THE WAGE CURVE IN HUNGARY

FROM THE VIEWPOINT OF INACTIVITY

by

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ABSTRACT

The wage curve is an empirical law of the labor market, a negative connection between local unemployment rate and individual wages, introduced by Blanchflower and Oswald (1994), consistent with at least three theoretical frameworks, and empirically showed for several countries. Although rarely taken into account, the relevant labor force supply in measuring the wage curve consists not only of the ILO definition of unemployed, but also the inactives, many of whom return to the labor market. It might be also worth distingushing the inactives who „want to work” and those who do not.

I estimate the wage curve for the corporate sector of Hungary, using Hungarian individual wage data (Bértarifa), 2002-2011. The yearly cross-section regressions explain (log) real wages with the (log) unemployment and inactivity rates of the locality, controlling for individual and company characteristics. I also estimate the wage curve on different subsamples by gender, education, company size and regions; then a panel regression with locality fixed effects, and check for robustness in various ways.

The results show a stable wage curve in line with the international literature: the unemployment elasticity of wage was -0.083 on yearly average. However, there is no strong evidence that the inactivity rate is relevant for the wage curve: its coefficient on average was -0.063 for years 2002-2008 (significant only until 2004), but for 2010-2011 it even changed sign. A possible explanation for this is the increasing rigor of unemployment benefit entitlement from end-2005, which changed the group of inactives measured. In the panel model I found no evidence that the changes in unemployment would also affect the changes in wages.

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I am also thankful to the Databank of MTA-KRTK KTI (Kitti Varadovics) for providing me the Hungarian Wage Survey (Bértarifa) datasets, to Budapest Institute for Policy Analysis for letting me use historical unemployment rates from NMH (National Labor Authority), and also to (former) ECOSTAT Government Impact Assessment Centre for providing me access to LFS (Labor Force Survey) data to calculate inactivity rates and to estimate the probabilities of switching to unemployment for the inactives.

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CHAPTER 1: INTRODUCTION

The wage curve is an empirical law of the labor market, a negative connection between local unemployment rate and individual wages, introduced by Blanchflower and Oswald (1994). The wage curve is consistent with at least three theoretical frameworks, and was empirically showed for several countries. The wage curve can be viewed as a labor market self-correction mechanism: higher local unemployment rate is associated with lower wage costs for firms, which might generate capital inflows into the area.

The definition of the labor force supply is key in measuring the wage curve. Although most wage curve studies use only the ILO definition of unemployed, Fazekas and Köllő (2008) argues that this is not enough: we have to take the inactives into account. Although formally not being part of the labor supply, many inactives return to the labor market by entering a job. According to LFS there is a clear distinction between those who „want to work" and those who do not, so it is worth separating these two groups in the analysis.

In the literature review I review the international theoretical and empirical literature on the wage curve, and present the differences between unemployment and inactivity. I also describe the features of the Hungarian labor market by telling its brief history after the regime change, highlighting its weaknesses. The changes of Hungarian employment and social policy, namely the changing rigor of unemployment benefit and welfare provision entitlement will be key to understand the mixed nature of the paper's findings.

In my empirical analysis, I estimate the wage curve on individual worker data of the corporate sector of Hungary, for the period 2002-2011. I use yearly databases of the Hungarian Wage Cost Survey (Bértarifa) for yearly cross-section regressions explaining (log) real wages with the (log) unemployment rate of the locality, controlling for individual and company characteristics. Secondly, I augment the model with the (log) inactivity rate, thirdly I split inactivity rate along the will to work. Finally, I also estimate the wage curve with inactivity on different subsamples by gender, education, company size and regions; also a panel regression model with locality fixed effects, and check for robustness in various ways.

I found that the wage curve in the Hungarian corporate sector really exists for the analyzed period, and is in line with the international literature: the unemployment elasticity of wage was close to the „magic" -0.1 found by Blanchflower and Oswald (1994 and 2005), -0.083 on yearly average. However, we do not have strong evidence that the inactivity rate is relevant for the wage curve in Hungary: generally we see a negative coefficient, gradually losing significance over the years. I found the most significant results for companies with at least 50 employees, but after 2006 they became also insignificant. A possible explanation for this insignificance is the above mentioned changes of Hungarian employment policy from end-2005, about which I will provide more details in the paper.

