dependent, and whether it is influenced by the way in which agents form expectations. The approach we take differs in two respects. First, while all the studies mentioned in the paragraph above examine the term spread's predictive properties within a closed economy, we are the first to do so using a small open economy modeling framework. For this purpose we have chosen the Czech economy. Second, we examine the relationship using model simulations, not analytical solutions. The rest of the paper is organized as follows: the model is introduced in Chapter 2; Chapter 3 examines the role of monetary policy behavior and expectations formation on the predictive ability of the term spread using model simulations; and, Chapter 4 states our conclusions.

2. The model

For our purposes we chose to build a quarterly monetary business cycle model. While building the model, three general principles were applied. First, behavioral equations should be grounded in economic theory. Second, the model should be as simple as possible. Third, the equations should resemble the Czech data. We briefly discuss the main behavioral equations below. The whole model, including the calibrated coefficients, is summarized at the end of this chapter.

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[1] The same argument applies to the reason why it is often the case that regressing inflation data on lagged values of the central bank's interest rates leads to false conclusion that the central bank does not affect inflation. This is one of the reasons why it is crucial that inflation forecasts used for monetary policy are based on a structural model.

2.1 Aggregate demand

The first equation specifies aggregate demand determination. All variables are deviations from the long-term equilibrium trend:

$$y_t = \alpha_{11} y_{t-1} + \alpha_{12} R_{t-1} + \alpha_{13} y^*_{t-3} + \alpha_{14} q_{t-1} + shock_t^{IS} \tag{1}$$

The left-hand side (LHS) variable y_t is the output gap. The data was obtained by subtracting from quarterly real GDP data the estimated potential output series using the Hodrick-Prescott (HP) filter.[2] The output gap enters the right-hand side (RHS) with a one-period lag.[3] The second term on the RHS R_{t-1} is one-period-lagged long-term real interest rate (1Y PRIBOR) deflated by expected CPI inflation (equation 7). We assume four-fifths of agents form inflation adaptively and one-fifth model-consistently or rationally (equation 10). The third term on the RHS y^*_{t-3} stands for three periods lagged foreign demand proxied by the German GDP gap (HP filter). The lag reflects our assumption that the duration of foreign trade contracts is relatively long. The fourth term on the RHS q_{t-1} is the one-period-lagged real exchange rate. Note that a rise in q stands for depreciation. The foreign trade structure and the availability of consistent historical data was the reason for working with the CZK/DEM exchange rate, deflated by CPI rates of inflation (equation 8). The last term on the RHS $shock_t^{IS}$ stands for demand shock.

While calibrating the coefficients, we started off with an OLS estimate using data for 3Q1994 – 1Q2001, and found the values broadly in line with economic intuition.[4] The influence of foreign demand $\alpha_{13} = 0.47$ reflects the high income-elasticity of Czech exports, as well as the fact that exports form a substantial part of Czech GDP. The level of long-term real interest rates 1 p.p. above equilibrium causes, with a lag of one quarter, a decline in real output one-fifth of a percentage-point below equilibrium ($\alpha_{12} = -0.22$). The influence of the real exchange rate is about the same in magnitude ($\alpha_{14} = 0.20$). The output gap persistency was estimated at 0.97. Such a value seemed too high compared to other studies, as did the implied long-term elasticities of both the foreign demand and the domestic policy variables. We thus calibrated the coefficient slightly lower and set $\alpha_{11} = 0.90$.

2.2 Aggregate supply

The "Phillips curve" equation links nominal and real variables, assuming short-term stickiness in prices and wages.

$$\pi_t = \alpha_{21} \Pi^e_{t+4} + \alpha_{22} \pi^*_{t-1} + (1 - \alpha_{21} - \alpha_{22})(s_t - s_{t-1})4 + \alpha_{23} y_t + shock_t^{PC} \tag{2}$$

The term on the LHS π_t stands for quarter-to-quarter annualized CPI inflation. The first term on the RHS Π^e_{t+4} represents current inflation expectations of year-to-year inflation four quarters in the future (equation 10). This specification reflects a common belief that the lower the inflation, the less frequently contracts are re-negotiated. Consequently, there are higher nominal rigidities in the economy. While this may not be the case of other small open transition economies, in the Czech economy we suppose an average contract duration of one year, and hence work with inflation expectations four quarters in the future. The second term on the RHS π^*_{t-1} stands for one-period-

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[2] In the case of the domestic output gap, we had a strong view as to the current output gap value. To account for this view, a variant of the HP filter due to Laxton-Rose-Xiu (LRX) was used, making it possible to expertly adjust the end-point of the gap (-1.0 p.p. in 1Q2001 in this case).

[3] An optimizing-agent-based forward-looking specification complemented by explicitly modeled habit formation – in order to reflect high output persistency – as in Fuhrer (2000) or McCalum (2001), was judged inferior to the final specification based on the above-mentioned principles, namely data consistency and the simplicity principle.

[4] The coefficients were all significant at standard levels; adj. $R^2 = 0.95$; LM (4) = 4.36; S. E. = 0.01.

lagged foreign quarter-to-quarter annualized inflation, proxied by German PPI. The third term $(s_t - s_{t-1})$ represents quarter-to-quarter (annualized in equation 2) change in the nominal CZK/DEM exchange rate. These two terms are intended to capture foreign influence on domestic price development. The choice of German PPI rests on the idea that this price index reflects the influence of both intermediate goods prices and raw material prices.[5] The imposed linear homogeneity in the inflation terms reflects the assumption of a vertical long-term Phillips curve (no long-run trade-off between inflation and growth). The fourth term y_t is the output gap and reflects price pressures arising from excess demand. We believe that the current output gap captures the influence of past excess demand (due to high output persistency), but also makes it possible to grasp the role of forward-looking agents on price determination. The last term on the RHS $shock_t^{PC}$ is "cost-push" supply shock.

While calibrating this equation we again started off with OLS estimation results.[6] The estimated coefficients were in line with our expectations and data typical of small open economies. Of the "inflation terms," foreign inflation (0.46), together with nominal exchange rate dynamics (0.22), had the strongest influence. Inflation expectations enter the equation with the expected sign, however, the coefficient was found insignificant on standard levels. We believe this result may be connected to our specification of the expectations formation process. Since we experiment with this process later on, and the value is in line with international evidence (e.g. Laxton and Scott, 2000), we decided to calibrate this coefficient on the level of the original estimate (0.32).[7] The estimates further showed that the cyclical position of the economy has a strong influence on the determination of prices. Real output standing one percentage-point above potential output increases inflation by 0.61 p.p.

2.3 Uncovered Interest Rate Parity

The arbitrage-based UIP specification posits that the expected change in the domestic exchange rate is equal to the current differential between domestic and foreign interest rates reduced by risk premium:

$$s_{t+1}^e - s_t = (I_t - I_t^* - disp_t)/4,$$

where s_{t+1}^e is the currently expected nominal exchange rate one period in the future and s_t stands for current nominal exchange rate. The exchange rate is expressed in domestic units per unit of foreign currency, and, as was mentioned above, a rise in s_t reflects a depreciation. I_t and I_t^* stand for long-term (here one year) nominal domestic and foreign interest rates, respectively.[8] The term *disp* is used to capture all the disparities between actual exchange rate development and that implied by risk-free UIP. These disparities can be attributed both to the risk premium and to temporary shocks. As an example of a transition-economy-specific temporary shock, consider a foreign capital inflow-driven appreciation of the domestic currency that is due to privatization of domestic assets. The expected exchange rate can be modeled in various ways. As with inflation expectations, we simply have divided the agents in the financial market into two groups: one group of participants (weighted as α_{31}) forms model-consistent expectations, while the other group (weighted as $1 - \tilde{\alpha}_{31}$) is strictly backward-looking[9]

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[5] Imported inflation could, of course, be modeled using alternative specifications. For instance, it would be possible to trace the separate influences of import prices and raw material prices and complement the current setting by the CZK/USD exchange rate reflecting the trade in raw materials.

[6] Adjusted $R^2 = 0.42$; DW = 2.18; S. E. = 0.03.

[7] Alternatively, a separate wage setting equation (with e.g. unit labor costs, imported inflation, the output gap and expected inflation) could be considered. This would, however, violate our simplicity principle.

[8] For a discussion of interest rate maturity entering UIP equation see Derviz (1999). Note that the interest rate differential is divided by four to reflect quarter-to-quarter specification.

[9] Alternatively, one could model exchange rate expectations by adding expected equilibrium real appreciation adjusted by the expected inflation differential to the last observed exchange rate value. This specification, used

$$s_t = \alpha_{31} E_t s_{t+1} + (1 - \alpha_{31}) s_{t-1} - (I_t - I_t^* - disp_t)/4 + shock_t^{UIP} \tag{3}$$

where E_t stands for model-consistent expectations. We begin by setting the fraction of agents forming exchange rate expectations in this way equal to that on the goods market, i.e. $\alpha_{31} = 0.2$, and later experiment with this coefficient.

2.4 The central bank's reaction function

The reaction function is used to capture the agents' perceived pattern of central bank behavior. We do not attempt to explicitly derive the reaction function through loss function optimization, but instead suppose a standard forward-looking equation as in Clarida, Gali and Gertler (1997) or Woodford (2000):

$$i_t = \alpha_{41} i_{t-1} + (1 - \alpha_{41}) \left[i_t^{eq} + \alpha_{42}(E_t \Pi_{t+4} - \Pi_{t+4}^{tar}) + \alpha_{43} y \right] + shock_t^{RF} \tag{4}$$

The LHS variable i_t is the short-term (3M) interest rate. The term in square brackets on the RHS includes the current output gap and the expected deviation of inflation from the corresponding inflation target (Π_{t+4}^{tar}) four quarters in the future. This deviation is sometimes referred to as the "inflation gap." It is important to note that the forward-looking central bank, in contrast to all other agents, forms inflation expectations as purely model-consistent ($E_t \Pi_{t+4}$). In addition to these two variables, the RHS term in brackets also includes the equilibrium short-term nominal interest rate (equation 11). The reaction function is further supplemented by a one-period-lagged short-term nominal interest rate to reflect the observed persistence in short-term rates. This "interest rate smoothing" may be explained by monetary policy uncertainties, central bankers' fear of "losing face," or simply by their efforts not to destabilize markets.[10] The last term in equation (4) stands for a reaction function or "monetary" shock.

The coefficients were calibrated using the ranges estimated by Clarida, Gali and Gertler (1997). The authors, examining reaction functions of Germany, Japan, USA, UK, France, and Italy, came up with the range of $0.9 - 0.95$ for α_{41}, $0.9 - 2.04$ for α_{42} and $0.19 - 0.88$ for α_{43}. We experiment with the values of these coefficients in Chapter 3, but the baseline simulations are based on $\alpha_{41} = 0.8$, $\alpha_{42} = 2$ a $\alpha_{43} = 0.9$. This means we start off with a less aggressive "smoothing" coefficient and upper bound coefficient on the deviation of inflation from the target. This is to reflect a more aggressive policy usually observed in the first years after the switch to an inflation targeting strategy that is due both to credibility problems and the fact that many central banks use inflation targeting for disinflation purposes. At the same time, we increase the weight assigned to output stabilization. This should reflect the fact that many central banks of small open transition economies implicitly target the external balance and that this balance is, to a large extent, driven by excessive demand pressures.

2.5 Long-term interest rate determination – rational expectations hypothesis

The last behavioral equation determines the long-term nominal interest rate based on the REH, and is understandably a key relationship in our model. The REH can be formally expressed as:

$$I_t = \alpha_{51} i_t + (1 - \alpha_{51}) \left(i_t + E_t i_{t+1} + E_t i_{t+2} + E_t i_{t+3} \right)/4 + z_t \tag{5}$$

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in some other CNB's models, would reflect the common knowledge of Balassa-Samuelson driven real exchange rate trend-appreciation in converging economies.

