

**Tax-benefit Systems in the New Member States and
Their Impact on Labour Supply and Employment**

Andres Vörk
Reelika Leetmaa
Alari Paulus
Sten Anspal

January 2007

In this paper we analyse whether differences in labour force participation and employment rates in eight Central and East European new member states can be explained by incentives that tax and benefit systems generate. We use macro-level cross-country data on labour market outcomes, tax wedge and marginal effective tax indicators in 1996-2004. We use graphical and panel data regression analyses. We find that the tax wedge reduces the labour force participation and employment rates, especially for the elderly. A reduction of the tax wedge by 1 percentage point could increase employment rate by about 0.2-0.7 percentage points. High marginal effective tax rates when moving from unemployment to work decrease the employment rate of the elderly.

This is a part of the project “Tax/benefit systems and growth potential of the EU” (TAXBEN, Project no. SCS8-CT-2004-502639), financed by the European Commission under FP 6 of Research.

Keywords: tax-benefit system, labour supply, employment, new member states



PRAXIS Center for Policy Studies
Estonia pst. 5a, 10143, Tallinn, Estonia
tel (+372) 640 9000
fax (+372) 640 9001
e-mail praxis@praxis.ee

TAX-BENEFIT SYSTEMS IN THE NEW MEMBER STATES AND THEIR IMPACT ON LABOUR SUPPLY AND EMPLOYMENT*

Andres Vörk
Reelika Leetmaa
Alari Paulus
Sten Anspal

PRAXIS Center for Policy Studies

Abstract: In this paper we analyse whether differences in labour force participation and employment rates in eight Central and East European new member states can be explained by incentives that tax and benefit systems generate. We use macro-level cross-country data on labour market outcomes, tax wedge and marginal effective tax indicators in 1996-2004. We use graphical and panel data regression analyses. We find that the tax wedge reduces the labour force participation and employment rates, especially for the elderly. A reduction of the tax wedge by 1 percentage point could increase employment rate by about 0.2-0.7 percentage points. High marginal effective tax rates when moving from unemployment to work decrease the employment rate of the elderly.

Keywords: tax-benefit system, labour supply, employment, new member states

Corresponding author:

Andres Vörk
PRAXIS Center for Policy Studies
Estonia pst 5a,
Tallinn 10143, Estonia
e-mail: andres.vork@praxis.ee

* This is a part of the project "Tax/benefit systems and growth potential of the EU" (TAXBEN, Project no. SCS8-CT-2004-502639), financed by the European Commission under FP 6 of Research. We thank Karsten Staehr, Kari Alho, and all the seminar participants at PRAXIS, ETLA and CPB for helpful comments. All remaining errors are ours.

Contents

1. Introduction	4
2. Previous empirical research on labour markets in the new member states	5
3. Background data.....	8
3.1. Employment rates.....	8
3.2. Structure of taxes and benefits	10
4. Can marginal effective tax rates and tax wedge explain differences in labour market outcomes?.....	14
4.1. Measures of work incentives in tax-benefit systems.....	14
4.2. Statistical analysis	16
4.3. Econometric models	22
5. Conclusions	26
References	29
Annex 1. Data used in statistical and econometric analysis.....	32
Annex 2. Statistical tables and estimation results of econometric models.....	33

1. Introduction

The level and structure of taxes and benefits have been the subject of much attention and discussion in recent years in EU countries. It has been suggested that disincentives generated by the structure of tax-benefit systems are one cause of low employment and slow economic growth in the European Union (European Commission, 2000). Tax-benefit systems create incentives that influence the behaviour of both employees and firms. On the demand side, high tax burdens can increase the cost of labour. On the supply side, generous out-of-work benefit payments may lead to reduced efforts to seek employment and high marginal tax rates reduce the reward for additional work efforts (Carone and Salomäki, 2001).

Eight new member states, formerly planned economies from Central and Eastern Europe, (here and afterwards abbreviated as NMS-8) that entered the EU in 2004 have had rapid economic reforms since 1990s, but still in several new member states the unemployment rate have remained high and the employment rates low. Meanwhile, considerable differences exist in labour taxation and disincentives created by tax-benefit systems.

The existing literature suggests that different labour market institutions, including characteristics of tax-benefit systems, can explain differences in unemployment and employment patterns between developed countries (see for example Daveri and Tabellini, 1997; Nickell and Van Ours, 2000; Belot and Van Ours, 2004; European Commission, 2004; Nickell, Nunziata and Ochel, 2005). Most of the studies find that labour market institutions, including labour taxation and unemployment benefits matter for unemployment and/or employment performance.

In this paper we analyse whether cross-country differences in employment and unemployment rates in the eight new member states can be explained by the characteristics of tax and benefit systems. We use macro-level panel data from eight countries over the years 1998-2004. We apply graphical analysis and panel data regression models to investigate whether the variation in the incentives in the tax and benefit systems, measured by the tax wedge and marginal effective tax rates, can explain variation in the employment and unemployment rates. In our regression models we also control for other macroeconomic variables that may influence labour market developments, like GDP growth, inflation and openness.

Compared to previous cross-country studies that have used similar approaches (e.g. OECD, 2005, chapter 3; or European Commission, 2004) we specially focus on the new member states from Central and Eastern Europe. As in our case the time series is considerably shorter

we have to rely on simpler econometric models and we cannot directly compare our results with previous studies on the EU-15 countries or OECD countries. To allow some comparability we also estimate the same models for the old EU countries.

Although the period we study is determined by the availability of the data, going further back into the past would not help much, because at the beginning of the transition period other factors (e.g. privatization, foreign direct investments, and legal and institutional reforms, etc.) were more important for labour market outcomes than the tax-benefit systems (see also Nesperova, 2002 and Vodopivec *et al.*, 2003).

In our analysis we focus on the importance of the tax-benefit systems, while we do not consider in this paper other labour market institutions (e.g. employment protection legislation, minimum wage, union density, co-ordination of wage bargaining). Previous studies have shown that other labour market institutions are generally less rigid or their effect on employment is smaller in new member states than in the EU-15 (e.g. Cazes, 2002; Ederveen and Thissen, 2004; Boeri and Garibaldi, 2005; Eamets and Masso, 2004).¹

The rest of the paper is structured in the following way. Section 2 gives a brief overview of previous studies on the impact of taxes and benefits on labour market outcomes in Central and East European new member states. Section 3 gives background data on the labour markets and on taxes and social expenditures in the new member states. Section 4 uses cross-country and panel data analysis to study the relationship between incentives in tax-benefit systems and labour force participation, employment and unemployment. Section 5 concludes.

2. Previous empirical research on labour markets in the new member states

There are a few studies which have analysed cross-country differences of labour market institutions, including tax-benefit systems, and their impact on labour market outcomes in new member states or transition countries. The dominant conclusion from previous studies is that although labour market institutions are less rigid and labour markets are more flexible in the new member states than in the EU-15, taxes and benefits still influence employment and unemployment rates.

¹ Another part of TAXBEN project (work package 3) focuses among other things more specifically on other labour market institutions in new members states and their impact on employment and economic development.

Ederveen and Thissen (2004) analyse whether labour market institutions can explain differences in unemployment rates in the new EU member states (Poland, the Czech Republic, Hungary and the Slovak Republic). Among other factors, they consider unemployment benefit replacement rates and benefit duration, tax wedge, and minimum wages. They find that labour market institutions in the new member countries (accessing countries at that time) were less rigid than in the EU-15. Unemployment benefit replacement rates are lower and duration is shorter, wage bargaining generally takes place at the firm level, employment protection legislation is less strict, and minimum wages as a percentage of average wages are lower. (The same conclusion is reached also by Boeri and Garibaldi (2005)). Based on predictions from a regression analysis, Ederveen and Thissen (2004) conclude that labour market institutions can explain only a small part of unemployment in the new EU member states. However, the authors point out that heterogeneity exists among the new member states. In some of them, labour market reforms could prove a key issue in improving employment performance.

Lenain and Rawdanowicz (2004) analyze the reasons behind low employment rates in Czech Republic, Hungary, Poland and Slovakia (CEE-4). They conclude, however, that the factors explaining low employment in the CEE-4 do not appear to be very different from those explaining low employment in several countries of the European Union. They propose that among other things, low employment is related to: a) high social benefits, high early retirement benefits (which were initially introduced to ease the impact of transition reforms), b) high labour taxes, especially for low-skilled, c) high minimum wages, d) strict dismissal laws. Also Burns and Kowalski (2004) conclude that low employment and activity rates in Poland are among other things caused by unemployment traps and poverty traps in the existing benefit systems, accompanied by inefficient targeting of social transfers.

Cazes (2002) analyzes labour market institutions in transition countries and concluded that while the countries have adopted institutions broadly similar to those in the EU, high labour taxation is where the countries rank among the highest. She found that overall and long-term unemployment rates were not significantly affected by the replacement rate and duration of unemployment benefits. Also employment protection legislation did not affect unemployment rates, but she finds that payroll taxes are positively correlated with unemployment rates, in particular long-term and youth unemployment rates, suggesting that a reduction of payroll taxes might lead to lower unemployment rates,.

In addition to macro-level aggregate analyses, there are many microeconomic studies on new member states that have focused on some aspect of the tax-benefit system and labour market. Several studies have analysed the impact of the unemployment insurance system on duration of unemployment (see also Vodopivec *et al.* (2003) for an extensive list of studies). Vodopivec (1995) showed that in the Slovenian unemployment system at the beginning of 1990s the recipients of unemployment compensation tended to stay formally unemployed until their benefits expired. The study suggested that reduction of duration of benefits would reduce the unemployment and its duration, while not impairing job matches. Lubyova and van Ours (1997) studied the impact of the Slovak unemployment compensation system on the flows from unemployment to job and to inactivity in 1994 and 1995. Their results indicated that there were no disincentive effects of the benefit system. Ham, Svejnar and Terrell (1998) analyzed the effects of various variables on the duration of unemployment in Czech and Slovak Republics in 1991-1993. Their results showed that the unemployment compensation had positive but small effects on the duration of unemployment spells in both countries. Terrell and Sorm (1998) analysed the impact of unemployment benefits on unemployment duration in the Czech Republic 1992-1994 and found no significant effect of benefits on unemployment duration. Hungarian unemployment insurance system has been analyzed by Micklewright and Nagy (1995) and Wolff (1997) who used data before and after the unemployment insurance benefit reform in 1992-1993 respectively. They found that the benefit reforms increased only slightly the exit rates from unemployment to employment, but increased significantly the transition rate to other destination, especially to (early) retirement schemes. Puhani (1999) has analyzed the impact of reduction in unemployment compensation on unemployment duration in Poland in 1990-1991. The study found that the reform did not reduce the duration of unemployment for those indicating they were searching for work. Still, the author argues that the reform might have reduced the registration of people not actually searching for work.