CHAPTER 2: LITERATURE REVIEW

2.1. The relationship of wages and unemployment rate

2.1.1. The Harris–Todaro model

The Harris – Todaro model had a great popularity in the 1970s, 80s, as it fit into the conventional perfect competition equilibrium framework (Blanchflower and Oswald , 1994, Section 2). This model claims a positive relationship between wages and unemployment: where the unemployment rate is high, workers need to be compensated by their employers with higher wages.

The model was born originally to explain the urbanization process the migration from villages (with presumably higher unemployment rates) to cities or towns. It assumes that the migration decision does not depend on the expected income level, but rather on the expected long-term wage gap (weighted with the probability of getting a job). If there is a tense labor market in the city (the unemployment rate is higher), getting a job is less likely in the city, which has to be taken into account by the worker when deciding on moving to the city.

In the equilibrium of the model, the adjusted wages (that is wages multiplied by the ratio of available jobs and job seekers respectively for the city and the village) equal to each other. Note that there is full employment and perfect competition in the village by the assumption of the model. In equilibrium, therefore, the expected wages (weighted by the jobs / job-seekers ratio) of the two areas are the same, there is no migration, the city has a certain amount of unemployment.

The conclusion of the Harris – Todaro model is that higher unemployment in the urban area results in higher wages in the rural area. In this sense, the partial elasticity of wage on unemployment should be positive. Empirical research of the 1970s and 80s mainly used aggregate macroeconomic data, and confirmed this expectation.

2.1.2. The wage curve

Blanchflower and Oswald (1994) showed for the first time that the *Harris - Todaro model* is far from reality in explaining the relationship of the local unemployment rate and wages: by interpreting the job market fluctuations in a perfect competition framework, we lose just the essential information, that is workers' and employers' decisions. When investigating labor market issues and testing the empirical validity of theories, it is preferable to use cross-sectional micro data, with which we can grasp deeper relationships. However, these data were not yet available in the 1970s. Actually, the Harris - Todaro model is not irrelevant in a sense: interpreted as a long-run positive connection of unemployment and earnings, it can be held even together with the short-run negative correlation between unemployment and earnings of a particular year.

Unlike the mentioned theory of the 70s, the wage curve theory of Blanchflower and Oswald states that the wage and local unemployment rate are inversely proportional, and this result is consistent with at least three theoretical frameworks:

In the *contract theory of employment*, the contractual relationship is the optimal response to the immobility of labor and to product market uncertainties. The model takes the differences of regions into account (differences in non-monetary benefits, technology, the probability of demand shocks, the level of unemployment). The objective function of the rational workers consists of the income-related utility component and the non-monetary utility provided by the residential area (climate, beauty of the environment, infrastructure, population density etc.), and there is an exogenous demand shock in the production function of the representative employer (the production function is multiplied by the probability of this shock). At the beginning of each time period the free movement of workers is allowed, not that of the companies. In the competitive equilibrium of the model, utility levels (from non-monetary and monetary benefits) provided by the regions to their residents are equalized: in regions characterized by more attractive atmosphere (higher non-monetary utility) there will be higher unemployment and lower wages, migration ceases. In this contract theory framework, not only competition, but also unemployment, wage rigidity and demand shocks can be interpreted, while the immobility and risk neutrality of firms might be the weak points of the model. Here, the relationship between unemployment and wage is grasped by the contract curve, showing the optimal wage for both parties (employer and employee) for a given level of employment.

According to the *efficiency wage theory*, unemployment is a disincentive of shirking at the workplace: in case of higher unemployment workers are more afraid of losing their job, because it would be more difficult to find a new job on a more tense labor market. So, companies might pay lower wages to compensate for the work of same efficiency. In the model, the utility of employees positively depend on their present and future expected earnings, and negatively on the effort made at the workplace. If shirking is detected, there is a certain probability for the worker to lose their jobs. Recall that it is more difficult to find a new job on a labor market with higher unemployment. Therefore, people are willing to make efforts at work, and avoid shirking.

In the *wage bargaining model*, wages are not determined by companies unilaterally, but through wage negotiations between firms and their employees. Higher local unemployment reduces the bargaining power of workers, so they can only keep a small part of the profit (their wages are determined as a percentage of profit per employee after bargaining). So, in the wage bargaining model, there is a positive correlation between the profit and wage level, and wages are in a negative partial correlation with the unemployment rate. The wage bargaining process can fit not only in a competitive model, but also in the employment contract model: the company and its employees make an implicit insurance contract which determines the wages and enables the workforce to eliminate the risk of random demand shocks.