[10] Lansing (2001) interestingly argues that the observed persistency in short-term interest rates is due to the central bank's inability to identify changes in trend growth of potential output.

where α_{51} represents the share of agents that form their expectations about future short-term interest rates in an adaptive way. If α_{51} equals zero, the equation collapses into expectations hypothesis. The last term z_t is a term premium. We make the assumption that it evolves according to an autoregressive process of the form:

$$z_t = \alpha_{52} z_{t-1} + shock_t^{TS} \tag{6}$$

where $shock_t^{TS}$ is term premium shock, with persistency given by α_{52}. We begin by supposing α_{52} equals zero, i.e. no persistency. The term premium reflects agents' uncertainty about future interest rate behavior and can be broken down into uncertainty about the future reaction function of the central bank and future shocks affecting the economy. Since the agents that are unsure about the central bank's reaction function may prefer to set the current long-term nominal interest rate at the current short-term interest rate level, the first type of uncertainty can also be modeled by increasing α_{51}. This is done in the following chapter.

Although empirical tests of the REH have long been quite popular, the results remain mixed. This may be partly due to mis-specifications of some of the tests, as pointed out by Bekaert, Hodrick and Marshall (1997). Other reasons for the empirical failures of the REH have been offered by Mankiw and Miron (1986) and McCallum (1994), who examine the influence of monetary policy on the validity of the REH in practice. The authors argue that the high "interest rate smoothing" that results in the high auto-correlation of short-term interest rates may be behind the considerable influence of current short-term interest rates on long-term interest rates (coefficient α_{51} above) that has been observed. Mankiw and Miron even conclude that the REH began to fail in 1914 when the Fed was established. We believe that it is precisely for the reasons mentioned — the influence of monetary policy on the REH — that testing the REH using a single-equation approach is insufficient. If this influence is to be taken into account, one needs to endogenously model the behavior of the monetary authority as well. This is the approach we take below. The baseline simulations are based on the results of Kotlán (1999c), who was not able to reject the validity of the REH based on comparing actual long-term interest rates with those implied by the current term spread in the Czech money market. We thus start off by setting $\square_{51}$ equal to zero, and later experiment with this coefficient.

2.6 Identities, expectations and exogenous variables

Equations 7 and 8 below are identities for the real long-term interest rate and real exchange rate, respectively. Equation 9 transforms quarter-to-quarter inflation into a year-to-year representation. Equation 10, describing the expectations formation process, has already been described above, as has equation 11, which determines the equilibrium short-term interest rate. Equation 12 is an identity for the term spread as the difference between long-term (1Y) and short-term (3M) nominal PRIBOR interest rates. As for foreign variables, instead of explicitly modeling their behavior and inter-relations, we assume that foreign inflation, output gap, and interest rates evolve independently of each other based upon an auto-regressive process. This is supplemented by a stochastic term with a zero mean value that serves as a shock to foreign variables. The auto-regressive coefficient is set ad hoc to 0.5 in equations 13 and 14, which, respectively, determine foreign inflation and output gap, and to 0.8 in equation 15, which determines foreign long-term interest rates.

2.7 The model and baseline coefficients

The final specification of the model equations (including the values of the coefficients as discussed above) that will be used for our baseline simulations in the following chapter are reported below. The model characteristics have been checked using a series of simulations. Specifically we ran simulations of five *unexpected temporary* (one-quarter) one-percentage-point shocks: demand, supply (cost push), foreign inflation, exchange rate, and reaction function shock simulations were undertaken. The responses (deviations from equilibrium) over the course of 16 quarters are plotted in *Figures A1*

through A5 in the Appendix. They have been compared to those of Svensson's (2000) small open economy model and were found to be broadly consistent.

$$y_t = \alpha_{11} y_{t-1} + \alpha_{12} R_{t-1} + \alpha_{13} y_{t-3}^* + \alpha_{14} q_{t-1} + shock_t^{IS} \tag{1}$$

$$\pi_t = \alpha_{21} \Pi_{t+4}^e + \alpha_{22} \pi_{t-1}^* + (1 - \alpha_{21} - \alpha_{22})(s_t - s_{t-1})4 + \alpha_{23} y_t + shock_t^{PC} \tag{2}$$

$$s_t = \alpha_{31} E_t s_{t+1} + (1 - \alpha_{31}) s_{t-1} - (I_t - I_t^* - disp_t)/4 + shock_t^{UIP} \tag{3}$$

$$i_t = \alpha_{41} i_{t-1} + (1 - \alpha_{41}) \left[i_t^{eq} + \alpha_{42} (E_t \Pi_{t+4} - \Pi_{t+4}^{tar}) + \alpha_{43} y \right] + shock_t^{RF} \tag{4}$$

$$I_t = \alpha_{51} i_t + (1 - \alpha_{51}) \left(i_t + E_t i_{t+1} + E_t i_{t+2} + E_t i_{t+3} \right)/4 + z_t \tag{5}$$

$$z_t = \alpha_{52} z_{t-1} + shock_t^{TS} \tag{6}$$

$$R_t = I_t - \Pi_{t+4}^e \tag{7}$$

$$q_t = q_{t-1} + s_t - s_{t-1} - \pi_t/4 + \pi_t^*/4 \tag{8}$$

$$\Pi_t = \left(\pi_t + \pi_{t-1} + \pi_{t-2} + \pi_{t-3} \right)/4 \tag{9}$$

$$\Pi_{t+4}^e = \beta_{11} \Pi_{t-1} + (1 - \beta_{11}) E_t \Pi_{t+4} \tag{10}$$

$$i_t^{eq} = r_t^{eq} + \Pi_{t+4}^{tar} \tag{11}$$

$$spread_t = I_t - i_t \tag{12}$$

$$\pi_t^* = \gamma_{13} \pi_{t-1}^* + shock_t^{\pi^*} \tag{13}$$

$$y_t^* = \gamma_{14} y_{t-1}^* + shock_t^{y^*} \tag{14}$$

$$I_t^* = \gamma_{15} I_{t-1}^* + shock_t^{i^*} \tag{15}$$

TABLE 1

Coefficient	Value (S.E. if estimated)	Interpretation	Equation
α_{11}	0.90	Output gap persistency	*(1) IS* curve
α_{12}	-0.22 (0.08)	Long-term real interest rate	
α_{13}	0.47 (0.26)	Foreign output gap	
α_{14}	0.20 (0.05)	Real exchange rate	
α_{21}	0.32	Inflation expectations	*(2)* Phillips curve
α_{22}	0.46 (0.32)	Foreign inflation	
$(1 - \alpha_{21} - \alpha_{22})$	0.22	Nominal exchange rate dynamics	
α_{23}	0.61 (0.28)	Output gap	
α_{31}	0.2	Fraction of model-consistent exp.	*(3)* UIP
α_{41}	0.8	Interest rate smoothing	*(4)* CB's reaction function
α_{42}	2	Inflation gap	
α_{43}	0.9	Output gap	
α_{51}	0	Fraction of non-REH agents	*(5)* Long IR determination (REH)
α_{52}	0	Term structure shock persistency	*(6)* Term structure shock eq.
β_{11}	0.8	Fraction of backward-looking agents	*(10)* Inflation expectations
γ_{13}	0.5	Auto-regressive foreign inflation	*(13)* Foreign inflation
γ_{14}	0.5	Auto-regressive foreign output gap	*(14)* Foreign output gap
γ_{15}	0.8	Auto-regressive foreign long-term IR	*(15)* Foreign long-term interest rates

3. The term spread as an indicator

After discussing the motivation in the first chapter and introducing the model in the previous chapter, we now approach the very questions posited in the introduction. First, in section 3.1 we explore whether the predictive abilities of the term spread are dependent on the central bank's behavior. Second, in section 3.2 we examine the influence of the way agents form expectations. In both cases we do so by simulating model-consistent reactions of chosen variables to macro-economic shocks. In contrast to the simulations depicted in the *Appendix,* in this chapter the shocks to which the model is subjected are all *expected shocks*.[11] This is to reflect the idea that forward-looking agents react to expected future economic events in advance. We investigate the responses of inflation, real economic activity, and the term spread in reaction to future expected temporary one-percentage-point demand and supply shocks. The shock is always introduced into the model eight quarters after the start of the simulation. The graphical results of the following two sections are further examined in the last section of this chapter.

Figure 1 below shows the results of a baseline simulation, i.e. a simulation where all the coefficients are kept as calibrated in the previous chapter. These responses form a "benchmark" to which all later simulations will be compared.

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[11] Although certain type of shocks (e. g. oil price shocks) are mostly unexpected, various other events shifting the system potentially out of equilibrium are expected in advance (e. g. future rise in taxes).

FIGURE 1 Benchmark simulation

Demand shock
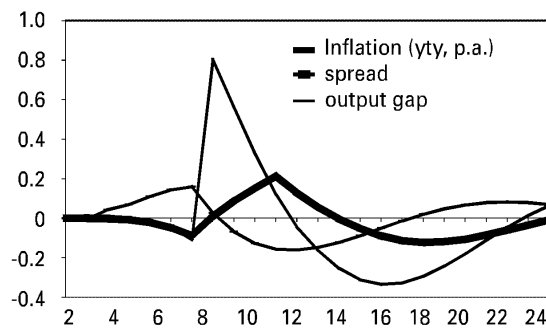
Supply shock
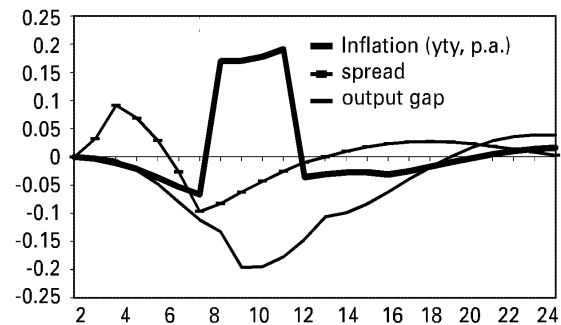
Let us first briefly discuss the response of the economy to an expected demand shock depicted in the left-hand panel of Figure 1. Before the shock actually occurs, a moderate fall in both inflation and the output gap may be observed. This is due to restrictive monetary conditions driven by the expected monetary policy reaction to a positive demand shock (rise of long-term interest rate) and a rise in inflation expectations (real exchange rate appreciation). The output gap increases dramatically in the eighth quarter, although the above-mentioned high persistency of real economic activity causes the spike in the output gap to be slightly below one percentage-point. Together with demand pressures, year-to-year inflation gradually rises (quarter-to-quarter inflation rises immediately). The shock is smoothly eliminated through the central bank's reaction and, after some "overshooting" (driven by the dynamics of the nominal exchange rate and the falling real interest rate), both inflation and output converge back to equilibrium. Market expectations of the central bank's reaction (long-term rates) and the reaction itself (short-term rates) drive the development of the term spread. The expected demand shock first pushes the term spread up and then, after the reaction occurs and future loosening is expected, the term spread falls. Concentrating on the predictive properties, it is apparent that the term spread indicates future real economic activity about three quarters in advance. Similarly, the position of the term spread indicates future inflation, with a lead-time of five to six quarters.

The right-hand panel of Figure 1 shows the response of the chosen variables to a supply shock. Since year-to-year inflation is examined, the original one percentage-point shock in quarter-to-quarter inflation is spread out over a longer period. Expected pre-emptive monetary policy in a small open economy is once again strongly assisted by an appreciation of the real exchange rate driven by the (expected) inflation differential. This leads to a fall in real output with disinflationary consequences, and the necessary interest rate hike is thus much smaller than in a closed economy. Still, the movement of the term spread is similar to that in the demand shock case because the agents' perceived reaction function puts strong emphasis on inflation stabilization. The term spread's ability as an indicator of future inflation is unchanged, but it is no longer able to indicate future real economic activity. This, though, is a sensible outcome, since supply shocks have, by nature, different impacts on output and price dynamics.[12]

3.1 The term spread and monetary policy behavior

We now turn to examine the role of monetary policy behavior on the relationship between the term spread and future inflation and real economic activity. Modifying coefficients in the reaction

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[12] Further refinement could be made with regard to the so-called "escape clauses" or "caveats" that some inflation targeting central banks use in the case of temporary supply shocks. The aim of such measures is to ex ante communicate that the bank will not aim to fulfill its inflation target. This should ensure that unnecessary output losses are avoided while the bank's credibility is not affected by missing the inflation target. Taking this complication into account would require specification of an asymmetric reaction function. This remains a challenge for further research.

function (4) allows us to perform three different experiments. We start off by examining the role of interest rate smoothing.