Van Ours and Vodopivec (2004) found a significant positive effect on the exit rate to employment after the potential duration of UI benefits were reduced in Slovenia in 1998. Hinnosaar (2004) found that receiving unemployment assistance benefits or social assistance benefits reduces search activity and leads to longer unemployment spells in Estonia in 1997-2000.

In general, previous analyses of the experiences of the new EU member states from Central and Eastern Europe show that although labour market institutions are less rigid and labour

markets are more flexible in the new member states than in the EU-15, taxes and benefits still influence employment and unemployment rates. The benefits and tax systems have created work disincentives that have influenced unemployment and employment both at macro and micro level. As many studies are from the period of the early transition period, it is difficult to disentangle the effects of transition and labour market institutions. Also the findings may not be transferable to the current period as the structure of the economy and labour market institutions keep changing, especially after joining the EU.

3. Background data

3.1. Employment rates

Although the new Central and Eastern European member states share a similar history, they chose different economic and social policies, which have contributed to differences in labour market performance.² Table 1 shows that there is considerable variation in labour force participation rates ranging from 70.2% in Estonia to 60.2% in Hungary in 2004 (column 1). Similarly there is a large variation in employment rates from 65.3% in Slovenia to 51.7% in Poland. Differences in employment rates in NMS-8 are likely the result of multiple factors, including differences in the tax-benefit policies. Employment rates of all new members are below EU-15 average (66%) and considerably below the Lisbon target for 2010 (70%) set by European Employment Strategy.

There is an especially large gap between NMS-8 and EU-15 in terms of employment of young people (aged 15-24) and people with lowest education (ISCED categories 0-2). The average employment rate of young people in NMS-8 (26.4%) is about 14 percentage points lower than in EU-15 (40.7%). The gap for the employment rate of low-educated people is almost 17 percentage points. As was discussed in section 2, earlier studies have already suggested that the relatively high tax burden of low-wage earners may be one reason behind the large differences.

One of the important issues in the EU employment policy has been the employment of older workers and the postponement of retirement. That is seen as important both for economic performance and the sustainability of social insurance schemes. There are large differences in

² For an overview of the main characteristics of labour market in the new member states and their developments since the 1990s, see for example Nesporova (1999), various issues of *Employment in Europe* by the European Commission, or Vodopivec *et al.* (2003).

the employment rate of older workers (55-64) both among the old and new member states (Table 1, column 5). The average employment rate of older workers (37.9%) in the NMS-8 is about 6 percentage points lower than in the EU-15 (44.1%).

Table 1. Labour force participation and employment rates in new member states 2004

	Labour force part. rate 15-64 (1)	Employment rate				
		Total 15-64 (2)	Women 15-64 (3)	Young 15-24 (4)	Elderly 55-64 (5)	Low- educated (ISCED 0-2) (6)
Estonia	70.2	63.0	60.0	27.2	52.4	24.2
Slovenia	69.9	65.3	60.5	33.8	29.0	31.4
Czech Republic	69.9	64.2	56.0	27.8	42.7	16.4
Slovakia	69.7	57.0	50.9	26.3	26.8	9.5
Lithuania	69.3	61.2	57.8	20.3	47.1	16.9
Latvia	69.2	62.3	58.5	30.5	47.9	28.3
Poland	63.7	51.7	46.2	21.7	26.2	16.9
Hungary	60.2	56.8	50.7	23.6	31.1	20.9
NMS-8 average	67.8	60.2	55.1	26.4	37.9	20.6
Cyprus	72.7	68.9	58.7	37.5	49.9	40.6
Malta	57.6	54.0	32.7	46.2	31.5	38.0
EU-15 average	71.2	66.0	58.4	40.7	44.1	37.3
EU-15 max	80.2	75.7	71.6	65.9	69.1	54.5
EU-15 min	62.7	57.6	45.2	21.4	28.8	27.5

Source: Eurostat database, accessed 10 March 2006. Labour Force Survey data from second quarter of 2004 for labour force participation rate. Note: arithmetic averages for country groups

Among the NMS-8 group, the employment rate of older workers is the highest in Estonia and the lowest in Poland, which may be related to incentives in their pension systems. Leppik and Kruuda (2003) point out that the Estonian pension system includes several high-powered incentives to work. Replacement rates are low, the normal pension age has increased (and is still going to increase for women), it is allowed to combine old-age and work-incapacity pensions with earnings from work without limitations. Early retirement is discouraged by a reduction of pensions and deferred old age pensions are encouraged as the pension rises more than the actuarially fair amount. Sroka (2005) argues that the main reason for low labour force participation rates of elderly in Poland is the present social transfers system that allows early exit from the workforce among those aged 45 years and over. Most important are the early retirement schemes offered to certain vocational groups, pre-retirement benefits for unemployed people, and disability benefits for those who are incapable of taking up employment.

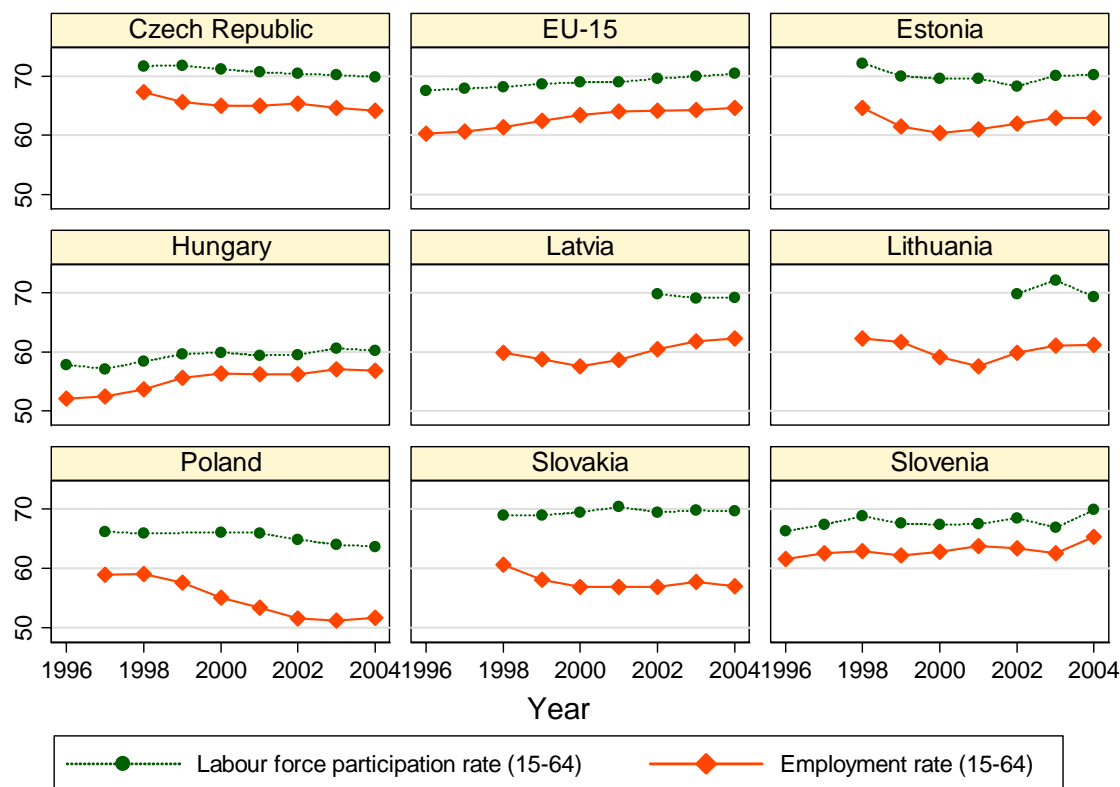


Figure 1. Labour force participation rate and employment rate in new EU member states in 1996-2004

Source: Eurostat database, accessed 10 March 2006; Note: LFP rates are from Labour Force Survey data of second quarter.

During the period 1998 and onwards employment rates first decreased and then increased in most of the new member states (Figure 1). Several countries, especially the Baltic countries, were hit by the Russian financial and economic crises in 1998-99, which lead to higher unemployment and lower employment. In our regression analysis below, we include GDP growth as an additional explanatory variable to capture the impact of changes in the labour demand on employment and unemployment rates.

3.2. Structure of taxes and benefits

This section gives a brief overview on the main features of the tax-benefit systems in the new member states. More thorough treatments of the tax systems can be found in European Commission (2005c) and of the benefit systems in European Commission (2003) and in European Commission (2005b). For an overview of the development of the unemployment benefit systems in the CEE countries, see Vodopivec *et al.* (2003).

In general, the post-socialist new member states (NMS-8) are characterised by lower taxes and social expenditures than the EU-15. Taxes, measured as share of GDP, are considerably lower in the new member states (Figure 2). In all countries of NMS-8, the share of taxes is lower than the EU-15 simple average of 40%. The variation of total taxes in GDP is larger among old members (from 50% in Sweden to 29% in Ireland) than in the new member states (from 40% in Slovenia to 29% Lithuania in 2003). The member states with a relatively high tax-to-GDP ratio also tend to collect a relatively high amount of labour taxes. Hence, differences in the share of total taxes in GDP are largely determined by the share of labour taxes. For the majority of the countries in the Union, the high share of labour taxes reflects the important role played by wage-based contributions in financing the social security system (European Commission, 2005c). Also, in the new member states the source of financing for social protection has experienced a gradual shift from payroll taxes and the general budget towards earmarked social security contributions paid by employers and employees (European Commission 2003).