In summary: the wage curve relationship can mean different things, depending on which labor economics theoretical framework we interpret it, but in all cases there is a negative relationship between individual wages and local unemployment. In the employment contract framework it means the optimal wage contract curve, in the efficiency wage model it means the essential condition for the workers to make efforts in the workplace, and in the wage bargaining model it shows the relative bargaining power of workers and firms.

The authors analyzed labor market data from 12 countries (USA, UK and other countries in Western Europe, Canada, South Korea, Australia) to empirically test the validity of the wage curve, and showed the results for 4 countries from other authors. They run regressions on (log) wages with the (log) unemployment rate of the region of the actual workplace, and individual and company characteristics as explanatory variables. They concluded that the wage – unemployment connection is very strong. With a few exceptions (e.g. Ireland), they found that the wage elasticity on the local unemployment rate was around -0.1, which means that a 1% increase in the local unemployment rate reduces wages by 0.1%, ceteris paribus. This empirical relationship also applies for a variety of industries, as well as for several developing countries – according to other authors, whose papers I present in the next section.

2.1.3. International empirical wage curve literature

The empirical law of the wage curve shown by Blanchflower – Oswald (1994) on cross-sectional micro data was had a crucial importance to call many economists to investigate the wage determination in their country on individual worker data to test the wage curve relationship, and also to use this finding as a means to study other labor market phenomena, as Card (1995) also pointed out in his review, foreseeing the future.

Blanchflower and Oswald (2005) addressed critics from three sides (Phillips curve, Harris-Todaro, labor market equilibrium models), and established a theoretical framework in which the autoregressive nature and the simultaneous determination of wages and unemployment can be allowed by instrumenting them with their lags properly. They also included the unemployment benefit as a crucial element of the people's decision to work or not, noting that it does not make up for the same amount of wage, as joblessness have a disutility. In this augmented model, they re-estimated the wage curve in the United Stated for years 1979-2001. They found the long-run micro-econometric association between the level of wages and the local unemployment rate to be approximately -0.1, and concluded again that the wage curve is an empirical law of economics. Their additional findings are the following: (i) wages are higher in states with more generous unemployment benefits, (ii) the perceived probability of job-finding is lower in states with higher unemployment, and (iii) employees are less happy in states that have higher unemployment.

By 2005, there were already 43 countries for which the wage curve relationship was proved empirically. Nijkamp and Poot (2005) documented 208 papers in their meta-analysis written about the wage curve, and confirmed that the wage curve is a robust empirical law, but they pointed out the evidence of publication bias: the uncorrected mean of wage elasticites was -0.1, but after controlling for the so-called “Blanchflower-Oswald advocacy effect”, they found the true wage curve elasticity to be only about -0.07. Still, the empirical robustness of the wage curve remains remarkable.

In the following part of this section, I concentrate on the most recent wage curve literature, to show that it is still a hotly debated topic of labor economics, and where possible, highlight the findings for the inactivity point of view. Notably, there is no developed literature with strong results or any consensus on the wage curve from the aspect of inactivity yet.

Bucheli and Rodríguez-Villamil (2012) investigated the wage curve of Uruguay for twenty years (1986-2005), and got an -0.09 as an elasticity of wages on unemployment rates. They found a higher elasticity for the youth, women, and less educated workers. The elasticity is also higher in case of adverse macroeconomic shocks. The results of the paper also indicate that an increase in unemployment pushes up informality and self-employment, leading to decreased wages in these sectors.

Baltagi et al (2012) examined the Turkish wage curve on individual data from the Household Labor Force Survey in the period 2005–2008. Similarly, they found an unemployment elasticity of −0.099. This elasticity is higher for the subgroups of younger, less educated, less experienced and female workers.

İlkkaracan et al. (2012) also estimated the wage curve of Turkey on household labor force data, including various definitions of the unemployment rate (discouraged and marginally attached workers, long-term unemployment). They found the broader definitions of unemployment to be a more effective reference point in measuring wage flexibility for women, who are usually more weakly attached to the labor market in the Turkey; while for men, the elasticity was highest on the long-term unemployment rate. Secondly, they used local unemployment rate disaggregated by education, which provides more accurate measures of the degree of group-specific wage competition, especially in a developing economy where labor markets are segmented by skill level. With quantile regressions, they showed that wage responsiveness to unemployment is different for wage groups, that of the median segment of wage distribution being the highest.