3.1.1 Smaller interest rate smoothing

The motivation for altering the degree to which a central bank smoothes interest rates may vary. Let us look at a specific transition economy factor for smoothing: extreme vulnerability to capital flows. Countries in transition often exhibit a high interest rate differential compared to the rest of the world, which often leads to a high volume of speculative capital inflow. Because of this, policymakers in transition countries usually set interest rates with respect to some "limit" level of the interest rate differential, after which massive capital outflow is believed to occur, causing abrupt nominal exchange rate depreciation. If policymakers are unsure of this "limit" level, they will be very cautious in setting interest rates. But once domestic interest rates get close to foreign interest rates, the differential is too small to attract speculative capital and the caution in setting interest rates may decrease. This will mean a more flexible monetary policy, in other words less interest rate smoothing. We reflect this in our model by lowering the coefficient $\square_{41}$ in the reaction function from 0.8 to 0.4. Simulation responses are depicted in *Figure 2*.

FIGURE 2 Smaller interest rate smoothing
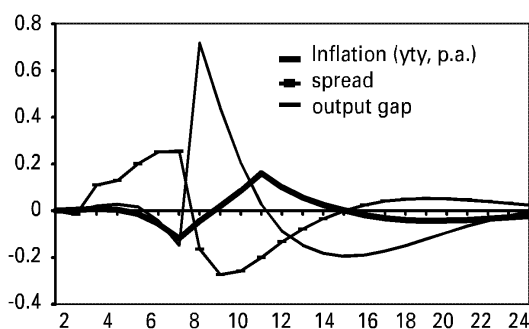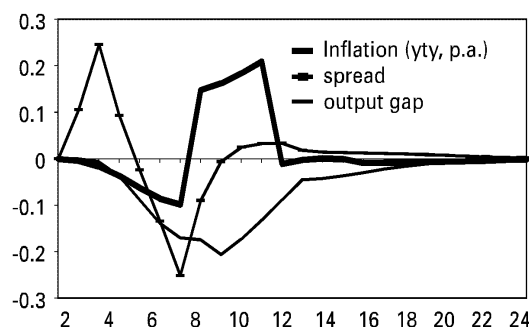
The simulation shows that a more flexible monetary policy results in smaller volatility of inflation (both shocks) and real output (demand shock) around their equilibrium values in comparison to the baseline case in Figure 1. Monetary policy is less bound by the previous levels of interest rates and may be faster and more emphatic in eliminating the consequences of the shocks. The short-term nominal interest rate is logically more volatile, which is then translated to the term spread movement. Overall, there seems to be no qualitative difference in the predictive abilities of the term spread. The spread is still a good indicator of inflation about six quarters in the future.

A much more important modification of the central bank's behavior may concern the weight placed on inflation gap and output gap stabilization in the reaction function. Let us illustrate the motivation by a simple example. Suppose there are two central banks with different reaction functions. Let us assume that central bank A sets interest rates only with respect to future development of the inflation gap, whereas central bank B takes into consideration only the output gap. Suppose also that countries A and B are both expected to be hit by an identical supply shock in the future (for instance, a tax increase). What will happen to the yield curves in the two countries after the agents find out about the expected adverse shock? It is likely that country A will see an upward sloping yield curve, i.e. a positive term spread. The reason is that agents will expect the bank to raise interest rates in the future in order to prevent a future rise in inflation. The agents of country B, however, will probably expect the central bank to cut rates in the future in order to prevent any (real exchange rate-appreciation-driven) negative impact of the supply shock on real economic activity. This will lead to a downward sloping yield curve and thus a negative term spread. As this example of an adverse supply shock illustrates, the predictive power of the term spread may be monetary policy dependent –

different reaction functions lead to different predictive abilities of the term spread. Let us now examine this proposition in our model framework.

### 3.1.2 Greater weight on the inflation gap

We start off by simulating a case in which the reaction function only includes the inflation gap. We change the model reaction function by setting the coefficient on the output gap equal to zero, and at the same time increase the coefficient on the inflation gap in order to make the results more vigorous. We run the simulations with $\alpha_{42} = 5$ and $\alpha_{43} = 0$. The results are shown in *Figure 3*.

FIGURE 3 Greater weight on the inflation gap
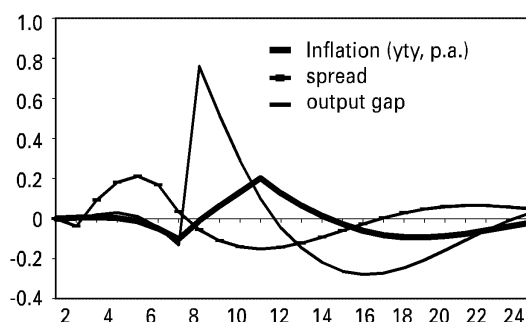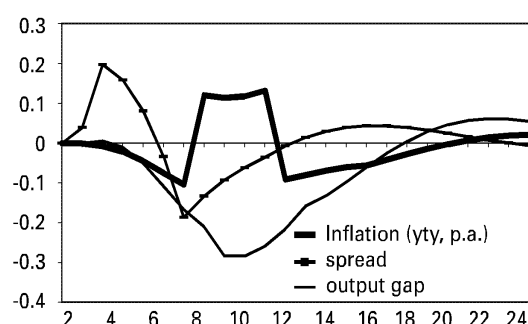
The demand shock responses of both the inflation and output gaps are very similar to the benchmark case in Figure 1. This is because the output gap that serves as an initial propagation variable for demand shock enters inflation through the Phillips curve equation. Consequently, even a central bank that puts zero weight on the output gap in its reaction function, is concerned about real output to the extent that it affects inflation. Furthermore, even in the baseline case, the weight put on price-level stabilization is greater compared to that put on output stabilization. In the case of the supply shock shown in the right panel of Figure 3, however, the results are very different from those in Figure 1. The supply-shock-induced fall in the output gap is now not a "problem" for the central bank. In fact, it is even welcome because it helps to contain inflationary pressures. Agents are aware of this and expect more aggressive restriction, which translates into higher long-term rates and a higher term spread. Increased policy flexibility is connected to greater volatility of the term spread. However, the predictive ability of the term spread seems to remain unaffected: the term spread is still a good indicator of future inflation.

3.1.3 Greater weight on the output gap

We now examine the predictive ability of the term spread in a setting in which interest rates are set only with regard to the output gap. Again, for the purpose of illustration, we decided to model a case where not only is the weight placed on the inflation gap decreased to zero, but the weight placed on output is increased compared to the baseline case.[13] We set $\alpha_{42} = 0$ and $\alpha_{43} = 5$. The simulation results are shown in *Figure 4*.

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[13] This also assures determinacy of the model.

FIGURE 4 Greater weight on the output gap
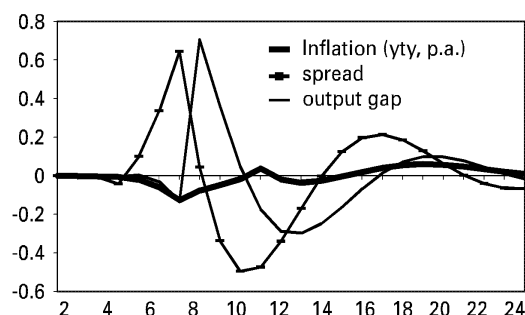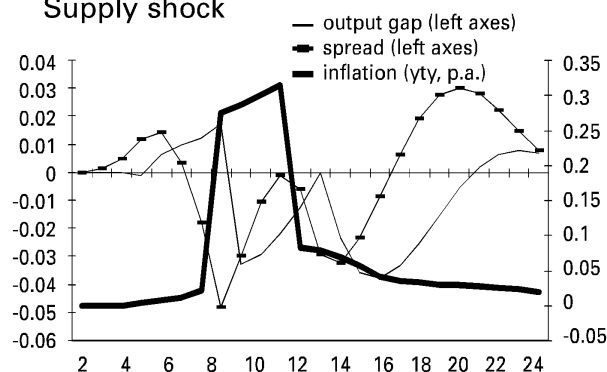
Examining Figure 4, it is clear that in the case of monetary policy driven solely by the output gap, the term spread becomes a good indicator of future real economic activity. It is important that this holds true under both types of shocks (supply shock depicted using dual scaling). Further, it is apparent that the lead horizon has shortened: while the demand shock responses in the benchmark case (Figure 1) pointed to a lead horizon of three quarters, in the case examined here the term spread indicates future real output only two quarters ahead. This is due to the specification of the reaction function, where there is no lag between changes in output and policy reaction and the agents thus expect the restriction to come much "earlier," before the shock. In line with our illustration above (country A and B), the term spread's predictive ability for future inflation disappears completely.

3.2 The term spread and the formation of expectations

Since the predictive ability of the term spread is based on agents' expectations of future economic development, the way agents form expectations is possibly an important determinant of the relation between the term spread and future inflation or economic activity. Before examining the above results in more detail in the following section, this section examines this proposition. We first focus on the way agents set long-term interest rates based on expected short-term rates, and then on the way inflation and exchange rate expectations are formed.

3.2.1 Long-term interest rates and the rational expectations hypothesis

When specifying the model in Chapter 2, we discussed possible reasons for empirical failure of the REH. Our baseline specification, however, was based on the findings of Kotlán (1999c) that the REH holds in the Czech inter-bank market. In this section, we relax the assumption that all agents behave according to the REH.

There is still another reason for doing so apart from the problems of empirical evaluation of the REH mentioned in Chapter 2. The employed model assumes there is only one asymmetry between the central bank and the rest of the agents. This asymmetry rests in the difference between the formation of inflation expectations for the two types of agents (equation 4 vs. equation 10). The assumption that only a portion of the agents set interest rates according to the REH may be viewed as introducing yet another asymmetry. This one represents the uncertainty agents face while trying to pin down the central bank's reaction function. The impact of this uncertainty on the predictive properties of the term spread is partly discussed by Roley and Sellon (1996), and Favero (2001). The latter paper, using a GE macroeconomic model, shows that it may be this uncertainty about monetary policy behavior that often leads to empirical rejection of the REH.

We approach the problem by supposing that the fraction of agents who are unsure about the central bank's reaction function set long-term interest rates in a rather naive way by identifying them with current short-term interest rates. Specifically, we suppose that half of all agents behave
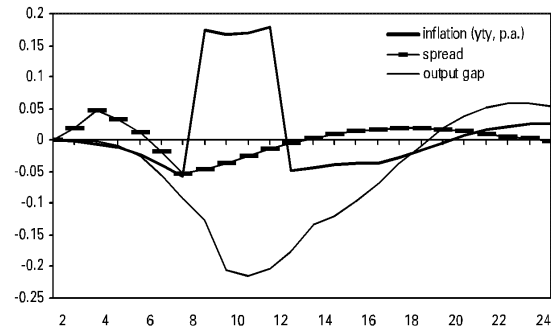
in this way, and we thus set the coefficient α_{51} in the term structure equation (5) to 0.5. *Figure 5* depicts the responses of the observed variables to demand and supply shock simulations.