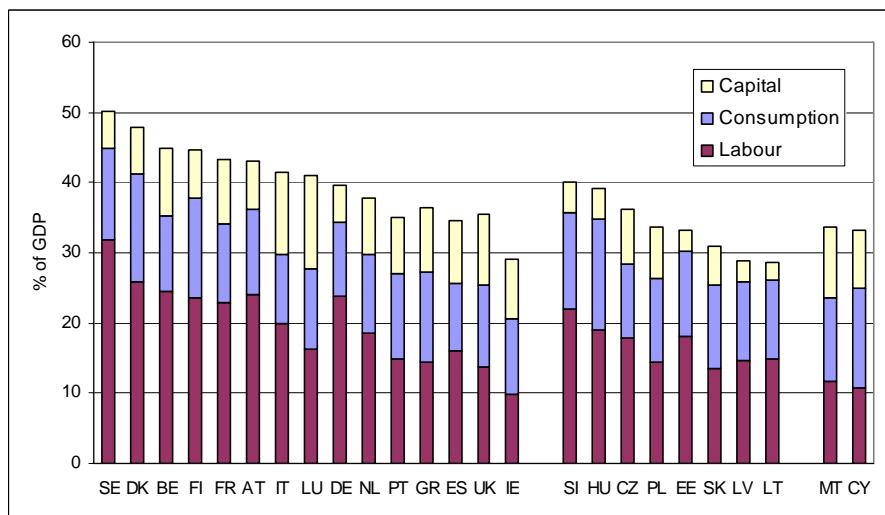


Figure 2. Taxes by economic function (% of GDP) in EU countries in 2003

Source: Eurostat database, accessed November 2006

The new member states have relatively high labour taxes (Figure 3). The average share of labour taxes in total taxes is about 51% in NMS-8 and 49% in EU-15. Relatively high share of labour taxes is partly inherited from the socialist systems and also due to low taxes on capital. Several new member states, especially the three Baltic countries, have lowered taxes on capital in order to attract foreign investments.

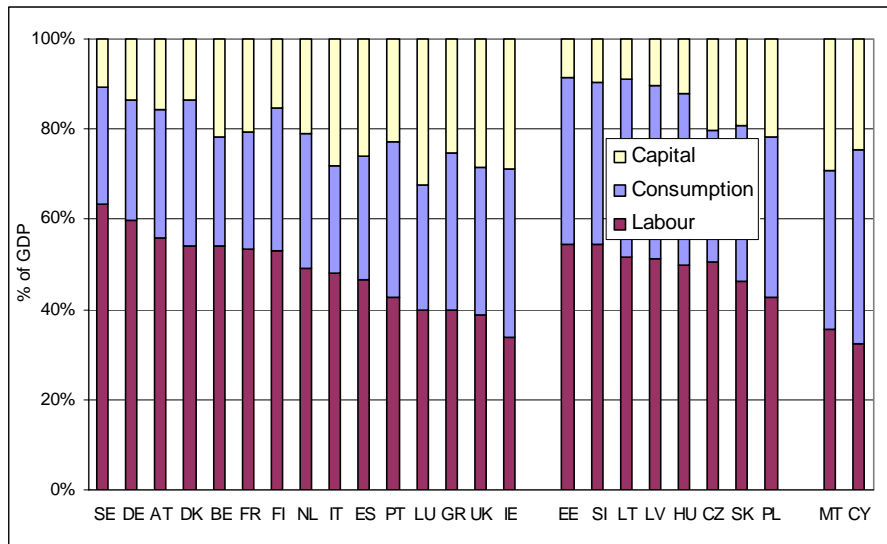


Figure 3. Taxes by economic function (% of total taxes) in EU countries in 2003

Source: Eurostat database, November 2006

During 1996-2004, the share of taxes in GDP, including taxes on labour, has slightly declined in Slovakia, Poland, in Estonia, and it has remained more or less stable in other NMS-8 countries. (Figure 4).

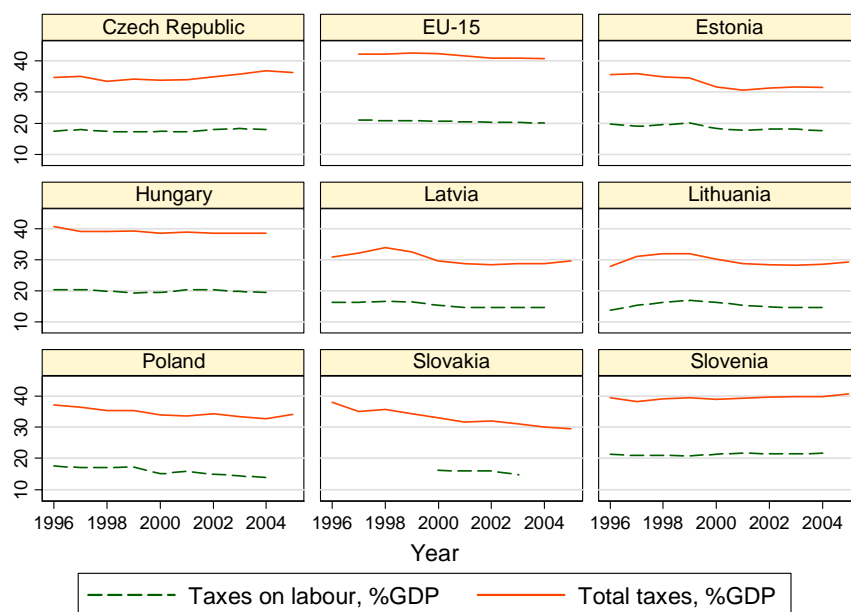


Figure 4. Taxes on labour and total taxes as % GDP in NMS-8 countries in 1995-2004

Source: Eurostat database, last accessed 10 November 2006.

Lower taxes in post-socialist new member states are accompanied by lower social expenditures. Total social expenditures vary between 13-14% of GDP in the three Baltic states to 25% in Slovenia (Figure 5 vertical axis and Table 2).

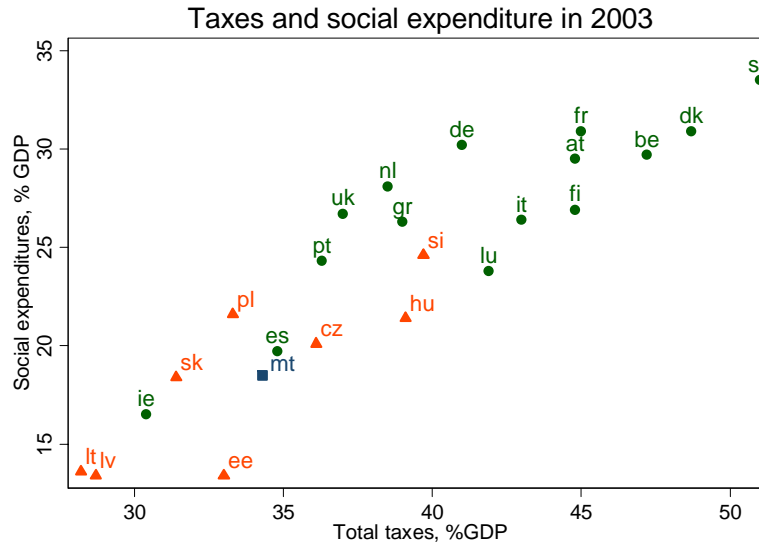


Figure 5. Total taxes and social expenditure (% GDP) in EU in 2003

Source: Eurostat database, March 2006

Taxes: Total receipts from taxes and social contributions (including imputed social contributions) after deduction of amounts assessed but unlikely to be collected

Similar to old members, major expenditures go to old-age and survivors benefits, but the share of unemployment benefits (average 3.1% of expenditures) is considerably lower than in EU-15 (average 7.0% of expenditures) (Table 2). Later, we see that lower unemployment benefits lead also to lower effective tax rates in moving from unemployment to work.

Table 2. Structure of social expenditures in NMS-8 countries in 2002 (% of total expenditures and GDP)

	Old age, survivors	Sickness, health care	Family, children	Disability	Unemployment	Housing, social exclusion	Total social expenditures % GDP
Slovenia	46.3	31.3	8.5	8.5	3.3	2.0	24.6
Poland	57.3	20.7	5.2	12.7	4.2	0.0	21.3
Hungary	42.9	28.1	12.3	10.3	3.0	3.4	20.3
Czech Republic	41.7	35.7	8.0	8.0	3.5	3.0	19.9
Slovakia	38.5	34.2	8.0	8.6	4.3	6.4	18.7
Lithuania	47.8	30.1	8.1	8.8	1.5	3.7	13.6
Latvia	56.3	19.3	10.4	9.6	3.0	1.5	13.5
Estonia	45.0	30.5	11.5	9.2	0.8	3.1	13.1
NMS-8 average	46.8	29.0	8.8	9.5	3.1	2.8	18.1
Malta	17.7	53.1	25.4	6.2	6.2	6.8	2.3
Cyprus	16.1	49.1	25.5	8.1	3.7	5.6	8.1
EU-15 average	42.9	28.0	9.2	9.3	7.0	3.6	25.3
EU-15 max	62.2	41.4	16.7	14.0	13.1	6.6	31.3
EU-15 min	23.7	21.0	2.6	4.9	1.6	0.0	15.2

Source: Eurostat database, March 2006.

Note: arithmetic averages for country groups

4. Can marginal effective tax rates and tax wedge explain differences in labour market outcomes?

4.1. Measures of work incentives in tax-benefit systems

Tax-benefit systems create incentives that may affect the behaviour of both employees and firms. High tax burdens can increase the cost of labour and therefore reduce labour demand. Generous social benefits may lead to reduced efforts to seek employment or remain in work and high marginal tax rates reduce the reward for additional work efforts.

There is a plenty of research done to estimate the impact of taxes and social benefits on labour supply and demand both at micro and aggregate level. Although the empirical results vary depending on methods and data used, the overall picture suggests that there are four major cases where the structure of taxes and benefits is particularly important for the supply of labour (Disney, 2000; Carone and Salomäki, 2001). First, social benefits may discourage the labour supply of low-wage households. Married women and single parents are the most sensitive to participate in the labour force and change working hours. Second, high old-age pensions and disability insurance schemes encourage early retirement from labour force. Third, progressive income tax negatively influences labour supply of high wage earners. Finally, high taxes and high benefits may discourage the entrance of low-skilled young people into labour market. Previous studies have also found that taxes and benefits influence primarily the decision to participate in the labour market and less pronouncedly the number of working hours of the employed. Working hours are usually fixed by employers, unions or laws, and people cannot change them much.

Taxes also affect the demand for labour, but this depends on tax incidence, i.e. who is the ultimate payer of the tax – employers or employees. If not associated with a reduction of the after-tax wage, an increase in labour taxes raises labour costs and reduces therefore labour demand (and employment). The empirical evidence of the effects of taxes on labour costs and unemployment is mixed. Some authors find significant effects of taxes on labour costs or unemployment, others find few effects of taxes on labour costs (see European Commission, 2004, p 63).

Quantifying the combined effects of taxes and benefits on the financial incentives to enter employment, work longer hours, or move to higher-paid jobs is a not an easy task. Measures

that are based solely on average taxes and social security contributions – such as tax wedges – present only a partial picture of the difference between gross and net income (OECD, 2005).