Gertler (2012) examines the relationship between the local unemployment rate and wage level in Slovakia, using annual enterprise-level panel microdata. He finds the wage curve elasticity to be -0.08: a 10% rise in the local unemployment is associated with a drop in wages by 0.8%. He found evidence of considerable differences across sectors, regions and skills. The results of the paper indicate that wage flexibility in the labor market of Slovakia is driven more by the wage flexibility of higher-skilled employees (because of their broader opportunities for employment), than by the institutional arrangements.

James (2012) estimated the effects of regional unemployment, long-term unemployment and inactivity upon earnings. James used the Living in Wales survey data, allowing disaggregation to postcode sector level, splitting Wales into 515 localities. She used the Welsh Index of Multiple Deprivation to control for regional differences in education, health, geographical access to services, housing and the physical environment. As a dependent variable of the wage equation, she used both the ILO definition unemployment rate and the claimant count rate, finding the unemployment elasticity between −0.09 and -0.12 for both rates, and for both at unitary authority level and at postcode sector level. She concluded that the effects of long-term unemployment and inactivity on wages are also significant, but might be caused by other non-observed factors.

Daouli et al. (2013) investigates the wage curve in Greece for the period 2003-2012, using micro level data from the Quarterly Labour Force Survey. They cannot identify the short-run wage curve either on pooled or longitudinal data. They argue that wages in Greece have permanent disparities between regions, and do not respond to the transitory components of regional unemployment. However, implementing the structural break of unemployment in the 1st quarter of 2009, they found that while regional unemployment rates doubled, wages fell by around 6 percentage points in the period 2009-2012, controlled for individual composition effects.

Baltagi and Rokicki (2013) analyzed the wage curve using individual data from the Labor Force Survey (LFS) over the period 1999-2010 in Poland (at the 16 NUTS2 regions). Worth to mention, LFS does not gather information on wages of self-employed or paid family workers in any country. The authors found the unemployment elasticity of wages to be -0.06 in Poland. They also found that male workers are significantly more responsive to the local unemployment rate (-0.08) than female workers (-0.04). They checked the robustness of the model with lagged unemployment rate as an instrument, yielding a substantial increase of unemployment elasticity of wages for less experienced and temporary workers.

2.1.4. Hungarian wage curve literature

Regional wage differences and the wage curve on Hungarian data was analyzed by Köllő and Kertesi (1998) and Köllő (2003). Köllő (2003) estimated the wage curve for the period 1986-2000, and Szabó (2006) repeated the analysis of the latter for the period 1996-2004. They based their research on the theoretical framework of the above mentioned Blanchflower and Oswald (1994), and applied a similar empirical methodology. They used the sample of individual workers from the Hungarian Wage Survey ("Bértarifa") databases to estimate yearly cross-sectional regressions explaining gross (and net) (log) wages with the following explanatory variables: gender, years of work experience and its square, education, occupational type; company size, industry, ownership, (log) fixed capital per worker, (log) productivity, region and settlement type of actual workplace location; and the (log) unemployment rate of the locality (NUTS3). Where not specified, dummy variables were used for each categories.

Regions can differ from each other in various non-observed aspects, which influence productivity and wages (language knowledge, technological skills and work morale of employees, and also quality of infrastructure, density of roads etc.(and have to be controlled for. The main determinant of regional differences is the local unemployment, however. According to the wage curve theory, in localities with higher unemployment, real wages are lower, ensuring the possibility for companies to move in localities with higher unemployment to realize wage cost reduction, while workers can commute or move to localities with lower unemployment to have higher wages. This is the labor market self-correction mechanism. However, it does not always work. In a less developed region, the costs for a company to scan and recruit workers are lower, but the company faces a lot of other disadvantages: lower-educated workers, worse infrastructure, the big distance from trade partners and channels can mean an almost prohibitive disincentive to moving (Köllő, 2003). The strong connection of lack of economic development and high unemployment is what makes the wage curve analysis so indispensable.