FIGURE 5 Expectations hypothesis partly ignored

Demand shock
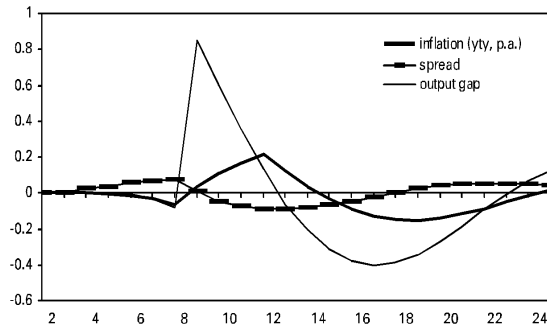
Supply shock

Examination of the responses and their comparison with the benchmark results of Figure 1 leads to the following conclusion. Although the responses of inflation and real economic activity are similar, the elasticity of their relationships with the term spread changes significantly. The predictive ability of the term spread does not vanish, but there is a marked quantitative change, which is explored further in section 3.3 below.

3.2.2 Expectations about future exchange rate and inflation

While the previous paragraphs examined what happens to the predictive properties of the term spread if the number of agents who form expectations rationally goes down, this section takes up the opposite situation. We examine the impact of "expectations rationality" on the term spread's predictive ability. Namely, we let all the agents forming expectations on the future exchange rate (equation 3) and inflation (equation 10) behave fully rationally (model-consistently), and set $\alpha_{31} = 1$ and $\alpha_{11} = 0$ (in line with the baseline case, we reset α_{51} back to zero). Simulation results are summarized in *Figure 6.*

FIGURE 6 The case of rational expectations

Demand shock
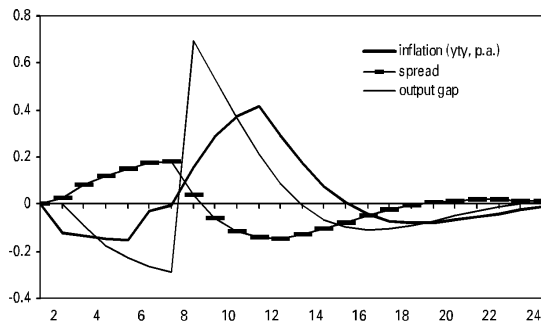
Supply shock
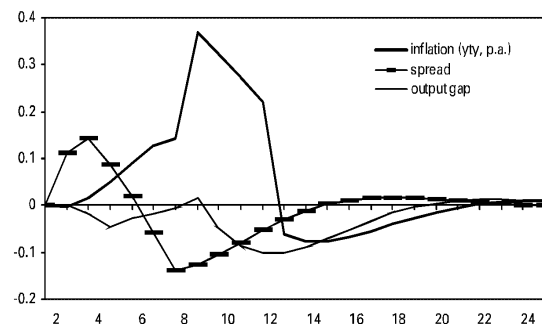
The basic feature of the responses in Figure 6 as compared to our benchmark case in Figure 1 is the faster convergence of all variables towards their long-term equilibrium levels in the period after the shock actually takes place. In the same time under a purely forward-looking economy, both demand and supply shocks lead to a deeper initial fall in real economic activity. After inspecting the responses of other variables not shown in Figure 6, we conclude this happens because of the quick initial appreciation of the real exchange rate driven by a rationally expected rise in inflation. Overall, the term spread remains a good indicator of future inflation.

3.3 Summary of the results and discussion

The results of the simulations are summarized in *Table 2* below. The first column characterizes the type of simulation performed and thus also the question we sought to address. The second column shows the value of the modified model coefficients used in the given simulation. The third column presents our results with regard to future inflation, and the fourth with regard to future real economic activity. The results are presented in a simple yes/no form (i.e. indicate/doesn't indicate future inflation or output) with the optimal lead horizon in parentheses. In the case that the results for both types of shocks are positive, we further examine the outcome by performing a series of OLS regressions using the data values obtained in the simulations performed. We let inflation and real economic activity be explained by the term spread with an appropriate lag. For the sake of brevity, we only report the coefficient on the term spread (always significant on standard levels) and the fit of the regression, displaying R^2 in parenthesis.

TABLE 2 Summary of the results

Model	Modified coefficients	Spread indicates inflation (lead in quarters)		Spread indicates output (lead in quarters)	
		Demand shock coefficient (R^2)	Supply shock coefficient (R^2)	Demand shock coefficient (R^2)	Supply shock coefficient (R^2)
Baseline	original	yes (5–6) 0.88 (0.79)	0.88 (0.17)	no	
Smaller smoothing	$\alpha_{41} = 0.4$	yes (5–6) 0.23 (0.33)	0.39 (0.07)	no	
Higher weight on inflation gap	$\alpha_{42} = 5$ $\alpha_{43} = 0$	yes (5–6) 0.71 (0.81)	0.66 (0.63)	yes	
Higher weight on output gap	$\alpha_{42} = 0$ $\alpha_{43} = 5$	no		yes (2) 0.68 (0.69)	0.76 (0.43)
REH partly ignored	$\alpha_{51} = 0.5$	yes (6) 1.82 (0.82)	2.26 (0.42)	no	
Rational expectations (eq. 3 and 10)	$\alpha_{31} = 1$ $\alpha_{11} = 0$	yes (6–7) 1.35 (0.59)	1.53 (0.52)	no	

The *baseline simulation* results reported in the first row show that the term spread has a substantial predictive power for future inflation. The coefficients lead to the conclusion that a one percentage-point difference between the long-term (1Y) and short-term (3M) interest rates indicates that inflation 5 to 6 quarters in the future is expected to be about 0.9 percentage-points above the inflation target. As the baseline model coefficients should best mimic the Czech economy, this finding is important.

After reviewing the results of the baseline simulations, let us now inspect the findings with regard to the role of monetary policy behavior. The outcomes are summarized in rows 2–4 of Table 2. Smaller *interest rate smoothing*, i.e. more activist monetary policy, leads to a weakening of the predictive ability of the term spread (lower fit of the regressions). This result is not surprising. If the agents are aware of the fact that monetary policy will react to changes in economic conditions more flexibly, the term spread becomes more volatile. Since higher policy flexibility at the same time leads to lower volatility of inflation and output, the relation between these variables and the term spread becomes weaker. In the case of a *greater weight on the inflation gap* in the reaction function, the term spread remains a good indicator of future inflation. The quantitative changes are very small and the results seem even more robust when the fit of the regressions is examined. The results are completely reversed when the reaction function is specified with a *greater weight on the output gap*. Inspecting the results in the fourth row, we conclude that while the predictive properties in terms of future inflation have disappeared, the term spread is now a good indicator of future real economic activity. Quantitatively, the plausible outcome is that the term spread of one percentage-point in this case indicates future output to be about 0.7 percentage-points above its equilibrium value. These results differ from those of Estrella (1998), who concludes that if the reaction function includes just the output gap, the term spread indicates future real output (four quarters ahead) and inflation (eight quarters ahead). Estrella further shows that when only the inflation gap is considered for setting the policy rate, the predictive ability of the term spread vanishes. The experiments we performed suggest the differences can be explained by the role of the exchange rate transmission channel in a small open economy. Consider two examples. First, in the case of greater weight on the output gap we find no link with future inflation. This can be blamed on exchange rate appreciation that pushes inflation back to the target quickly (see demand shock responses depicted in Figure 4). Second, the shorter lead horizons in our simulations can again be attributed to the working of the exchange rate transmission channel that greatly speeds up monetary policy effects in a small open economy.

Another series of simulations was performed in section 3.2 with the aim of examining the influence of the way expectations are formed. The results are summarized in the last two rows

of Table 2. Even though the predictive ability of the term spread remains high, the relation is quantitatively different. Namely, if the fraction of agents not setting long-term interest rates in accordance with the *rational expectations hypothesis* increases, the same value of the term spread indicates future inflation that is farther above the target than in the baseline case. The fact that agents do not set long-term interest rates based on expected central bank action, makes the central bank behave more aggressively. Higher short-term rates are necessary to influence long-term rates, and the term spread thus falls. A smaller spread is then connected to similar values of inflation and real output as in the baseline case. The last row summarizes the results for the case of *rational exchange rate and inflation expectations*. The term spread remains a good indicator of future inflation, albeit the quantitative relation changes slightly.

4. Conclusions

The main findings of this paper can be summarized as follows:

1. The predictive ability of the term spread with regard to future inflation and real economic activity is not structural but depends on monetary policy behavior and on how agents' expectations are formed. It is therefore necessary to use a model of the economy with endogenous monetary policy and expectation formation in order to find out what variables the term spread indicates and with what lead.

2. The term spread's predictive ability, with regard to future inflation, increases as more weight is placed on inflation stabilization in the central bank's reaction function. Similarly, the term spread's predictive ability with regard to future real economic activity increases as more weight is placed on real economic activity stabilization in the central bank's reaction function.

3. In the Czech economy, the term spread between one-year and three-month PRIBOR interest rates of one percentage-point indicates that agents expect inflation to be almost one percentage-point above the target six quarters in the future.

Even though we tend to think the results presented in this paper present a certain amount of progress in the understanding of the predictive properties of the term spread, we are aware of its limitations. First, further research will be focused on performing stochastic simulations with reaction function derived from the central bank's loss function. Second, developing a truly structural model of the Czech transition economy certainly remains among the biggest challenges.

The results suggest that the term spread is a good indicator. However, this does not say much as to what importance should be assigned to the term spread in the conduct of monetary policy. On the one hand, it is tempting to say the "predictions" of the term spread may form a valuable input into monetary policy decision making. After all, many central banks pay considerable attention to its development. On the other hand, the warnings of Lucas (1976) or Goodhart (1981) fully apply. Since the relation between the term spread and future inflation or output is based upon agents' expectations, and monetary policy action alters those expectations, using the term spread as a direct input into setting policy does not seem to be a wise decision. The central bank always needs to bear in mind that the information based upon agents' expectations is only a supplement and that inflation targeting cannot be successfully implemented without a forward-looking structural model. Indicators may, however, help assess the degree to which the policy is understood and believed. As credibility is one of the main preconditions for a successful inflation targeting strategy, this is a very important function.

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SUMMARY

Using a simple single-equation approach, many studies have shown that the term structure of interest rates or its approximation – the term spread – is a useful indicator of future inflation and/or future real economic activity. However, this paper argues that shortcomings of the single-equation approach may produce results that are biased, and that the predictive ability must be analyzed from within a model framework. We have elected to use a simple macroeconomic model of a small open economy and examine the predictive properties of the term spread from within its framework.

The main contribution of this paper to the literature is threefold. First, we show that the predictive ability of the term spread is not structural but monetary-policy dependent. Second, we argue that the term spread's predictive ability with regard to future inflation (real economic activity) increases as more emphasis is placed on inflation (real economic activity) stabilization in the central bank's reaction function. Third, we show that understanding the way expectations are formed is an important prerequisite for using the term spread as an indicator.

Apart from these general findings, the predictive power of the term spread is examined in the context of the Czech economy. It is shown that the term spread between one-year and three-month PRIBOR interest rates of one percentage-point indicates that agents expect inflation to be almost one percentage-point above the inflation target six quarters in the future.