Incentives generated by the tax-benefit systems can be measured in several different ways:

- 1) macro level (ex post) indicators that find actual tax burden on labour or implicit tax burden on labour (calculated as total labour taxes as a share of labour cost or GDP);
- 2) indicators based on formal tax-benefit rules for different types of typical households, such as OECD and EC indicators on average tax rates or marginal effective rates (e.g. OECD series *Benefits and Wages*, or Carone *et al.*, 2003);
- 3) indicators based on formal rules applied to actual distribution of households, estimating using a microsimulation approach. A recent international comparison of net replacement rates based on micro-data is provided by a EUROMOD project (Immervoll and O'Donoghue, 2001; Immervoll, 2002; Immervoll and O'Donoghue, 2003).

We choose the second approach and use Eurostat structural indicators on tax wedge and marginal effective tax rates for stylised households to compare work incentives in tax-benefit systems of different countries and their possible correlation with actual labour market outcome.³ We use tax wedge on labour costs that is calculated as a share of taxes for a single person receiving 67 per cent of an average production worker's (APW) wage. The higher is the tax wedge, the larger is the difference between labour cost and after-tax pay to employee and, therefore the larger is the negative impact on employment.

The Marginal Effective Tax Rate (METR) shows the amount of additional gross income that is taxed away as a result of combined effect of change in labour taxes and benefits (for details see Carone *et al.*, 2003 or Eurostat, 2004). Note that METR does not take into account indirect taxes (e.g. value-added taxes or excise taxes) as the main interest lies comparing the states of working and receiving labour earning, on the one hand, and not working and receiving non-employment benefits, on the other hand. The higher is the METR values, the lower is the motivation to move from unemployment to employment or increase work effort (e.g. from part-time to full-time).

METR for two types of transitions are now part of Eurostat structural indicators:

³ The indicators are constructed since 2001 by the OECD and developed jointly with the European Commission, see Carone *et al.* (2003).

1) METR on the move from short-term unemployment to employment with a wage equal to 67% of the wage of APW for a single person (also called the unemployment trap; structural indicator no. 36);

2) METR on the move from 33% of APW wage to 67% APW wage for a single person, and a one-earner couple with two children (also called the low-wage trap, structural indicator no. 37).

4.2. Statistical analysis

In the new member states, we see considerable variation in the marginal effective tax rates both on moving out of short term unemployment and on increases in wages. From now on we use the term “unemployment trap” for METR when moving from unemployment to employment, and “low-wage trap” for METR when wage increases from 33% of the wage of APW to 67% of the wage of APW.

The unemployment trap ranges from 87.1% in Latvia to 43.0% in Slovakia (Table 3). Similarly, there is large variation in effective marginal tax rates on low-wage earners – from 22% in Slovakia to 65% in Poland for a single person, and from 20% in Hungary to 100% in Latvia for a one-earner couple with two children.

Table 3. Indicators of labour supply and employment incentives in NMS-8 countries in 2004

	Unemployment trap (%)	Low-wage trap (%) (single person)	Low-wage trap (%) (one earner couple with two children)	Tax wedge on labour cost (%) (low wage earners)
Latvia	87.1	46.7	100.0	41.1
Poland	83.0	65.0	91.0	41.9
Slovenia	80.5	34.9	26.1	39.8
Hungary	66.0	32.0	20.0	41.5
Czech Republic	65.0	33.0	57.0	41.9
Estonia	50.4	28.2	80.1	38.9
Lithuania	48.8	36.0	68.6	40.0
Slovakia	43.0	22.0	39.0	38.8
NMS-8 average	65.5	37.2	60.2	40.5
Malta	67.4	15.6	15.4	18.0
Cyprus	56.6	6.3	55.9	18.6
EU-15 average	80.3	51.3	67.2	35.6
EU-15 max	89.0	81.0	110.0	46.4
EU-15 min	59.0	15.0	-12.0	15.7

Source: Eurostat database, March 2006. See Carone et al. (2003) for methodological details of the computation of the indicators. Note: arithmetic averages for country groups

The tax wedge on low wage earners is very high in post-socialist new member states. In all NMS countries the tax wedge is higher than the average of EU-15 countries. In what follows we are analysing whether high tax wedge hinders the employment of low-wage earners in the NMS.

As tax and benefit systems change slowly, the values of the indicators describing changes in the systems have remained relatively stable in 2001-2004 (Figures 6 and 7), except for Slovakia, which according to the indicators have reduced the work disincentives. Short time series with little variation over time means that we have to rely mainly in cross-section variation trying to explain differences in labour force participation or employment rates.

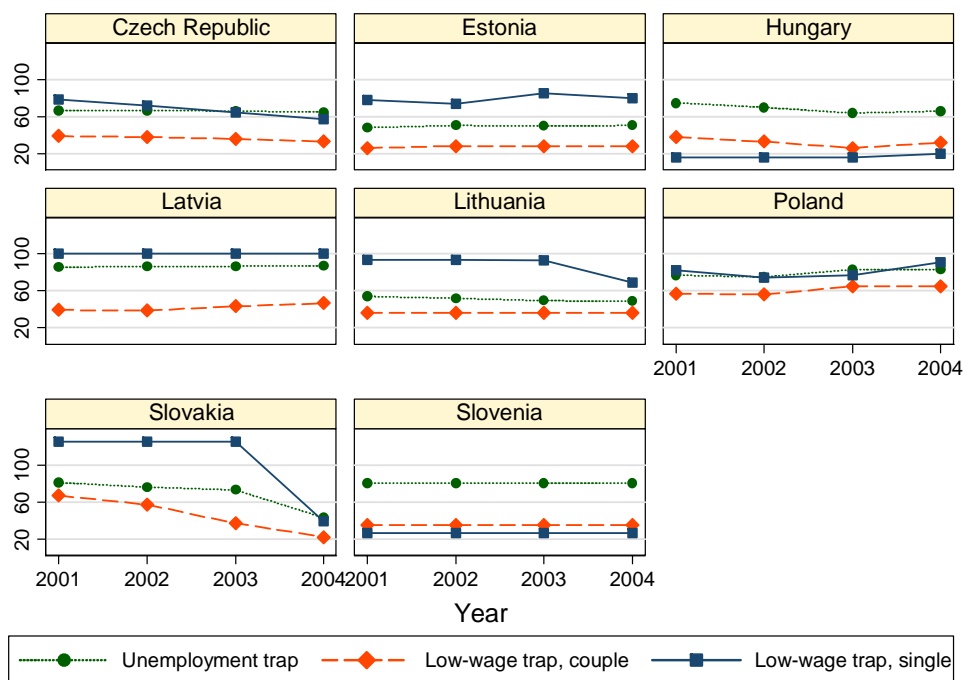


Figure 6. Unemployment trap and low-wage traps in NMS-8 countries in 2001-2004

Source: Eurostat database, October 2006.

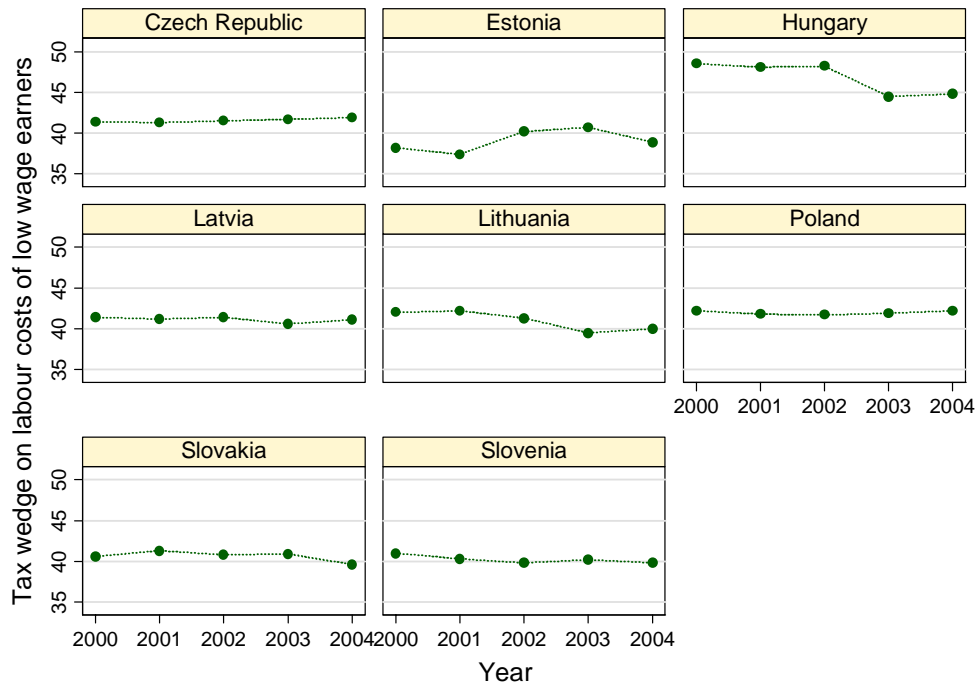


Figure 7. Tax wedge in NMS-8 countries in 2000-2004

Source: Eurostat database, October 2006.

We continue to analyse whether the indicators on work incentives in tax-benefit systems can explain the variation in activity rates and employment rates. We first use simple two-variable scatter diagrams to plot employment and activity rates on tax-benefit indicators. In all figures we present data in three groups: EU-15, NMS-8 and Malta and Cyprus. For the EU-15 group and NMS-8 group we draw separate regression lines between the points to illustrate the average relationship between the variables in the two groups.

For countries in the NMS-8 group we found a weak negative pair-wise relationship between the size of tax wedge and labour force participation rates and employment rates in various age groups (15-64, 25-54, 55-64, 15-64 women). Figure 7 graphs tax wedge and employment rate in the age group 15-64. We cannot see any relationship within the EU-15 group, but there is a negative correlation between tax wedge and employment rate within NMS-8 group. Similar negative relationships hold with other age groups.



Figure 8. Tax wedge on labour costs on a low-wage earner and total employment rate in EU in 2004

Note: Linear regression lines go through countries belonging to groups EU-15 and NMS-8 respectively.

Source: Eurostat database, October 2006.

There was also a negative relationship between the unemployment trap and the labour force participation rates and employment rates between countries in NMS-8 group, except with age group 15-24, which showed the opposite result. Figure 8 gives an example of the relationship between unemployment trap and labour force participation rate of age group 55-64. On average, in the NMS-8 countries where the larger share of gross income is taxed away when going from unemployment to work (as the combined result of a reduction in benefits and an increase in labour taxes) the employment rate of older workers is lower. In the EU-15 group the simple pair-wise relationship is positive, but with a large variation.