Summing up the results of Hungarian wage curve research for the period after the regime change, we can see the following: the unemployment elasticity of wages was between -0.07 and -0.13 for almost all the years of the period 1992-2003, in line with the international wage curve literature. There was no linear trend, but the elasticity became closer to 0 in the last years, as the graph and the table shows:

Figure 1: The unemployment elasticity of gross wages according to Köllő (2003) and Szabó (2006)

Table 1: The unemployment elasticity of gross wages according to Köllő (2003) and Szabó (2006)

1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
-0.085	-0.092	-0.106	-0.118	-0.131	-0.083	-0.090	-0.101	-0.076	-0.094	-0.090	-0.072

Source: 1992-2000: Köllő 2003, 70, Table 1; 2001-2003: Szabó 2006, 72, Figure 4.3

Köllő and Kertesi (1998) also investigated the changes in the structure of unemployment, the regional division of foreign direct investment, and also the potential equalizing role of labor force mobility. Beyond finding a stable wage curve for Hungary, they made the following policy recommendations: the reduction of regional labor market inequalities cannot be expected from the reduction of relative wages, or from migration or commuting, but rather from the increasing FDI. Foreign companies will move to less developed regions only if there is more educated workforce, and better transport connections.

Kőrösi (2005) analyzed the labor demand and wage setting of companies. He established a dynamic model of wage setting, where the market share of the company, and the bargaining power of the employees determine the share of profit received by each party. This dynamic wage setting model was estimated by industries. Kőrösi found that the effect of changes of unemployment on the changes of wages did not significantly differ from 0.

2.2. Hungarian labor market and employment policy background

Kőrösi (2005) also describes the labor market of the Hungarian private sector: the employment chances of low-skilled workers are not only lower than in more developed European countries, but also lower than in other transition economies. The reason for this is the steadily high structural unemployment, which stems from the deterioration of the human capital of workers out of the labor force. Their expected wages are decreasing with their human capital. The employment chances of inactives are worsened by the higher expectations coming from technological improvement, by trade union activity, and by the rising minimal wage. Kőrösi highlights a positive change as well: the expansion of tertiary education around 2000 made the average employment chances better.

Fazekas and Scharle (2012) summarizes the structural problems of the Hungarian labor market in the two decades after the political regime change. They show that Hungary could not raise its employment after the transitional recession to the extent Slovakia, Poland and the Czech Republic did, but more modestly. This was due to many reasons: temporarily to the external economic downturn, but permanently to internal structural distortions, such as loosening fiscal policy, an increasingly unstable business environment and even more to changes of the welfare system. They highlight that the generous welfare system provided the possibility for groups with low employment possibilities to exit the labor market in various forms of welfare provision (unemployment, maternity or disability provisions, early retirement schemes). Third of the working-age population (mostly inactives) is still dependent on any of them. At the same time, active labor market policies were weak, and the labor market was not flexible enough: *"when unemployment grows, average wages should fall in real terms so that employment levels can rise. This has two preconditions: wages are allowed to fall and unemployment is visible on the labour market (i.e. the unemployed actively look for jobs)."* (Fazekas and Scharle 2012: 5) However, minimal wage restrained the adjustment space of the labor market, and willingness of the non-employed population to work remained also low until recently.

Scharle (2012) reviews the changes of welfare provisions from 1990 to 2010. The changes relevant to the present research are the following: in November 2005, unemployment benefit and pre-retirement unemployment benefit was replaced by the jobseekers' allowance. *"The benefit in the first phase (up to 91 days) was linked to previous earnings; in the second phase it was a flat-rate payment. In the second phase, everybody was paid 60 per cent of the minimum wage, and thus the average unemployed person received more money at the beginning and less at the end. As a further incentive, those who took up a new job before the end of their entitlement could claim half of their remaining benefit paid as a lump sum."* (Fazekas and Scharle 2012: 134) In September 2011, the benefit entitlement was changed radically: the maximum benefit period was decreased from 270 to 90 days.

There were also some changes in the social assistance in July 2006, when the allowance was linked to the size of the family, and in January 2007, when it was capped at the net minimum wage. In 2008, the rehabilitation allowance was introduced, and in

2009 the “Road to Work” program, as further means of helping people take up employment.