APPENDIX

TABLE A1 Overview of recent research findings

Author(s)	Predicts future real output		Predicts future (change in) inflation	
	Yes	No	Yes	No
Mishkin (1991)	-	-	France, Germany, UK	Canada, Switzerland
Hu (1993)	France, Italy, Canada, Germany, USA	Japan, UK	-	-
Plosser and Rouwenhorst (1994)	Germany, USA	UK	-	-
Bernard and Gerlach (1996)	Canada, Germany, USA	Japan	-	-
Bonser-Neal and Morley (1997)	France, Canada, Germany, USA Australia, Holland, UK	Italy, Japan, Sweden, Switzerland	-	-
Estrella and Mishkin (1997)	Germany, USA	Italy	Italy, Germany, USA	France, UK
Kozicki (1997)	Australia, Italy, Canada, Germany, USA	Sweden, Switzerland, UK	-	-
Kozicki (1998)	-	-	Australia, Japan, Canada, USA Germany, Sweden, Switzerland	Italy, France, Holland, UK

FIGURE A1 Aggregate demand shock

Nominal variables
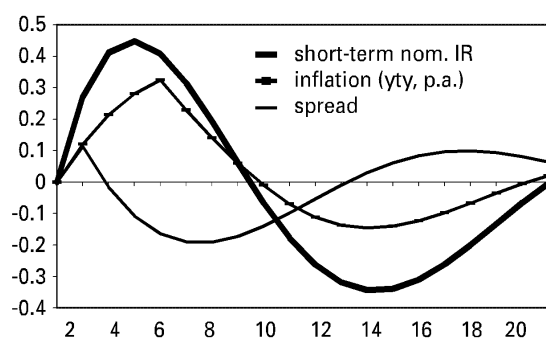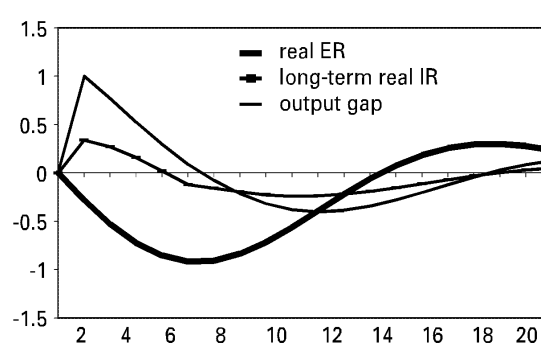
Real variables

FIGURE A2 Supply (cost-push) shock

Nominal variables
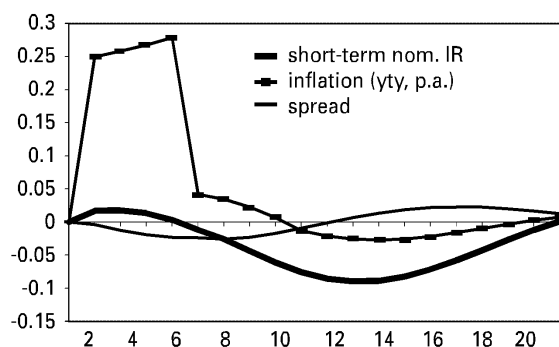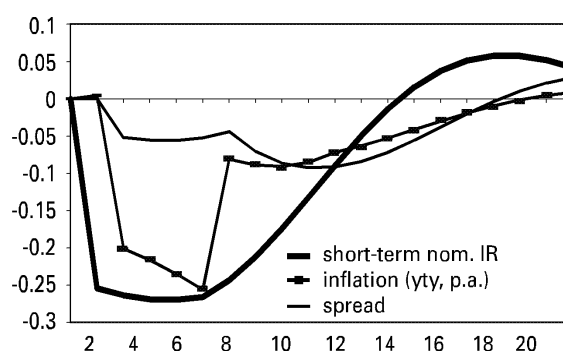
Real variables

FIGURE A3 Foreign inflation shock

Nominal variables
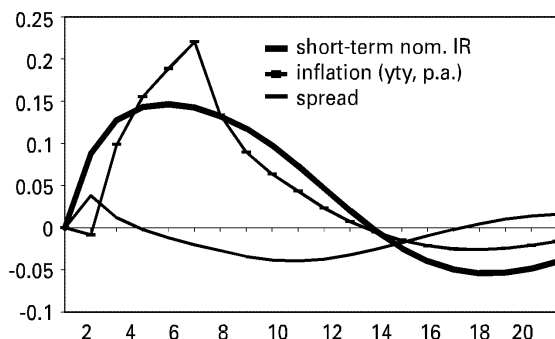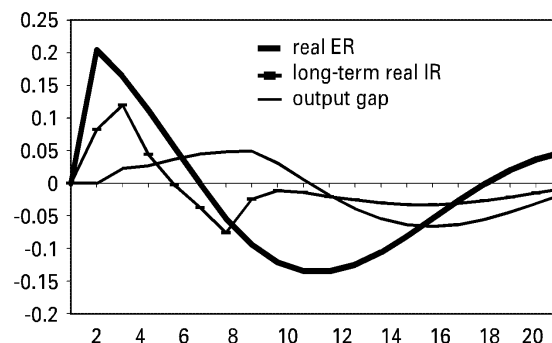
Real variables

FIGURE A4 Exchange rate shock (nominal depreciation)
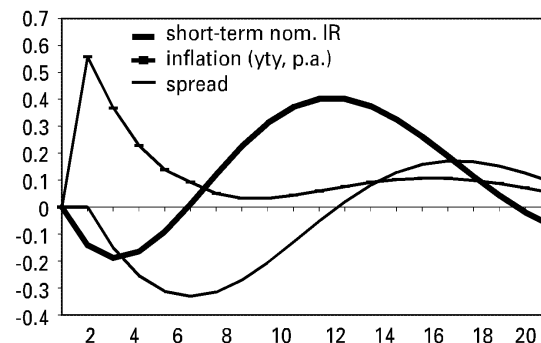
Nominal variables
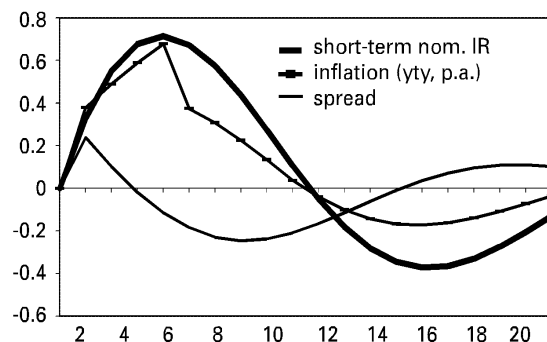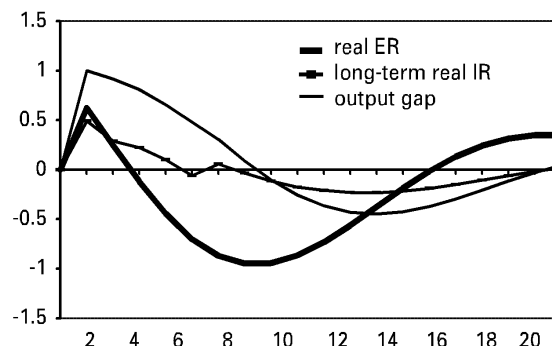
Real variables

FIGURE A5 Reaction function (monetary) shock

Nominal variables
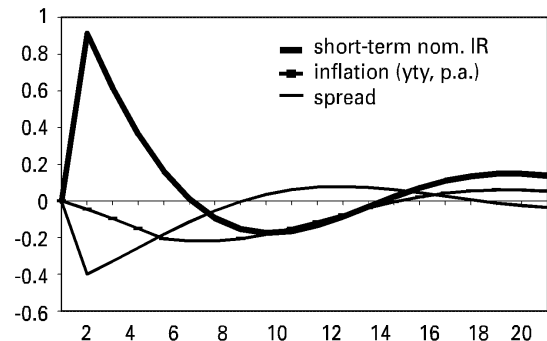
Real variables

Intra-industry Trade and Geographical Size Differences between Slovenia and the Czech Republic[1]

Stanislav ČERNOŠA[*]

1. Introduction

The objective of the present study was to measure intra-industry trade in overall trade of Slovenia and the Czech Republic at the 3-digit level of SITC. Our previous empirical analysis (Černoša, 2000) showed that in the period from 1993 to 1997 Slovenia and the Czech Republic had a similar structure of exports and imports, similar shares of intra-industry trade (GL indices), and they also reveal similar comparative advantages (RCA indices). The previous analysis was carried out using statistical data at the 2-digit level of SITC. The present article is based on the statistical data at the 2-digit and 3-digit level of SITC for the period 1995 to 2000. The results of analysis showed that at the 2-digit level of SITC both observed countries achieved similar shares of intra-industry trade and that at the 3-digit level of SITC Slovenia and Czech Republic achieved different intra-industry trade values in the period from 1995 to 2000.

The central aim of this article is to test two hypotheses. The first hypothesis supposes that Slovenian and Czech overall levels of intra-industry trade in the second half of the 1990s were considerably closer to those of industrialized developed market economies. Greenaway and Milner (1986, p. 92) examined the similar hypothesis that the recorded level of intra-industry trade would be greater in the trade of countries subject to some kind of economic integration than in the trade of non-integrated countries. The second hypothesis supposes that intra-industry trade is an increasing function of income (GDP) per capita and market size.[2] According to this hypothesis, the level of intra-industry trade of each country is correlated with gross domestic product per capita and market size. Greenaway and Milner also tested the similar hypothesis that the growth of average levels of intra-industry trade is directly correlated to the growth of per capita income (Greenaway – Milner, 1986, p. 91).

Grubel and Lloyd (1975) presented a number of possible sources of intra-industry trade and methodology of measuring intra-industry trade. Since the phenomenon of intra-industry trade can be associated with a variety of different market structures, Greenaway and Milner (1986) distinguished between various models of intra-industry trade in a variety of different market structures. Thus intra-industry trade in *structurally competitive markets* can be explained by means of neo-Heckscher-Ohlin models, neo-Chamberlinian models of monopolistic competition and neo-Hotelling models of monopolistic competition. Intra-industry trade in *oligopolistic markets* can be explained by a model of trade in identical commodities, a model of trade in horizontally differentiated commodities and a model of trade in vertically differentiated commodities. Finally, intra-industry trade is characteristic for markets where *multi-product firms* and *multi-national firms* operate.[3]

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[1] I wish to thank anonymous reviewers, the editor and the editor-in-chief.

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[2] The second hypothesis is adopted from McAleese (1979, p. 142).

[3] For details see (Greenaway – Milner, 1986).

The neo-Heckscher-Ohlin model (Falvey, 1981, p. 495–511) is grounded in a two-country, two-factor setting, where each country has different endowments of capital (K) and labour (L). The differential endowments result in different factor prices in the two countries with the foreign price of labour being relatively low and the domestic price of capital being relatively low. It is assumed that the higher capital-labour ratio results in a higher quality of products. As a consequence of the assumption that a higher capital-labour ratio results in higher quality, the capital-abundant country exports relatively high quality products, whilst the labour-abundant country exports relatively low quality products. The direction of trade is also determined by this model and is therefore of interest to both countries because it provides an explanation of intra-industry trade between European-developed economies and Central European economies at the end of the 1990s.

The first and second chapter are dedicated to descriptive matters. In the first chapter we present some economic indicators for Slovenia and the Czech Republic, and in the second we present trade at the 1-digit level of SITC. In the third chapter we present methodology (GL indices) and results of measuring intra-industry trade of Slovenia and the Czech Republic at the 2-digit and 3-digit level of SITC for the period from 1995 to 2000. For the needs of empirical calculations in this study, we use published or internal statistical data from two sources: the Statistical Office of Slovenia and the Czech Statistical Office.

2. General Description

TABLE 1 Some Economic Indicators for Slovenia and Czech Republic from 1995 to 2000

	1995		1996		1997		1998		1999		2000*	
	SI	CZ	SI	CZ	SI	CZ	SI	CZ	SI	CZ	SI	CZ
GDP growth in %	4.1	5.9	3.5	4.8	4.6	-1	3.8	-2.2	4.9	-0.2	4.8	3.1
GDP p.c. (USD)	9431	5052	9481	5624	9163	5111	9878	5408	10078	5157	9950	4822
Inflation in %	8.6	9.1	9.9	8.8	8.4	8.5	7.9	10.7	6.1	2.1	8.7	3.9
Unemployment in %	14.0	3.0	13.9	3.1	14.4	4.4	14.3	6.0	14.1	8.5	12.6	9.0
Productivity in %	3.3	3.3	4.4	4.1	5.2	0.9	3.8	-0.6	4.2	3.0	3.5	5.4
Export (million USD)	8316	21647	8310	21910	8369	22785	9051	26395	8546	26821	8731	32382
Import (million USD)	9492	25252	9421	27721	9367	27177	10111	28989	10083	28888	10115	36046
Trade bal.(million USD)	-1176	-3605	-1111	-5811	-998	-4392	-1060	-2594	-1537	-2067	-1384	-3664
Current-acc. (mil. USD)	-23	-1369	31	-4292	11	-3211	-147	-1336	-783	-1567	-625	-2369
Foreign debt (bil. USD)	3.0	16.5	4.0	20.8	4.1	21.4	4.9	24.0	5.4	22.6	6.2	21.3
F. Reserves (mil. USD)	1801	13843	2297	12352	3315	9734	3638	12542	3168	12806	3100	12990

Note: *Temporary data for the year 2000.