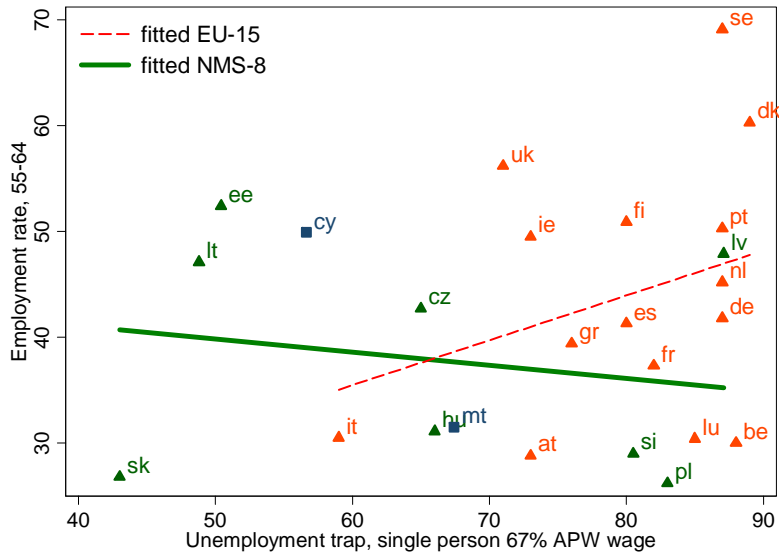


Figure 9. Unemployment trap and employment rate of elderly (55-64) in EU in 2004

Note: Linear regression lines go through countries belonging to groups EU-15 and NMS-8 respectively.
Source: Eurostat database, October 2006.

We find that low-wage trap indicators correlate with the share of part-time workers in employment across the countries (Figure 10 shows it for the indicator of single person). Countries where the share of income that is taxed away when increasing earnings is larger also have a large share of part-time workers in employment. This is both valid for EU-15 and NMS-8 groups. It may indicate that progressive taxes encourage part-time employment.

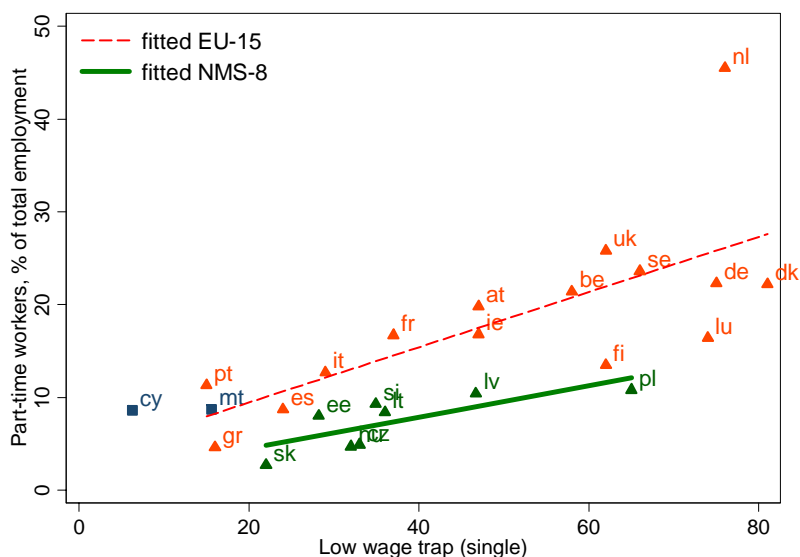


Figure 10. Low wage traps and share of part-time workers in EU in 2004

Note: Linear regression lines go through countries belonging to groups EU-15 and NMS-8 respectively.
Source: Eurostat database, October 2006.

We also find that indicator of the low wage trap for a single person is correlated negatively with all labour force participation rates and employment rates in various age groups between countries in NMS-8 group. Figures 11 and 12 show it for the young and for the elderly. It means that the new member states with more progressive effective taxes have lower employment rates. In the EU-15, on the other hand, the cross-country relationship is positive on average.

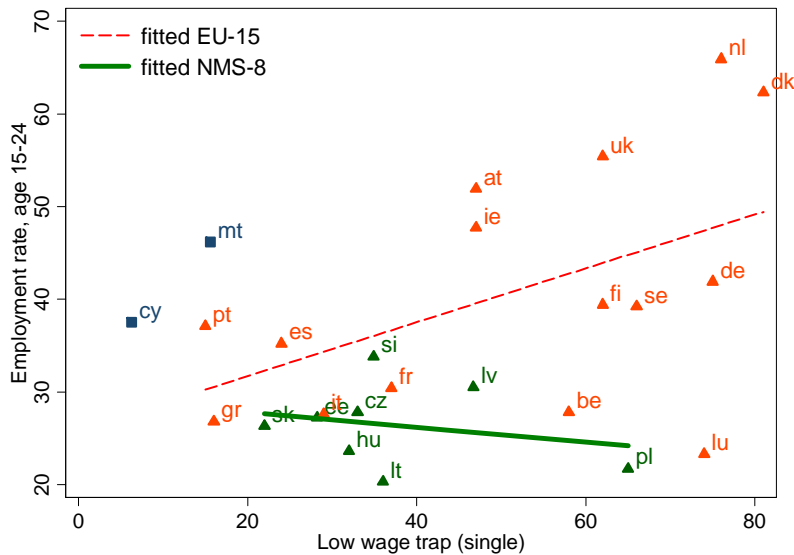


Figure 11. Low wage traps and employment rate of young people in EU in 2004

Note: Linear regression lines go through countries belonging to groups EU-15 and NMS-8 respectively. Source: Eurostat database, October 2006.

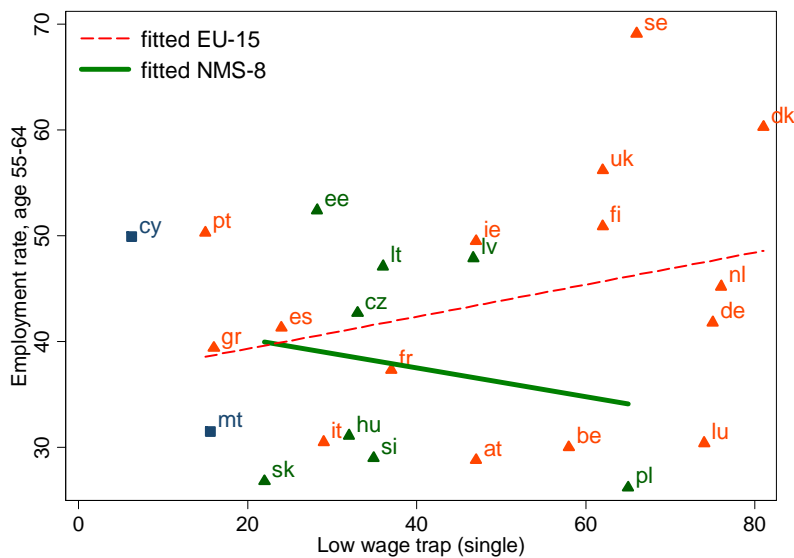


Figure 12. Low wage traps and employment rate of elderly people in EU in 2004

Note: Linear regression lines go through countries belonging to groups EU-15 and NMS-8 respectively. Source: Eurostat database, October 2006.

While low-wage trap indicators explain cross-country variation in usual weekly working hours among EU-15, there is no relationship among NMS-8 (Figure 13). This again may indicate that progressive taxes discourage increasing work effort in EU-15 countries.

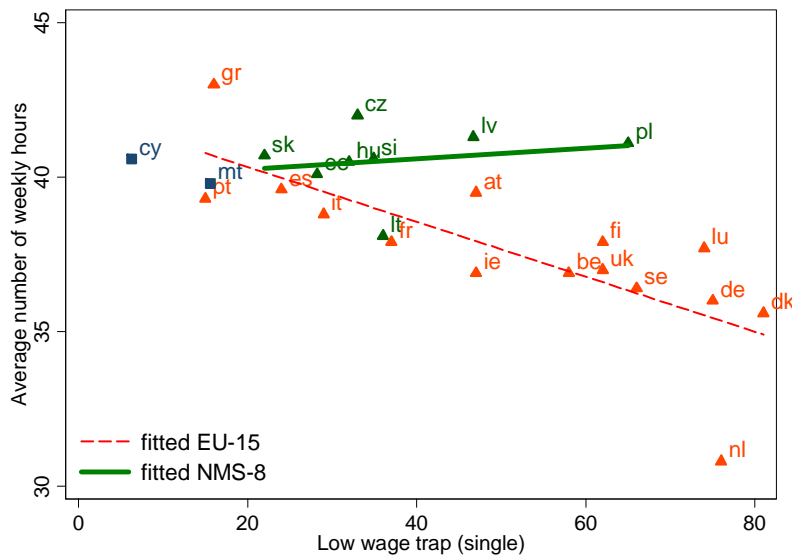


Figure 13. Low wage trap (single person) and average number of usual weekly hours in EU in 2004

Note: Linear regression lines go through countries belonging to groups EU-15 and NMS-8 respectively.
Source: Eurostat database, March 2006.

4.3. Econometric models

Simple two-variable cross-country scatter diagrams between various labour market outcomes and tax-benefit indicators, presented in Section 4.2, suggested in most of the cases that there is on average a negative relationship between labour market outcome and the progressivity of the tax-benefit systems across the new member states from Central and Eastern Europe. For the old EU members the relationship did not usually hold or was the opposite what we would expect.

In order to try to control for other variables that may influence employment and unemployment in the new member states, we estimate regression models of the following type:

$$\text{Labour Market Outcome}_{it} = \alpha_i + \beta * \text{TaxbenIndicators}_{it} + \gamma * \text{MacroeconomicControls}_{it} + \varepsilon_{it}$$

Under labour market outcome we consider as above employment and activity rates within various age, gender and educational groups, share of part-time workers, and usual weekly hours of work. Tax-benefit indicators potentially explaining the variation in employment and activity rates between countries and over time are the unemployment trap, low-wage trap indicators and the tax wedge. Control variables include the openness (the sum of exports and imports over GDP), the annual GDP growth rate, and the inflation rate (see Annex 1 for the definitions of the data).

All the NMS-8 countries can be considered as small open economies. Therefore their employment is also influenced by developments in the export markets. We include the GDP growth rate and the sum of the share of exports and imports in GDP to take into account the cyclical effects that may influence labour demand and hence employment.⁴ We also include inflation rate (measured as the change in GDP price index) to take into account possible expansionary effects in monetary or fiscal policy.

We estimate the models using the least squares method with pooled data (OLS) and fixed effects (FE). The fixed effects should take into account all cross-country differences that do not change over time, for example, other labour market institutions or cultural characteristics. Clearly, as both time dimension (minimum 4 years and maximum 9 year in very rear cases) and cross-sectional dimension (8 countries) are short, we clearly cannot control for all other possible covariates and the estimation results should be interpreted with caution. Very short panel also does not allow using more sophisticated models that allow for dynamic effects (e.g. by including lagged endogenous variables).