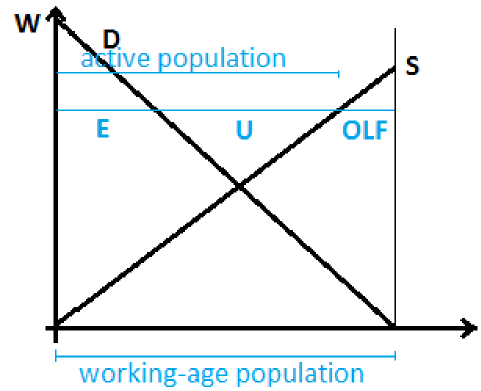
We can see some evidence that these measures really induced benefit claimants to actively search for a job, and so increase the activity rate by increasing the number of unemployed. Nagy (2012) states that *“after the introduction of the new eligibility criteria far more recipients were actively looking for jobs. The proportion of the ILO-defined unemployed among the benefit recipients reached two thirds in the period between 2005 and 2008 – 10 per cent higher than in the previous years; and by 2009 the proportion was close to three-quarters (74 per cent).”* (Fazekas and Scharle 2012: 120)

2.3. The difference between unemployment and inactivity

What is the difference between unemployed and inactive people? Is it worth to distinguish them in labor market research, and particularly in wage curve studies? Are the persons of these labor market statuses behaviorally different? To answer these questions, I clarify first the ILO definitions of unemployment and inactivity, and then show the international literature relating this issue.

According to the ILO – OECD conventions, a person is employed who worked at least one hour on the week prior to the survey, or if not, then was only temporarily absent from his regular workplace. Unemployed is the person who did not work in the month prior to the survey, and was actively looking for a job, being able to take up employment in case of finding a job. (Köllő 2010, 35)

Figure 2: Demand and supply on the labor market



The figure similar to (Köllő 2010, 36) shows the determination of employment (E), unemployment (U) and inactivity (out of labor force, OLF) for a given uniform wage in a classical framework (with linear labor demand and supply curves for simplicity). Usually, the unemployment rate is given from these as the ratio of unemployed and the active (U / (E + U)), however, in my research I will use the ratio of unemployed in the whole working-age population (U / (E+ U + OLF)), in order to get a comparable coefficient with that of the inactivity rate, which is the ratio of inactives in the working-age population[1] (OLF / (E + U + OLF)) .

Due to the relatively strong co-movement of the unemployment rate and inactivity rate (and the lack of inactivity rate in the original wage curve idea), most wage curve analyses only use unemployment rate as an explanatory variable with other controls, but not with inactivity rate. However, the correlation of inactivity rate and unemployment rate is not so strong in fact: there can be great differences even between small neighboring countries, such as Hungary and Slovakia: the ratio of inactives and unemployed was nearly five times bigger in the former country in 2001. e of unemployment relative to inactivity much (in 2001 nearly five times), although the two countries have otherwise very similar economic and labor market situations. (Köllő 2009, 28)

[1]ILO uses the working-age population as people with 15-64 years of age, but I will use 18-59 years instead, because it fits better to the Hungarian labor market. Hungarian Central Statistical Office (KSH) also uses this measure in its databases, e.g. TSTAR (see details in the Data desription chapter)

The majority view of labor market analysts is that the distinction between unemployment and inactivity is important. According to Garibaldi and Wasmer (2001), the motivation for this is to understand better the labor market equilibrium by extending our knowledge about the nature and determinants of the border between the unemployed and the inactive labor market statuses. Particularly interesting might be to understand why labor markets show such big differences in their size.

Flinn and Heckman (1982) also examined the attachment of inactives to the labor market, and found that inactives are linked less strongly to the labor market compared to the unemployed: the probability getting a job is significantly lower for them. The basic difference between an unemployed and an inactive is that the former is formally searching for a job, while the latter is not; so the former is more likely to receive a job offer. Flinn and Heckman also show in their theoretical framework that – with certain conditions – only the probability of job offer arrival matters to actually get a job, so the unemployed will be more likely to find a job than the inactives. Conclusively, the two groups have to be distinguished by their behavior on the labor market. Their conclusion is supported by empirical results, and consistent with the model of job search, in which the unemployed status is productive, since it facilitates job search, increasing the probability of finding a job.

Juhn et al. (1991) and Murphy and Topel (1997) also point out that inactives have to be taken into account when analyzing labor market phenomena, but they advise that we should handle them together with the unemployed.

Jones and Riddell (1999) separated several groups within the inactive, and concluded that the probability of actually finding a job is determined by the indicated will to work.

Boeri (2000) examined how welfare systems in countries of Central and Eastern Europe people's decision between unemployment and inactivity, and found a great impact. Cseres-Gergely (2007) did the same for the early retirement schemes for Hungary, and found that they have had a persistent effect on the inactivity rate, by keeping low the activity level of the elderly.