Source: Bank of Slovenia Bulletin 2000, February 2001, p. 14; EU Country Report - Slovenia, November 2000, pp. 5; Statistical Yearbook of the Republic of Slovenia 2000, pp. 381 and 678; Rapid Reports of the Statistical Office of Slovenia, 29 March 2001, pp. 10 and 11; Internal Statistical Data of the Czech Statistical Office; EU Country Profile, Czech Republic, October 2000, p. 5; Yearbook of the Czech Republic External Trade 1997 and 1998; Main Economic and Social Indicators of the Czech Republic 1990–2000, May 2001, no. 16, p. 3.

A comparison of the gross domestic product growth (GDP), gross domestic product per capita (GDP p.c.), inflation, unemployment rate, productivity, foreign trade (export and import),

trade balance, current-account balance, total foreign debt, and foreign reserves (excl. gold) was carried out for Slovenia and the Czech Republic for the period from 1995 to 2000 (see *Table 1*).

The gross domestic product growth in Slovenia was 4.9 % in the first half of 2000 and lower in the second half of the year yielding an annual GDP growth of 4.8 %. In the period from 1995 to 2000 Slovenia achieved approximately 4.3% growth of GDP. The forecast of real GDP growth of approximately 4 % for the period 2001–2002 is connected with the growth of manufactured exports and strong increase in foreign direct investment (EU Country Report, Slovenia, 2000, p. 10). Slovenia otherwise provided its own economic growth without foreign assistance by running into debts or selling national property (Mencinger, 1998, p. 27). Among other indicators for Slovenia in Table 1, we should stress the current-account balance deficit (except in 1996 and 1997), and trade balance deficit from 1995 to 2000.

In the period from 1995 to 1998 Slovenia's imports slowly decreased. In 1999 Slovenia had the strongest imports, so both the trade balance deficit and current-account deficit increased. It is worth mentioning that in July 1999 Slovenia introduced value-added tax (VAT). Consequently, imports in the first half of 1999 increased enormously, mainly through imports of passenger cars (Mencinger, 2000, p. 22). In the second half of 1999 the current account deficit also increased due to deterioration in the balance of services. In 2000 Slovenia's imports decreased, but current account was almost unchanged. The new reason for the imbalanced current account was higher oil prices on the world market. A comparably high current account deficit in 1999 and 2000 could lead to the trends of indebtedness in Slovenia becoming similar to those observed in the Czech Republic in the period until 1998.

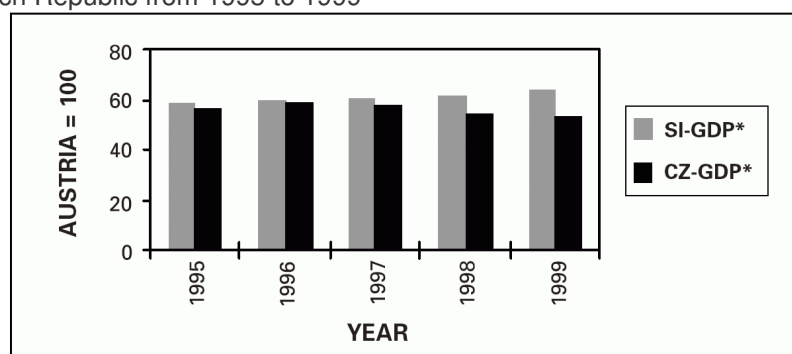FIGURE 1 Gross Domestic Product per capita for Slovenia and the Czech Republic from 1995 to 2000
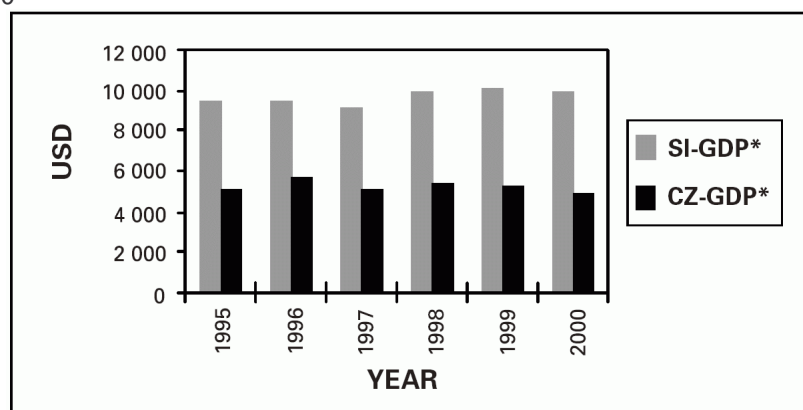
Note: * GDP per capita - Temporary data for the year 2000.

Source: Statistical Yearbook of the Republic of Slovenia 2000; Rapid Reports of the Statistical Office of Slovenia, 29 March 2001; EU Country Profile, Czech Republic, October 2000, pp. 5; Main Economic and Social Indicators of the Czech Republic 1990–2000, May 2001, p. 3.

In the period from 1995 to 1996 the Czech Republic's imports increased, resulting in a higher trade balance and current account deficits. The Czech Republic's balance of payments shows a surplus mainly because the capital account was favourable. Therefore, a close connection between the increase in total foreign debt and GDP growth in the Czech Republic was interesting from 1994 to 1996. But in 1997 the Czech Republic recorded lower levels of GDP growth which coincided with a more temperate increase in foreign debts. At the end of the 1990s a close connection between total foreign debt and GDP growth in the Czech Republic was no longer present. Thus in 1999 and 2000 the Czech foreign debt decreased and real GDP growth increased. Similarly from 1997 to 1999 the Czech Republic's trade balance deficit decreased as did the current-account deficit connected with it. The forecast of approx 3.1% growth of real GDP in the Czech Republic in 2001 and 4.3% growth in 2002 is connected with the increase in manufactured exports and strong inflows of foreign direct investment (EU Country Report, Czech Republic, 2000, p. 10).

The data in Table 1 also show that both countries differ as to the unemployment rate, as in the observed period Slovenia had a higher unemployment rate than the Czech Republic. In the observed period the growth of productivity in Slovenia was approximately 4 %, while the growth in the Czech Republic was lower by approximately one-third. Slovenia and the Czech Republic also differed with regard to foreign trade turnover. In the observed period the Czech Republic had approximately three times greater exports and imports in comparison with Slovenia. A relatively similar ratio, i.e. 1 to 3, applies to the achieved gross domestic product in the observed period as well. In this period a rather unequal GDP growth and GDP per capita is characteristic of both countries. The countries thus substantially differ by their GDP per capita, as in the observed period the Czech Republic achieved values approximately half as low compared to Slovenia (see *Figure 1*).

FIGURE 2 Gross Domestic Prroduct in Purchasing Power Parities per capita[4] for Slovenia and Czech Republic from 1995 to 1999

Note: * Goss domestic product in purchasing power parities per capita; Volume indices.

Source: Statistical Yearbook of the Republic of Slovenia, 2000, p. 679.

Figure 2 shows GDP in purchasing power parities per capita for Slovenia and Czech Republic from 1995 to 1999. It is important to note that Slovenia, compared to the Czech Republic, achieved almost the same GDP growth measured in purchasing power parity. In other words, the two countries substantially differ by their GDP per capita measured at current prices and at current exchange rates (see Figure 1), but they show similarities in their GDP growth measured in purchasing power parities per capita (see Figure 2).

3. Descriptive part – Trade at 1-digit level of SITC

A comparative analysis of the Slovene and Czech export and import commodity structure was carried out at the 1-digit[5] level of the Standard International Trade Classification (SITC) for the period 1995 to 2000.[6]

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[4] It is worth mentioning that GDP in purchasing power parities per capita cannot possibly be compared with foreign trade data measured at current price and current exchange rates.

[5] On the 1-digit level of SITC (Rev. 3) there exist ten sections, which are as follows:

   0 – Food and live animals, 1 – Beverages and tobacco, 2 – Crude materials, inedible, except fuels,

   3 – Mineral fuels, lubricants and related materials, 4 – Animal and vegetable oils, fats and waxes,

   5 – Chemical and related products, 6 – Manufactured goods classified chiefly by material,

   7 – Machinery and transport equipment, 8 – Miscellaneous manufactured articles,

   9 – Other commodity and transactions.

[6] temporary data for 2000

FIGURE 3 Commodity Structure of Slovene and Czech Exports for the Year 1995 and 2000
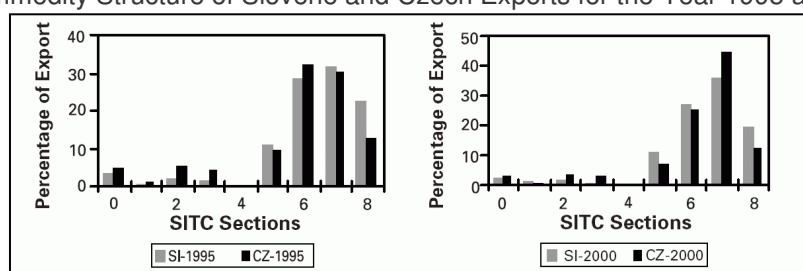
Source: Statistical Yearbook of the RS 1998 and 2000; Rapid Reports of the Statistical Office of Slovenia, 29 March 2001; Internal Data of the Czech Statistical Office; Yearbook of the Czech Republic External Trade 1997.

Figure 3 confirms that in 1995 the structures of exported manufactured goods in Slovenia and the Czech Republic were relatively similar. In 2000 both countries changed the structure of exports of manufactured goods in a similar way. But it is more characteristic for the Czech Republic that in the observed period the exports share of manufactured goods classified chiefly by material decreased, while machines and transport equipment shares increased in total exports. It is necessary to add here that the Czech government, in contrast to Slovenia, allowed foreign capital inflows and in this way enabled faster restructuring.[7] *Figure 4* further shows that in 1995 both countries' import structure of manufactured goods was similar and it remains almost unchanged in 2000. One exception was the Czech import share of machinery and transport equipment, which grew faster than Slovenia's import share of machinery and transport equipment between 1995 to 2000.

FIGURE 4 Commodity Structure of Slovene and Czech Imports for the Years 1995 and 2000
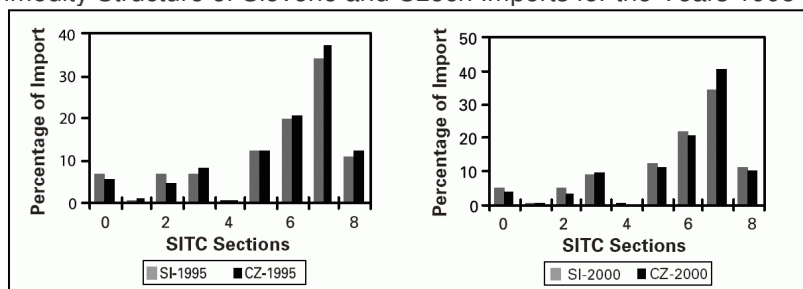
Source: Statistical Yearbook of the RS 1988 and 2000; Rapid Reports of the Statistical Office of Slovenia, 29 March 2001; Internal Data of the Czech Statistical Office; Yearbook of the Czech Republic External Trade 1997.