In our models we include work incentive indicators one at a time, as there is clearly correlation between them and it may cause problems with multicollinearity in our small sample (see Table A1 in the Annex 2 for linear correlation coefficients between the levels of explanatory variables). We use backward stepwise regression to exclude statistically insignificant macroeconomic control variables (using the criterion $p < 0.10$).

We run separate models for the two country groups as the previously presented graphs have already suggested that the impact of indicators of work incentives could be different for old and new member states for most of the outcome variables. We also tested the equality of the coefficients, which could be rejected in most of the models (results are available from the

⁴ We also tried to use GDP gap (with trend found using a Hodrick-Prescott filter with smoothing parameter 25) instead of GDP growth, but that decreased descriptive power of the equations. The results are available from the authors.

authors).

We do not include variables on other labour market institutions (e.g. coverage of trade unions, employment protection, and minimum wage) in the regression models. First, we do not have them for all new member states for all the years. Moreover, earlier studies have shown (see sections 1 and 2 above) that the potential role of other labour market institutions is rather unimportant, as labour markets in new member states are more flexible. Therefore when running the regression model in the specified form, the missing variable problem is presumably less important for the NMS-8 group than the EU-15 group. But as mentioned before, when estimating the models with fixed effects, all cross-country differences that do not change over time, for example, are implicitly taken into account.

Table 4 presents the summary of the estimation results. The detailed results are given in the Annex 2. Table 4 shows the regression coefficients of the tax-benefit indicators (the tax wedge, the unemployment trap and the low-wage traps) on activity rates, employment rates, unemployment rates, the share of part-time workers and weekly work-hours from pooled OLS and fixed effects regressions. Despite our very small sample we do find statistically significant effects of the tax-benefit indicators in several of our regression models. As tax-benefit systems do not change very rapidly and we have relatively short time period, it is not surprising that there are more significant results in pooled OLS regressions than in the models with country specific fixed effects. However, not all of the significant results have expected signs, clearly showing that we should take our results with caution.

Generally we find that the tax wedge influences negatively activity rates, employment rates and work-hours. It has also negative impact on the unemployment rate and the share of part-time workers. The regression coefficient of the impact of tax wedge on employment rate is about -0.7 in the model without country-specific intercepts. It means that on average an increase of the tax wedge by 1 percentage point reduces the employment rate by 0.7 percentage points. In the fixed effects models of the employment rate in age group 15-64 the coefficient is about -0.2, although only significant in the model for men. The similar point estimate from an EU-15 panel data model (Employment in Europe 2004, p. 81, Table 32, column 1 and 5), which used longer time period and dynamic panel data models allowing country specific heterogeneity was -0.25. Also our own point estimate for the EU-15 countries using our simple model from above is practically the same -0.2 (Annex 2, Table A5, column 1 and 2). Overall it suggests that concerning the tax wedge, its negative impact on employment rate is similar in the new member states.

Table 4. Summary of the marginal effects of tax-benefit indicators on the labour market outcomes in new member states

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Tax-benefit Indicator	Model type	Activity rate 15-64	Activity rate 55-64	Empl. rate 15-64	Empl. rate 15-64 women	Empl. rate 15-64 men	Empl. rate 15-24	Empl. rate 55-64	Empl. rate ISCED0-2 age 25+	Unempl. rate 15+	Share of part-time	Weekly work-hours
Tax wedge	OLS	-1.325**	-1.591***	-0.684***	-0.947***	-0.450***	-0.325	-1.018**	-0.691**	-0.377**	-0.195*	-0.073**
	FE	-0.232	-0.499	-0.225	-0.193	-0.261*	0.172	-0.696***	0.192	0.100	-0.215	-0.049
Unemployment trap	OLS	-0.064**	-0.161	0.080	0.077	0.148**	0.230** *	-0.201*	0.171*	-0.170*	-0.045	0.083***
	FE	-0.013	-0.124**	-0.017	0.008	-0.040*	0.016	-0.074**	0.027	0.010	-0.153***	0.029**
Low-wage trap (single)	OLS	-0.049	-0.222***	-0.203***	-0.172**	-0.106*	-0.082*	-0.253**	-0.425**	0.250** *	-0.073**	0.040***
	FE	-0.006	-0.121***	-0.003	0.013	-0.016	0.001	-0.009	0.039*	0.004	-0.183***	0.030***
Low-wage trap (couple)	OLS	0.065***	0.014	-0.006	-0.008	-0.022	0.007	0.009	-0.113***	0.085** *	-0.019*	0.013**
	FE	0.005	-0.046***	-0.000	0.011***	-0.010	0.009	-0.024	0.024**	0.005	0.048*	0.006
Table in Annex 2		A2	A3	A4	A6	A7	A8	A9	A10	A11	A12	A13

Notes:

OLS – linear pooled data model without country-specific fixed effects

FE – linear panel data model with country-specific fixed effects

Significance levels: *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.10$. The significance levels are based on Huber/White robust standard errors.

The tax-benefit indicators were included into the models one at a time. See Annex 2 for the details of the estimation results.

The regression models with other tax-benefit indicators do not yield so consistent results. Concerning the unemployment trap, we find that it decreases overall activity rate (age group 15-64) and the activity rate and employment rate of elderly (55-64). The relationship between the unemployment trap and employment rates in other demographic groups is not significant in fixed effects models, but has a wrong positive effect in the OLS models for age group 15-24 and the low-educated. We also find that higher unemployment trap reduces part-time employment and increases working hours.

Our estimates without country specific fixed effects suggest that there is negative cross-country relationship between the low-wage trap for a single person and employment rates of various demographic groups (men and women, elderly, low-educated). The low-wage trap also increases the unemployment rate as expected, although it is only marginally significant. The coefficients of the low-wage trap indicator for a couple with one earner and two children vary their sign depending whether the fixed effects are included or not.

Our estimation results also find that the progressivity of the tax-benefit system, at least at the low wage level, measured by the size of the trap indicators, is positively related to the average of usual weekly work-hours (Table 4, column 11) and negatively to the share of part-time workers (column 10). It suggests that in the countries where the system is more progressive, those people who work prefer to work more hours and not to be employed part-time.

5. Conclusions

In this paper we analysed whether low labour supply and employment rates in the Central and East European new member states (NMS-8) can be explained by work disincentives created by labour taxes and benefits.

On average, labour force participation rates and employment rates are lower in NMS-8 than in EU-15. The gap is especially large for young people and the low-educated, where none of the countries in NMS-8 group was above EU average, even though there is considerable variation between the new member states.

NMS-8 are characterised by lower overall tax burdens and social expenditures compared to EU-15. Still the new member states have relatively high labour taxes compared to their income levels. That also generates a relatively high tax wedge on labour cost. In all NMS-8 countries the tax wedge is higher than the average of the EU-15 countries. On the other hand,

expenditures on unemployment benefits are lower and that increases incentives to leave unemployment.

Our statistical and econometric analysis shows that higher tax wedge has a significant negative impact on labour force participation and employment rate in NMS-8. Our estimates suggests that an increase of the tax wedge by 1 percentage point reduces employment rate by 0.2-0.7 percentage points, depending whether we include country specific effects in the model or not. Negative relationship exists both for men and women, older workers (the strongest effect), and low-educated people.

Concerning high marginal effective tax rates when moving from unemployment to work (unemployment trap indicator), we find that they decrease the activity rate and the employment rate of elderly, and increase the unemployment rate. We also find some effects of the low-wage traps on the activity rate of elderly people and the low-educated.

As both the time series and number of countries in our analysis is small, and in several models we have encountered statistically significant coefficients with unexpected signs, all the results should be interpreted with caution. Still, given that other labour market institutions (e.g. employment protection legislation, unions, and active labour market policy) are rather unimportant in the new member states and we observe high tax wedge and large variation in unemployment traps, our general results do not conflict with our expectations. Also, our results are compatible with earlier conclusions, for example with Cazes (2002), who found that payroll taxes in transition countries are positively correlated with unemployment rates.

Several new member states have reduced or plan to reduce the tax burden of low-paid workers by increasing income tax allowances and/or decreasing marginal income tax rates. For example, Estonia has reduced the flat marginal income tax rate from 26% in 2004 to 23% in 2006 (and it continues to decline until 20% by 2009) and has doubled the annual tax allowance. Also there are plans in Estonia to change the current system of subsistence minimum to encourage people to take up a low-paid job (as the current system generates a 100% marginal effective tax rate over a certain range of earnings). Similarly, in the Czech Republic, there is the reduction of the marginal tax rates in the two lowest income tax brackets from 15% to 12% and from 20% to 19% in 2006 to stimulate the low income groups to find and maintain a job. Also the system of subsistence minimum and assistance in material need is changed in 2006 to increase people's motivation to work (Czech National Lisbon Programme (2005)). Given our results, these policies should lead to higher employment rates.

These simple policy measures also agree with the results of a comparative study of Estonian and Finnish labour markets (Paulus *et al.*, 2006; Alho, 2006), also as a part of the TAXBEN project. This study suggested that in the new member states, where wages are more flexible, a simple reduction of marginal income tax rate and increasing tax allowance might give the best results to encourage the employment of low wage earners.