Micklewright and Nagy (1999) and Köllő (2000) examined the Hungarian labor market and found that formal job search was really effective for women to get a job, but there was no difference in the probability of getting a job between unemployed men (formally searching for a job) and inactive men wanting to work.

Köllő (2009) also separated more groups of the non-employed working-age population along job search activity, namely four: the actual job-seekers, those who are willing to work but do not search formally, non-pensioners who do not want to work, and pensioners who do not want to work. He examines how the proportion of these groups depends on the welfare system and employment characteristics, and how these proportions influence actual job search.

CHAPTER 3: DATA DESCRIPTION AND METHODOLOGY

Wages, workers' individual characteristics and company characteristics used for the analysis come from the Wage Survey (Bértarifa) datasets of the Employment Office of the National Labor Authority (NMH). The sample contains employees of the companies with at least five workers, and also the public sector. Companies are selected on the basis of industry, region and size quota, and a random sample of around 10% is drawn from the full-time employees (those born on 5th, 15th or 25th of any month). Demographic data, education and employment-related data, including earnings of the workers are recorded. We know many variables regarding the companies (industry, size by number of employees, ownership, location, thus settlement type and region of actual workplace, but not that of the individual). The Hungarian Academy of Sciences, Institute of Economics (MTA-KRTK KTI) also provided me the calculated weights for the individual workers. These samples consist of 150 to 200 thousand observations per year, representing 2.3 to 2.9 million workers.

I estimate yearly cross-sectional ordinary least squares regressions on (log) wage as a dependent variable. To be more specific, the original wage variable of the Wage survey was monthly gross earnings for May, including the 1/12 of the previous year's total non-regular bonuses, but does not include the non-regular premiums and bonuses paid in this May. (Köllő 2003, 78) I standardized the wage variable for 40 weekly hours of work in order to get the actual full-time earnings, then I discounted them for the year 2005, so that we get comparable real wages in HUF 2005 for all the years:

- (Log) Full-time average gross monthly REAL earnings (in constant 2005 HUF)

Based on the analyses of Köllő (2000, 2003) and Szabó (2008) – but dropping variables like productivity and fixed capital, because they were not part of the Wage Survey after 2005, and also occupational type, because I was rather interested in education, which grasps similar effects as well – , and augmenting the analysis with (log) local inactivity rate, and later splitting this along the will to work, I used the following explanatory variables in the main specification of the regression:

- Gender (0 = female , 1 = male)[2]
- Estimated years of experience (age - years of educ -6) and its square
- Education:
    - maximum eight classes of primary school
    - vocational school
    - high school degree ("érettségi")
    - graduate or post-graduate degree (BA/BSc, MA/MSc, PhD)
- Settlement type (based on TSTAR 2008 population data)
    - Budapest
    - county seat
    - town/city (2008)
    - village
- Company size by number of workers:
    - 5-20 workers
    - 21-50 workers
    - 51-300 workers
    - over 300 workers
- Industrial sector: 2-digit ("TEÁOR" valid from 1998, 2003 or 2008)

[2]Except for experience, all of the variables are binary (dummy) variables.

- Majority ownership:
  - public (state or municipal)
  - foreign
  - private domestic or mixed
- Region 2008 (NUTS 2) code: 7 cat.
- Locality (NUTS3) code: 174 cat.[3]

Labor force rates were computed as a ratio of the respective labor force group in the working-age population (18-59 years) from Unemployment Register datasets of NMH and Labor Force Survey of the Central Statistical Office (KSH); then their logarithm computed:

- (Log) Unemployment rate - locality level data (NMH, average of quarterly rates)
- (Log) Inactivity rate - locality level data (LFS, average of quarterly rates)
- (Log) Ratio of inactive people "wanting to work" - locality level data (LFS, average of quarterly rates)
- (Log) Ratio of inactive people "not wanting to work" - locality level data (LFS, average of quarterly rates)

See Appendix: Table I for a more detailed explanation of the variables used.

The subject of my analysis is only the for-profit corporate sector (companies with at least five employees), as the wage setting in the public sector radically differs from that of the private sector, and also in the non-profit private companies, though not in the same way. In the OLS regressions I used analytic weighting by individual weights recommended by MTA-KRTK KTI ("pmsuly"). Analytic weighting uses the proportion of

[3] only used for clustering the standard errors, and later for the panel regression fixed effects and the pooled OLS model, about which I provide details in the respective subsection (Analysis: Panel regression)

the individuals represented by the observation to the total number of employees represented by all the observations.