4. Methodology

Grubel and Lloyd defined intra-industry trade (*Ri*) as the value of exports of an "industry" which is exactly matched by the value of imports of the same industry (Grubel – Lloyd, 1975, p. 20):

$$Ri = (Xi + Mi) - |Xi - Mi| \tag{1}$$

where *Xi* and *Mi* are the values of exports and imports of an industry priced in home country currency, and *i* = 1, ...*n*, where *i* denotes industry and n is the number of industries at a chosen level of aggregation, which is Standard International Trade Classification – SITC. It is also possible to explain intra-industry trade as an exchange of products for the same or similar products, as for

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[7] There are also theoretical grounds for expecting multinational involvement in a market and the level of intra-industry trade to be positively related – see (Greenaway – Milner, 1986, pp. 43–55).

instance an exchange of Czech-made Skoda cars for German-made Volkswagen cars, or Italian wines for Slovenian wines.

For the measurement of actual intra-industry trade, the bulk of empirical studies use the following *GLi* index proposed by Grubel and Loyd (Grubel – Lloyd, 1975, p. 21):

$$GLi = \frac{\left[(Xi + Mi) - |Xi - Mi|\right]*100}{(Xi + Mi)} \qquad (2)$$

and *GLi* index in its contracted form (Greenaway – Milner, 1986, p. 62):

$$GLi = \left(1 - \frac{|Xi - Mi|}{(Xi + Mi)}\right)*100 . \qquad (3)$$

In this equation, *GLi* represents the Grubel/Lloyd indices for particular groups *i*, *Xi* represents the export of the specified product group, while *Mi* represents the import of the specified group (see *Appendix 1*).

The present analysis of intra-industry trade in the overall trade of the observed country is thus based on Grubel-Lloyd (GL) indices.[8] The analysis by GL indices was implemented at the one, two and three-digit levels of SITC for the foreign trade of Slovenia and the Czech Republic with all countries (overall trade). For the year 2000 only temporary data for both countries at the one and two-digit level of SITC were available. Because of the above-mentioned reason, the analysis was conducted at the 2-digit level of SITC for the period from 1995 to 2000.

FIGURE 5 Slovene and Czech *GL* Indices Values (Weighted average) for All Industries (SITC 0–9)
and Manufactured Goods (SITC 5–8) from 1995–2000
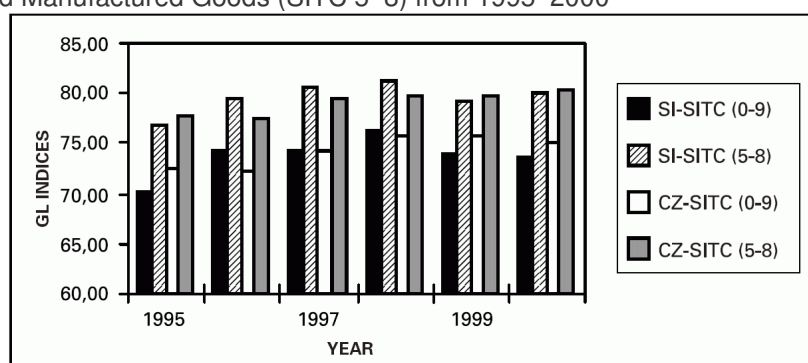
Source: Statistical Yearbook of the RS 1988 and 2000; Rapid Reports of the Statistical Office of Slovenia, 29 March 2001; Internal Data of the Czech Statistical Office; Yearbook of the Czech Republic External Trade 1997 and 1998 and proper calculation at the two-digit level of SITC from 1995 to 2000.

Comparing the intra-industry trade values in overall trade for Slovenia and the Czech Republic shows that GL indices values in 1995 are different for both countries, for all products, i.e. industries SITC 0–9 as well as for manufactured goods SITC 5–8. It was also stated that *GL* indices value growth for the specified years of the observed period were different, although in 1997 the indices values for both countries were relatively similar, either for all industries SITC 0-9 or for manufactured goods SITC 5–8. In 2000, *GL* indexes values for both countries were also relatively similar, so in the observed period the growth of intra-industry trade (weighted average) in overall trade of both countries was relatively similar (see *Figure 5*).

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[8] See Appendix 1

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The analysis at the 2-digit level of SITC showed that *GL* indices values range from 70 % to 80 %, meaning that the *GL* indexes values are lower at more disaggregated levels of SITC (for example the three or four-digit level) (see *Figure 6*). General connections between different levels of SITC and *GL* indices values are as follows. At the 1-digit level of SITC the *GL* indices values are highest, they slowly decrease in parallel with the disaggregation of the SITC levels, and are lowest at the seventh 7-digit level of SITC. Thus the Czech *GL* indices values calculated at the 3-digit level are lower than those at the 2-digit level of SITC, either for all industries SITC 0–9 (approximately 9.1 %) or for manufactured goods SITC 5–8 (approximately 8.4 %).

Similarly Slovenian *GL* indices values calculated at the 3-digit level of SITC were approximately 18.6 % lower for industries SITC 0–9 and approximately 19.1 % for manufactured goods SITC 5–8 than values calculated at the 2-digit level of SITC. Thus the empirical results confirmed that the measurement of intra-industry trade in overall trade at the 3-digit level of SITC compared to that at the 2-digit level of SITC is more sensitive and appropriate for Slovenia and the Czech Republic. As regards the 3-digit level of SITC there is a degree of professional consensus that this is a reasonable, initial approximation of an industry.[9]

FIGURE 6 Slovene and Czech *GL* indices (weighted average) at the One, Two and Three-digit Level of SITC for All Industries (SITC 0–9), and Manufactured Goods (5–8 SITC)* in 1997
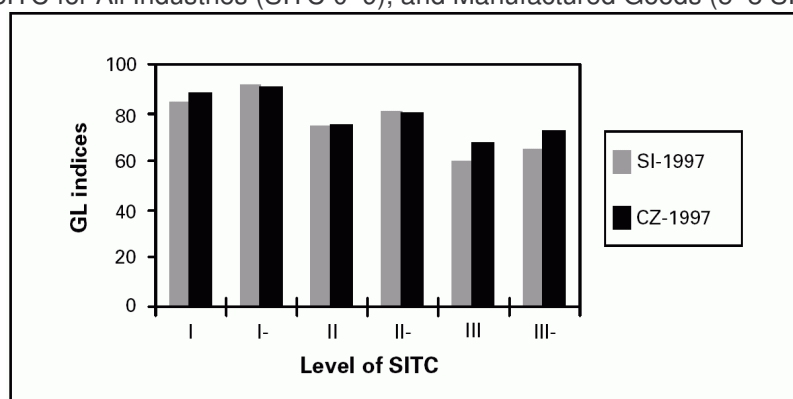
Note: * The second pair of columns marked (I-, II-, III-,) of each levels of the SITC represent *GL* indices values of manufactured goods 5-8 SITC.

Source: Statistical Yearbook of the RS 1988. Internal Data of the Statistical Office of RS; Yearbook of the Czech Republic External Trade 1998 and proper calculation at the one, two and three-digit level of SITC.

It is also possible to select more disaggregated levels of SITC, for example the 4, 5 or 7-digit level of SITC. If none of these levels of aggregation is sensitive enough for a specific purpose, two options are available. The first is a re-arrangement of the official classification to produce new "industry" groupings, which conform more closely to a researcher's own theoretical construct of a specific industry. A second approach, which implies a more formal and systematic procedure for evaluating the extent of categorical aggregation at the particular level of aggregation, is to calculate an adjusted index of intra-industry trade at the 3-digit level of SITC using subgroups at the 4-digit level of SITC.[10] The suggested formal and systematic procedure however leaves many categorical aggregation problems open.

We will now proceed to introduce McAleese's hypothesis that intra-industry trade is an increasing function of income per capita and market size (McAleese, 1979, p. 142). According to the aforementioned hypothesis the level of intra-industry trade of each country is correlated with

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[9] Greenaway and Milner (1986, p. 77) argue that the 3-digit level of SITC is reasonable initial approximation of an industry. Since the great many researchers have conducted documentary and econometric work at the 3-digit level of SITC, the above-mentioned level is indicative for a degree of professional consensus.

[10] Greenaway and Milner suggested the above-mentioned procedure Greenaway – Milner, 1986, p. 76):

gross domestic product per capita (measured in USD) and market size (measured by population). Both observed countries are in general declared as relatively small countries, therefore the Czech Republic has an advantage in terms of population and Slovenia has a slight advantage measured by GDP per capita. It is also known that small countries such as Belgium or Luxemburg (Greenaway – Milner, 1986, p. 103) showed relatively high values of intra-industry trade in overall trade (79.0 % in 1978). By contrast, large countries like the USA showed relatively low values of intra-industry trade (59.0 % in 1979) in overall trade. But in general the smallness of the domestic market is seen by the Dreze standardization thesis as a limit on the extent to which a country can benefit from scale economies in production when differentiable goods are produced (Greenaway – Milner, 1986, p. 102).

FIGURE 7 Intra-industry Trade (weighted average) for All Industries (0–9 SITC) and GDP p.c. for Slovenia and Czech Republic in 1997
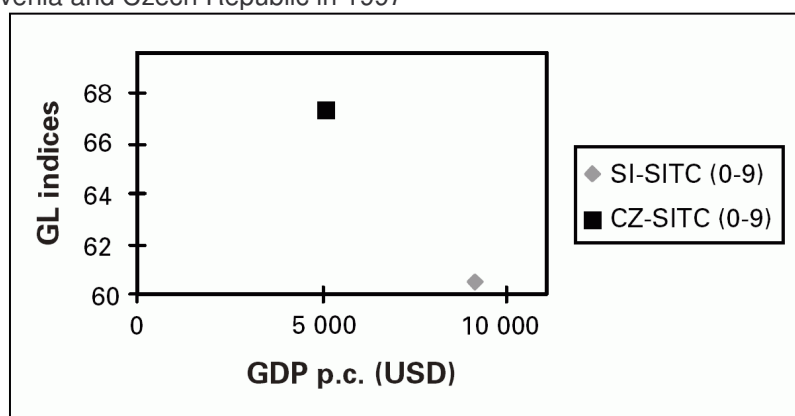
Source: Internal data of the Statistical Office of RS; Yearbook of the Czech Republic External Trade 1998 and proper calculation at the 3-digit level SITC.

Figure 7 shows that Slovenia in comparison with the Czech Republic has a higher GDP p.c., but its intra-industry trade in overall trade at the 3-digit level of SITC is lower by approximately 7 %. The share of intra-industry trade in overall trade of both countries is between 60 % and 85 %. In the 1980s such a share of intra-industry trade in overall trade was significant for developed market economies and some of the newly industrialized countries (Greenaway – Milner, 1986, p. 94). According to our findings the same holds true for the 1990s. Therefore the pattern of Slovenian and Czech levels of intra-industry trade also confirmed that per capita income (GDP p.c.) and intra-industry trade were not directly correlated.

It is worth mentioning that Slovenian and Czech overall levels of intra-industry trade in the second half of the 1990s are considerably closer to those of industrialized, developed market economies but simultaneously both observed countries have approximately more than 50 % lower GDP p.c. than developed market economies. Slovenian and Czech international economic relations in the 1990s predominantly caused intra-industry trade in overall trade to rapidly increase. The main foreign trade partner of both countries in the 1990s was Germany, and they also had an identical foreign trade partner in terms of a group of countries, namely the European Union (Černoša, 2000, p. 7). Thus Slovenia and the Czech Republic expanded their market in the 1990s[11] by means of the integration process.

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[11] McAleese defined the expansion of market size by two forms. McAleese defined the growth of internal market size as a growth of GDP and external market size as improved access to the foreign market. Both observed countries in 1990s expanded predominantly "external" market size, rather than internal market size.