References

- Alho, K. (2006). Labour market institutions and the effectiveness of tax and benefit policies in enhancing employment: a general equilibrium analysis. ETLA Working Paper no. 1008 for TAXBEN project.
- Belot, M., van Ours, J. C. (2004). Does the Recent Success of some OECD Countries in Lowering their Unemployment Rates lie in the Clever Design of their Labour Market Reforms? *Oxford Economic Papers*, 2004 56(4):621-642.
- Boeri, T., Garibaldi P. (2005). Are Labour Markets in the New Member States sufficiently flexible for EMU? Paper presented at ECB/CEPR Labour Market Workshop 2005: "Labour Markets in an Enlarged European Union: What would raise Employment?" 20-21 June 2005 <http://www.ecb.int/events/pdf/conferences/lmw/Boeri.pdf>, forthcoming in *Journal of Banking and Finance*.
- Burns, A., Kowalski, P. (2004). "The jobs challenge in Poland: policies to raise employment.", OECD Economics Department Working Papers no. 414.
- Cazes, S. (2002). "Do Labor Market Institutions Matter in Transition Economies? An Analysis of Labour Market Flexibility in the Late Nineties," ILO, International Institute for Labour Studies, Discussion Paper 140/2002.
- Carone, G., Salomäki, A (2001). Reforms in tax-Benefit systems in order to increase employment incentives in the EU. Economic Paper. ECFIN/511-EN-01
- Carone, G., Salomäki, A., Immervoll, H., Paturot, D. (2003). Indicators of unemployment and low-wage traps (marginal effective tax rates on labour), Economic Papers N° 197 December 2003, European Commission, Directorate-General for Economic and Financial Affairs.
- Council Decision of 12 July 2005 on Guidelines for the employment policies of the Member States. Official Journal of the European Communities, 2005. (2005/600/EC)
- Czech National Lisbon Programme 2005 – 2008. October 2005. http://www.mfcr.cz/cps/rde/xbcr/mfcr/NPR_EN_102005_pdf.pdf
- Disney, R. (2000). The Impact of Tax and Welfare Policies on Employment and Unemployment in OECD Countries. IMF Working Paper WP/00/164.
- Eamets, R., Masso, J. (2004). "Labour Market Flexibility and Employment Protection Regulation in the Baltic States", Institute for the Study of Labour (IZA), IZA Discussion Paper No. 1147, 37 pp. [<ftp://ftp.iza.org/dps/dp1147.pdf>]
- Ederveen, S., Thissen, L. (2004). "Can labour market institutions explain unemployment rates in new EU member states?", CPB Document No 59, April 2004 <http://www.cpb.nl/eng/pub/document/59/doc59.pdf>
- European Commission, (2000). Employment in Europe 2000. Brussels. [http://europa.eu.int/comm/employment_social/employment_analysis/eie/2000_en.pdf] 01.03.06
- European Commission (2003). "Social protection in the 13 candidate countries. A comparative analysis". Luxembourg.
- European Commission, (2004). "Employment in Europe 2004." Luxembourg. [http://europa.eu.int/comm/employment_social/employment_analysis/employ_2004_en.htm] 01.03.06

- European Commission (2005a). “Joint Report on Social Protection and Social Inclusion.”, Brussels.
- European Commission (2005b). “Joint Report on Social Protection and Social Inclusion. Technical Annex (2005b)”. Commission Staff Working Paper. Brussels.
- European Commission (2005c). Structures of the taxation systems in the European Union 1995-2003, 2005 edition. Luxembourg, 2005
- Eurostat (2004). “Net Earnings and related tax rates. Eurostat Metadata in SDDS format: Summary Methodology” [http://europa.eu.int/estatref/info/sdds/en/earncost/nearntax_sm.htm] 01.03.06
- Ham, J., Terrell, K., Svejnar, J. (1998). Unemployment and the Social Safety Net during Transitions to a market Economy: Evidence from the Czech and Slovak Republics. William Davidson Institute Working Paper No 169.
- Hinnosaar, M. (2004). “Reservation wage, job search intensity and unemployment benefits” in *Labour market research in Estonia: Papers of the research seminar, Tallinn, May 9, 2003*. Tallinn: Bank of Estonia, pp. 95-111.
- Immervoll, H. (2002). The Distribution of Average and Marginal Effective Tax Rates in European Union Member States, EUROMOD Working Paper EM2/02.
- Immervoll, H. and O’Donoghue, C. (2003). Employment Transitions in 13 European Countries. Levels, Distributions and Determining Factors of Net Replacement Rates, EUROMOD Working Paper EM3/03
- Immervoll, H. and O’Donoghue, C. (2001). Welfare Benefits and Work Incentives, An Analysis of the Distribution of Net Replacement Rates in Europe using EUROMOD, a Multi-Country Microsimulation Model, EUROMOD Working Paper EM4/01
- Leppik, L., Kruuda, R. (2003). “Study on the Social Protection Systems in the 13 Applicant Countries: Estonia Country Study”, European Commission — Employment and Social Affairs DG.
- Lenain, P., Rawdanowicz, L. (2004). „Enhancing income convergence in Central Europe after EU accession”, OECD Economics Department Working Paper, No. 392 [[http://www.oilis.oecd.org/oilis/2004doc.nsf/linkto/eco-wkp\(2004\)15](http://www.oilis.oecd.org/oilis/2004doc.nsf/linkto/eco-wkp(2004)15)]
- Lubyova, M., van Ours, J.C. (1997). Work Incentives and the Probability of Leaving Unemployment in the Slovak Republic. William Davidson Institute Working Paper No 82.
- Micklewright, J., Nagy, G. (1995). Unemployment Insurance and Incentives in Hungary. In: Tax and Benefit Reform in Central and Eastern Europe. Edited by D. Newbery.
- Nesporova, A. (1999). “Employment and Labour Market Policies in Transition Economies.”, International Labour Organization, Employment and Labour Market Policies Branch, Geneva. [<http://www.ilo.org/public/english/employment/strat/publ/nesporov.htm>]
- Nesporova, A. (2002). “Why unemployment remains so high in Central and Eastern Europe”, International Labour Office, Employment Paper 43, Geneva. [<http://www.ilo.org/public/english/employment/strat/download/ep43.pdf>]
- Nickell, S., Nunziata, L., Ochel, W. (2005). “Unemployment in the OECD since the 1960s. What do we know? The Economic Journal, 115 (January), 1–27.
- OECD (2004). Benefits and Wages. OECD Indicators, Paris.
- OECD (2005). “OECD Employment Outlook”. Paris.

- Paulus, A., Vörk, A., Alho, K. (2006). A Comparative General Equilibrium Analysis of Estonian Labour Market. Praxis Working Paper 28/2006 for TAXBEN project.
- Puhani, P. (1999). Unemployment Benefit Entitlement and Training Effects in Poland during Transition. The William Davidson Institutes Working Paper No 226.
- Sroka, J. (2005). "Changes in labour market situation in Poland", article at European Industrial Relations Observatory on-line.
[<http://www.eiro.eurofound.eu.int/2005/10/feature/pl0510104f.html>]
- Terrell, K., Sorm, V. (1998). Labor Market Policies and Unemployment in the Czech Republic. William Davidson Institute Working Paper No 216.
- Van Ours, J., Vodopivec, M. (2004). How Changes in Benefits Entitlement Affect Job-Finding: Lessons from the Slovenian "Experiment".
- Vodopivec, M. (1995). Unemployment insurance and duration of unemployment: evidence from Slovenia's transition. World Bank Policy, Research working paper; No. WPS 1552
- Vodopivec, M., Wörgötter, A., Raju, D. (2003) Unemployment Benefit Systems in Central and Eastern Europe: A Review of the 1990s. Social Protection Discussion Paper Series No. 0310, Social Protection Unit, Human Development Network, The World Bank.
- Wolff, J. (1997). Unemployment Benefits and Incentives in Hungary: New Evidence. The William Davidson Institutes Working Paper No 111.

Annex 1. Data used in statistical and econometric analysis

Eurostat definition	Date of extraction	Last update	Years
Tax rate on low wage earners: tax wedge on labour costs	30 Oct 06	29 Jun 06	1996-2004
Tax rate on low wage earners: unemployment trap	10 Mar 06	09 Jan 06	2001-2004
Tax rate on low wage earners: low wage trap (1- single person without children, 33% APW wage; 2 – one-earner married couple, two children, 33% APW wage)	10 Mar 06	09 Jan 06	2001-2004
Employment rates in various age groups (annual averages), part-time workers in % of total employment	30 Oct 06	26 Oct 06	1996-2004
Employment rates by gender, age groups and highest level of education attained (%), 2 quarter	30 Oct 06	23 Oct 06	1996-2004
Activity rates by gender and age groups (%), 2 quarter	10 Mar 06	3 Feb 06	1996-2004
Unemployment rates by gender, age groups and highest level of education attained (%), 2 quarter	30 Oct 06	23 Oct 06	1996-2004
Real growth rate of GDP volume – percentage change on previous year	9 Nov 06	7 Nov 06	1996-2004
Export and import as share of GDP (constant prices	10 Nov 06	7 Nov 06	1996-2004
Inflation (GDP price index from GDP and main components)	9 Nov 06	8 Nov 06	1996-2004

Note: we do not have data for all years for all new member states

Annex 2. Statistical tables and estimation results of econometric models

Table A1. Pair-wise correlation coefficients between tax-benefit indicators and macroeconomic variables in new member states (NMS-8) in 1998-2004

	Tax wedge	Unemployment trap	Low wage trap (single)	Low wage trap (couple)	GDP growth rate	Openness	Inflation rate
Tax wedge	1						
Unemployment trap	0.31	1					
Low wage trap (single)	0.71*	0.61*	1				
Low wage trap (one earner couple with two children)	0.29	0.09	0.47*	1			
GDP growth rate	0.23*	-0.18	0.17	0.48*	1		
Openness (Export+Import)/GDP	-0.03	-0.48*	-0.28	-0.25	0.11	1	
Inflation rate	0.36*	0.31*	0.03	-0.30	0.05	-0.23*	1

* - significant at 5% level

Note: Time period is not the same for all pair-wise correlations, varying between 1998-2004 and 2001-2004.

Table A2. Dependent variable: labour force participation rate, age group 15-64, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-1.325*** (0.099)	-0.232 (0.148)						
Unemployment trap			-0.064** (0.030)	-0.013 (0.016)				
Low-wage trap (single)					-0.049 (0.057)	-0.006 (0.015)		
Low-wage trap (couple)							0.065*** (0.020)	0.005 (0.007)
Openness	0.014** (0.007)						0.025** (0.010)	
Inflation				-0.203* (0.106)	-0.624** (0.271)	-0.201* (0.107)		-0.193* (0.108)
Intercept	120.712*** (4.166)	80.490*** (6.136)	72.024*** (2.007)	71.783*** (1.132)	72.158*** (2.305)	71.144*** (0.649)	59.458*** (2.274)	70.533*** (0.648)
R ²	0.780	0.952	0.058	0.963	0.177	0.963	0.412	0.963
Obs	52	52	30	30	30	30	30	30
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

Notes: In the parentheses under the coefficients are Huber/White robust standard errors. Significance levels - *** - p<0.01, ** - p<0.05, * - p<0.10. Backward selection of stepwise regression was used to drop insignificant macroeconomic control variables using the criterion p>0.10 for exclusion. Intermediate results are not presented.