TABLE 2   Intra-industry Trade and Exports Share of Selected Slovenian and Czech Groups of Manufactured Goods at the 3-digit level of SITC in 1997

	SLOVENIA			CZECH REPUBLIC	
SITC Group	Export (%)	*GL* indices	SITC Group	Export (%)	*GL* indices
533	1.61	69.08	665	1.52	23.16
542	4.54	53.06	673	1.28	98.61
625	1.86	36.02	676	1.99	50.71
635	2.19	14.95	679	1.15	82.97
641	2.91	64.70	741	1.08	92.77
642	1.78	85.33	773	1.43	96.22
651	1.25	83.83	782	1.32	98.75
663	1.01	63.63			
743	1.04	99.03			
764	1.09	76.30			
775	5.45	85.66			
841	1.61	91.44			
842	2.57	84.84			
845	1.32	94.64			
851	1.39	89.48			
684	2.77	72.92			
699	2.01	84.08	699	2.94	72.33
716	1.96	52.66	716	1.13	74.96
772	1.18	38.24	772	2.20	58.12
778	2.38	74.21	778	2.61	95.88
781	9.22	84.22	781	5.58	72.90
784	1.68	51.92	784	3.70	92.37
821	5.60	40.47	821	2.13	72.84
893	1.16	95.02	893	1.27	93.02
	Total	*Average**		*Total*	*Average**
	59.58	70.24		31.34	78.37

Note: * unweighted average

Source: Internal Data of the Statistical Office of RS; Yearbook of the Czech Republic External Trade 1998 and proper calculation at the 3-digit level SITC.

The analyses in the second chapter of this article showed that in the period 1995–2000 the Czech Republic increased exports more successfully than Slovenia did in the same period.[12] By introducing different forms of policies[13] the Czech government enabled faster restructuring towards encouraging production structure compatible with that of the higher income markets of industrial countries. The final result[14] was that the Czech Republic in comparison with Slovenia recorded higher values of intra-industry trade at the 3-digit level of SITC. Slovenia recorded lower intra-industry trade in overall trade because of different country size. The difference in country size caused Czech exports at the end of the 1990s to be more dispersed compared to Slovenian exports, with the latter being more concentrated (See Table 2).

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[12] Greenaway and Milner also tested the hypothesis that intra-industry trade will tend to be greater when there is a higher level of involvement by transnational corporations (Greenaway – Milner, 1986, p. 111).

[13] Greenaway and Milner argued that faster growth of GDP p.c. in newly industrialised countries may be developed by means of economic integration or by active orientation and forms of commercial policies (Greenaway – Milner, 1986, p. 105)

[14] Intra-industry trade is defined as the value of exports of an "industry" which is exactly matched by the imports of the same industry (that is the same group at the 3-digit level of SITC).

Table 2 shows that according to McAleese's hypothesis the level of intra-industry trade of Slovenia and Czech Republic is correlated with home market size and is not correlated with gross domestic product per capita.[15] Thus in 1997 Slovenian exports, compared to Czech exports in 1997, were more concentrated in a relatively narrow range of products[16]. 24 Slovenian groups at the 3-digit level of SITC account for 59.6 % of overall exports of the country in comparison to 15 groups of the Czech Republic, which account for 31.3 % of the overall exports of that country. At the bottom of Table 2 there are 8 groups that are identical for both observed countries in 1997. The Slovenian and Czech structures of exports were relatively similar and also concentrated in a few identical groups in 1997. The third and sixth columns in Table 2 show *GL* indices values, and the bottom of the aforementioned columns shows the average (unweighted) intra-industry trade in overall trade in 1997 of 24 Slovenian industries and 15 Czech industries at the third digit level of SITC. It is worth mentioning that the average (unweighted) *GL* indexes values of the chosen groups of both countries are higher than the average (unweighted) *GL* indexes values of overall trade of Slovenia and the Czech Republic. *Figure 8* shows average (unweighted) *GL* indexes values for both countries in 1997.

FIGURE 8   A comparison* of Alternative *GL* Indices Values at the Third Digit Level of SITC for Slovenia and Czech Republic in 1997
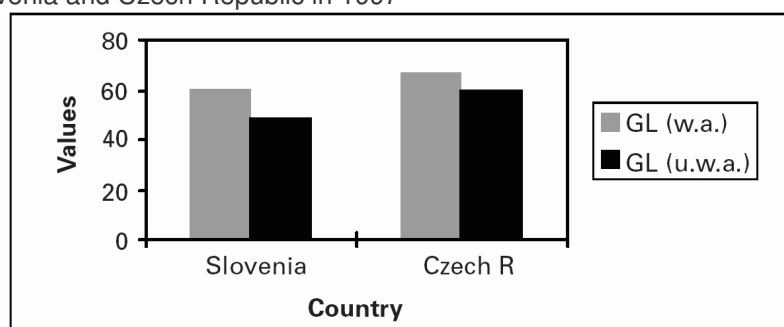
Note: * *GL* (w.a.) – *GL* indices values (weighted average); *GL* (u.w.a.) – *GL* indices values (unweighted average)

Source: Internal Data of the Statistical Office of RS; Yearbook of the Czech Republic External Trade 1998 and proper calculation at the 3-digit level of SITC.

Figure 8 shows the differences between Slovene and Czech *GL* indices values (weighted average) on the one side, and *GL* indexes values (unweighted average)[17] on the other. The relatively higher differences in the Slovene pattern between the *GL* indexes values (weighted average) and *GL* indices values (unweighted average) confirm that categorical aggregation[18] at the 3-digit level of SITC classification exists. Categorical aggregation occurs when products are inappropriately grouped together in trade categories for the purposes of analytical testing (Greenaway – Milner, 1986, p. 72). Slovenia is smaller than the Czech Republic and hence not able to equally develop all industries.[19]

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[15] The relatively high levels of intra-industry trade of both countries were the result of trade liberalisation in the 1990s.

[16] Only groups that represented more than 1 % of overall exports of the observed countries in 1997 were chosen.

[17] See *Appendix 2*.

[18] That kind of empirical justification was suggested by Greenaway and Milner (1986, p. 75).

[19] The first result is concentration of production on a relatively narrow range of products and the concentration of exports of the same products. The second result is similar concentration of imports on a narrow range of products, because of the input requirements of Slovene production. The third result is simultaneous exporting and importing of a relatively narrow range of products. Finally, empirical results proved simultaneous exports and imports in the same industries at the 3-digit level of SITC, because average (unweighted) intra-industry trade of exactly 24 Slovenian industries is 21.7 % higher than average (unweighted) intra-industry trade in overall trade of Slovenia in 1997.

Therefore the problem of unequal distribution of Slovenian exports and imports at more disaggregated levels of SITC classification, for example 4 or 5-digit levels, still exists due to production concentrated on a relatively narrow range of products.

Contrary to the situation in Slovenia, the Czech Republic's production is more equally distributed in a relatively wide range of products and consequently exports of manufactured goods are more dispersed. But the results of the analysis for the Czech Republic also confirm that concentration of simultaneous exporting and importing of a relatively narrow range of products exists. Thus average (unweighted) intra-industry trade of 15 industries at the 3-digit level of SITC is 19.3 % higher than average (unweighted) intra-industry trade in overall trade of the Czech Republic in 1997. It is interesting that exports and imports of both countries are concentrated on 8 identical groups of products at the 3-digit level of SITC. How to explain this fact? One may argue that Slovenia and the Czech Republic are competitors in the area of identical products of manufactured goods, because export share of the above-mentioned 8 groups of products accounted for 25.2 % of Slovenia's overall exports and 21.5 % of the Czech Republic's overall exports. Yet due to a relatively large share of simultaneous imports of the same groups of products, Slovenia and the Czech Republic are also partners in two-way trade or, better said, intra-industry exchange of the same or similar products.

5. Concluding Comments

The results of analysis showed that at the 2-digit level of SITC both observed countries achieved similar shares of intra-industry trade and that at the 3-digit level of SITC Slovenia and the Czech Republic achieved different intra-industry trade values in the period from 1995 to 2000. Therefore in the second part of the 1990s the Czech Republic achieved relatively higher intra-industry trade in overall trade compared to Slovenia. At the three-digit level of SITC Slovene exports are more concentrated in a few product groups, and Czech exports are more dispersed. We suppose that differences between Slovene and Czech intra-industry trade in overall trade exist also at the four, five and seven-digit level of SITC. It is worth mentioning that exports and imports of both countries are also concentrated in a few identical groups of products. Thus Slovenia and the Czech Republic are competitors and partners in intra-industry exchange of the same or similar products.

Our hypothesis that Slovenian and Czech overall levels of intra-industry trade in the second half of the 1990s are considerably closer to those of industrialized developed market economies has been confirmed. The hypothesis that the level of intra-industry trade of each country is correlated with gross domestic product per capita and market size has not been confirmed because Slovenia and the Czech Republic have a relatively lower GDP per capita than the aforementioned developed market economies. International economic relations predominantly caused intra-industry trade in overall trade of Slovenia and the Czech Republic to rapidly increase in the 1990s. Thus both of the observed countries have an identical main foreign trade partner, namely Germany, and also have an identical foreign trade partner in terms of a group of countries, namely the European Union. The Czech Republic in comparison with Slovenia has more successfully expanded its market by means of the integration process and enabled faster restructuring towards encouraging production structure compatible with that of the higher income markets of industrial countries.

APPENDIX 1

When calculating Grubel-Lloyd indices (*GL*), we applied statistical data on the two and three-digit level of SITC (Rev. 3). When calculating *GL* indices, the majority of authors have applied statistical data on the three-digit level of SITC, which in the case of the Czech Republic and Slovenia were not available for the year 2000. In the literature the concept of intra-industry trade measurement is represented extensively enough, and it is usually calculated by equation (3).

If the obtained *GL* index values are equal to 100, the exports of the specified product group is entirely equal to the imports, therefore we talk about the existence of a complete intra-industry trade for the specified product group. The *GL* index has 0 value when the export or import respectively of the specified product group is near 0, in which case we can establish that intra-industry trade does not exist. Thus, *GL* indices fail in the case where the relation between the import and the export is completely unbalanced. The intra-industry trade in overall trade on the aggregate level (weighted average) was measured by the following equation (Wolmayr – Schnitzer, 1997, p. 57), (Greenaway – Milner, 1986, p. 65):

$$GL = 1 - \frac{\sum_{i=1}^{n} |Xi - Mi|}{\sum_{i=1}^{n} (Xi + Mi)} = \sum Wi * GLi, \quad \text{and weights are: } Wi = \frac{Xi + Mi}{\sum_i Xi + \sum_i Mi} \quad (4)$$

where *Xi* and *Mi* are exports and imports respectively of the specified product group commodity. By equation 2 we measured the intra-industry trade on the level of Slovenia's and the Czech Republic's overall trade (0–9 SITC), and on the level of manufactured goods (5–8 SITC). By equation 2, the obtained *GLi* indices for specified product groups are weighted by the specified group's export and import shares in the overall trade, and then summed up. By equation 1 we calculated the indices values on the level of specific product groups (*GLi*) for Slovenia and the Czech Republic.

APPENDIX 2

GL indices values (unweighted average) are calculated as the simple arithmetic average by the following equation (Greenaway – Milner, 1986, p. 61):

$$GLa = \frac{1}{n} \sum_{i=1}^{n} GLi \quad (5)$$

In equation 5, *GLa* represent the Grubel-Lloyd index (unweighted average) and *GLi* represents the Grubel-Lloyd index for a particular commodity group.

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SUMMARY

The empirical results of measuring intra-industry trade in the overall trade between Slovenia and the Czech Republic confirmed that the 3-digit level of SITC is a reasonable, initial approximation of industry trade for both countries. At the 3-digit level of SITC the Czech Republic achieved relatively higher intra-industry trade values in overall trade than Slovenia. Slovenia is different in size and has more unequally distributed exports than the Czech Republic. Consequently, both Slovene exports and imports are more concentrated in several product groups. It was also confirmed that overall levels of Slovene and Czech intra-industry trade in the second half of the 1990s were considerably closer to those of industrialized, developed, market economies. International economic relations that predominantly influenced the intra-industry trade between Slovenia and the Czech Republic rapidly increased.