Table A3. Dependent variable: labour force participation rate, age group 55-64, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-1.591*** (0.402)	-0.499 (0.518)						
Unemployment trap			-0.161 (0.121)	-0.124** (0.045)				
Low-wage trap (single)					-0.222** (0.104)	-0.121*** (0.039)		
Low-wage trap (couple)							0.014 (0.042)	-0.046*** (0.013)
GDP growth	1.516*** (0.536)		2.898*** (0.731)		2.789*** (0.724)	1.030** (0.468)	3.253*** (0.632)	
Openness	0.063** (0.028)	0.105*** (0.015)		0.135*** (0.048)				0.114** (0.041)
Inflation	-0.568* (0.295)		-1.446** (0.534)		-1.953*** (0.531)		-1.566** (0.596)	-0.491* (0.280)
Intercept	89.284*** (16.522)	44.464** (21.239)	40.517*** (10.818)	26.204** (10.605)	40.873*** (8.396)	43.716*** (2.599)	27.251*** (5.622)	26.406*** (8.498)
R ²	0.546	0.956	0.711	0.975	0.728	0.974	0.684	0.977
Obs	52	52	30	30	30	30	30	30
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A4. Dependent variable: employment rate in NMS-8 (age 15-64)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-0.684*** (0.150)	-0.225 (0.145)						
Unemployment trap			0.080 (0.057)	-0.017 (0.019)				
Low-wage trap (single)					-0.203*** (0.052)	-0.003 (0.012)		
Low-wage trap (couple)							-0.006 (0.023)	-0.000 (0.006)
Openness	0.031*** (0.011)		0.069*** (0.021)				0.050*** (0.016)	
Intercept	83.838*** (6.354)	74.624*** (6.051)	44.031*** (6.208)	65.933*** (1.289)	67.653*** (2.222)	64.918*** (0.533)	52.773*** (3.234)	64.833*** (0.526)
R ²	0.338	0.825	0.287	0.948	0.334	0.947	0.250	0.947
Obs	65	65	32	32	32	32	32	32
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A5. Dependent variable: employment rate in EU-15 (age 15-64)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-0.195*** (0.071)	-0.171** (0.076)						
Unemployment Trap			0.273*** (0.084)	0.038 (0.062)				
Low-wage trap (single)					0.191*** (0.034)	-0.000 (0.033)		
Low-wage trap (couple)							0.147*** (0.010)	-0.003 (0.020)
GDP growth	-0.691*** (0.246)	-0.146* (0.086)						
Openness		0.126*** (0.017)		-0.046** (0.022)	-0.020* (0.011)	-0.048** (0.021)	-0.030*** (0.010)	-0.048** (0.021)
Inflation	-1.169*** (0.385)							
Intercept	76.994*** (3.475)	49.364*** (5.156)	43.957*** (6.771)	56.045*** (4.147)	58.355*** (1.907)	80.249*** (3.385)	59.312*** (0.995)	58.371*** (1.279)
R ²	0.090	0.942	0.161	0.989	0.429	0.989	0.613	0.989
Obs	150	150	60	60	60	60	60	60
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A6. Dependent variable: employment rate, women, age group 15-64, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-0.947*** (0.190)	-0.193 (0.170)						
Unemployment trap			0.077 (0.051)	0.008 (0.017)				
Low-wage trap (single)					-0.172** (0.065)	0.013 (0.013)		
Low-wage trap (couple)							-0.008 (0.025)	0.011*** (0.004)
GDP growth			0.876*** (0.212)		0.588** (0.254)		0.800*** (0.220)	
Openness	0.027** (0.011)		0.048** (0.020)				0.031* (0.017)	
Intercept	90.034*** (7.894)	64.945*** (7.096)	37.781*** (5.666)	55.990*** (1.136)	58.425*** (3.824)	56.084*** (0.536)	46.605*** (3.572)	55.786*** (0.342)
R ²	0.418	0.886	0.333	0.967	0.409	0.967	0.308	0.968
Obs	65	65	32	32	32	32	32	32
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A7. Dependent variable: employment rate, men, age group 15-64, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-0.450*** (0.127)	-0.261* (0.156)						
Unemployment trap			0.148** (0.055)	-0.040* (0.023)				
Low-wage trap (single)					-0.106* (0.052)	-0.016 (0.014)		
Low-wage trap (couple)							-0.022 (0.020)	-0.010 (0.009)
GDP growth	-0.401* (0.228)							
Openness	0.041*** (0.013)		0.094*** (0.021)		0.039** (0.018)		0.057*** (0.015)	
Intercept	80.154*** (5.987)	84.486*** (6.489)	40.968*** (6.100)	75.800*** (1.572)	63.283*** (4.341)	73.705*** (0.656)	57.982*** (2.714)	73.841*** (0.775)
R ²	0.250	0.779	0.395	0.932	0.326	0.930	0.310	0.931
Obs	65	65	32	32	32	32	32	32
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A8. Dependent variable: employment rate, age group 15-24, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-0.325 (0.229)	0.172 (0.356)						
Unemployment Trap			0.230*** (0.045)	0.016 (0.033)				
Low-wage trap (single)					-0.082* (0.041)	0.001 (0.024)		
Low-wage trap (couple)							0.007 (0.019)	0.009 (0.015)
GDP growth	-0.369* (0.211)							
Openness		-0.129*** (0.035)	0.075*** (0.017)	-0.112** (0.041)		-0.115** (0.042)		-0.110** (0.043)
Inflation	0.455** (0.180)				0.643*** (0.162)		0.739*** (0.231)	
Intercept	42.289*** (9.406)	48.159** (19.449)	0.603 (4.991)	50.137*** (8.720)	28.161*** (2.028)	51.834*** (8.241)	24.072*** (2.405)	50.305*** (8.473)
R ²	0.175	0.707	0.460	0.878	0.278	0.877	0.216	0.878
Obs	65	65	32	32	32	32	32	32
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A9. Dependent variable: employment rate, age group 55-64, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-1.018** (0.431)	-0.696*** (0.230)						
Unemployment trap			-0.201* (0.112)	-0.074* (0.040)				
Low-wage trap (single)					-0.253** (0.107)	-0.009 (0.041)		
Low-wage trap (couple)							0.009 (0.054)	-0.024 (0.014)
GDP growth	1.107** (0.431)		2.598*** (0.639)		2.178*** (0.759)		2.375*** (0.750)	
Openness	0.053** (0.023)	0.111*** (0.013)		0.170*** (0.050)		0.186*** (0.056)	0.066* (0.033)	0.174*** (0.052)
Inflation	-0.695*** (0.253)				-1.313** (0.550)		-1.118* (0.616)	
Intercept	66.799*** (17.157)	49.956*** (10.345)	35.728*** (10.387)	14.839 (10.533)	39.151*** (8.972)	7.468 (10.977)	17.059** (6.713)	11.056 (9.602)
R ²	0.471	0.937	0.558	0.962	0.618	0.961	0.611	0.962
Obs	65	65	32	32	32	32	32	32
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A10. Dependent variable: employment rate, education group ISCED 0-2, aged 25 and over, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-0.691** (0.339)	-0.192 (0.243)						
Unemployment Trap			0.171* (0.095)	0.027 (0.029)				
Low-wage trap (single)					-0.425*** (0.110)	0.039* (0.021)		
Low-wage trap (couple)							-0.113*** (0.034)	0.024** (0.009)
GDP growth			1.069*** (0.323)				1.076** (0.468)	
Openness	-0.030* (0.017)				-0.114*** (0.026)		-0.056** (0.027)	
Inflation	0.689*** (0.200)	0.365*** (0.126)	0.905* (0.446)	0.400* (0.216)	0.758* (0.384)	0.391* (0.210)		0.430* (0.216)
Intercept	56.151*** (13.493)	32.308*** (9.920)	5.872 (6.304)	22.016*** (2.268)	57.085*** (7.099)	22.402*** (1.304)	37.232*** (5.101)	22.089*** (1.262)
R ²	0.166	0.872	0.217	0.963	0.371	0.964	0.270	0.965
Obs	64	64	32	32	32	32	32	32
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A11. Dependent variable: unemployment rate, age group 15 and over, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-0.377** (0.169)	0.100 (0.143)						
Unemployment trap			-0.170* (0.087)	0.010 (0.023)				
Low-wage trap (single)					0.250*** (0.060)	0.004 (0.021)		
Low-wage trap (couple)							0.095*** (0.015)	0.005 (0.012)
Openness	-0.040*** (0.011)		-0.090*** (0.026)				-0.039** (0.015)	
Inflation	-0.308** (0.129)				-0.630*** (0.208)			
Intercept	34.128*** (6.823)	3.188 (5.975)	36.434*** (9.100)	7.003*** (1.571)	4.224 (2.615)	7.518*** (0.821)	10.638*** (2.454)	7.313*** (0.877)
R ²	0.239	0.816	0.290	0.956	0.486	0.956	0.567	0.956
Obs	66	66	32	32	32	32	32	32
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A12. Dependent variable: share of part time workers in employment, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-0.195* (0.115)	-0.215 (0.485)						
Unemployment Trap			-0.045 (0.042)	-0.153*** (0.044)				
Low-wage trap (single)					-0.073** (0.030)	-0.183*** (0.028)		
Low-wage trap (couple)							-0.019* (0.010)	-0.048* (0.025)
GDP growth	0.463*** (0.107)		0.550*** (0.100)	0.677* (0.361)	0.493*** (0.119)	0.698** (0.330)	0.648*** (0.136)	0.698* (0.358)
Openness	-0.054*** (0.005)	0.110*** (0.038)	-0.060*** (0.010)		-0.063*** (0.008)		-0.053*** (0.006)	
Inflation	-0.267*** (0.066)		-0.306** (0.132)		-0.445*** (0.091)		-0.486*** (0.122)	
Intercept	21.779*** (4.498)	9.928 (22.372)	17.353*** (3.808)	27.776*** (3.254)	18.329*** (2.355)	24.257*** (1.882)	14.683*** (1.549)	20.893*** (2.277)
R ²	0.640	0.871	0.785	0.974	0.808	0.981	0.799	0.971
Obs	59	64	32	32	32	32	32	32
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.

Table A13. Dependent variable: usual working hours in main job, NMS-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax wedge	-0.073** (0.036)	-0.049 (0.059)						
Unemployment trap			0.083*** (0.018)	0.029** (0.010)				
Low-wage trap (single)					0.040*** (0.009)	0.030*** (0.008)		
Low-wage trap (couple)							0.013** (0.005)	0.006 (0.006)
GDP growth	-0.186*** (0.064)		-0.114* (0.061)				-0.239*** (0.075)	
Openness		-0.025*** (0.004)	0.014*** (0.004)					
Inflation	0.104** (0.047)				0.236** (0.091)		0.224** (0.087)	
Intercept	44.554*** (1.536)	48.729*** (2.875)	33.675*** (1.851)	39.986*** (0.687)	38.316*** (0.771)	40.798*** (0.315)	40.245*** (0.726)	41.438*** (0.409)
R ²	0.265	0.859	0.640	0.925	0.309	0.934	0.389	0.914
Obs	63	63	32	32	32	32	32	32
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes

See notes below Table A2.