Later I will also use an alternative settlement-level unemployment rate, and also the ratio of longer-term unemployed (registered at least 180 days ago) coming from TSTAR, the Settlement Register of KSH. Access to this dataset was provided by Budapest Institute of Policy Analysis.

Further supplementary data was used from LFS for the analysis of the probabilities of switching into unemployment for the inactives. Access to LFS datasets was provided by the (former) ECOSTAT Government Centre for Impact Assessment.

CHAPTER 4: EMPIRICAL ANALYSIS

4.1. Descriptive statistics

I present the descriptive statistics of the main variables and their logarithms[4], which are the full-time real earnings of the Wage Survey, and the unemployment rate (NMH) and inactivity rate (LFS):

Table 3: Descriptive statistics of the main variables (2002, 2011)

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
			2002			
ftrear	145 300	2 270 801	127 890	144 127	45 011	8 252 705
unempr	142 195	2 223 417	0.051	0.034	0.013	0.235
inactr	139 373	2 179 730	0.310	0.067	0.198	0.674
lnftrear	145 300	2 270 801	11.538	0.576	10.715	15.926
ln_unempr	142 195	2 223 417	-3.187	0.636	-4.375	-1.449
ln_inactr	139 373	2 179 730	-1.191	0.195	-1.619	-0.395
			2011			
ftrear	158 611	2 538 410	154 261	171 378	45 558	10 600 000
unempr	158 654	2 539 205	0.088	0.049	0.026	0.292
inactr	157 546	2 518 788	0.279	0.055	0.172	0.599
lnftrear	158 611	2 538 410	11.719	0.589	10.727	16.181
ln_unempr	158 654	2 539 205	-2.565	0.510	-3.668	-1.230
ln_inactr	157 546	2 518 788	-1.294	0.184	-1.758	-0.513

Leaving out missing observations (mainly because of missing settlement ID essential to merge labor force rates to the wage dataset), we have 140-180 thousands observations per year, representing 2.1 – 2.7 million employees. The mean of real wages was between 120 and 160 thousand in constant 2005 HUF during the period. The average of the locality-level unemployment rates (in the total working-age population) was between 5 and 6% until the 2008 economic crisis, after that higher than 8%. However,

[4] Here only the first and last year of the dataset, but in Appendix all the years can be found.

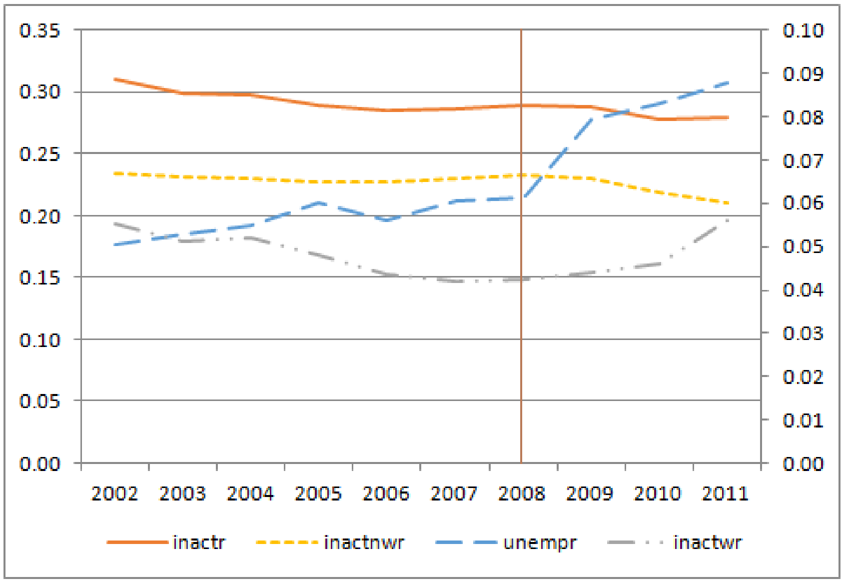
the percentage of the inactive did not rise after 2008, but remained around 28%. In 2005, and especially in 2010 there were significant drops in the number of inactives, due to the already mentioned increasing rigor in employment policy and welfare provision. This means that inactivity actually does not mean the same throughout the period because the policy changes changed the behavior of people when deciding between unemployment and inactivity with different ways of nudge to actively search for a job.

Table 4: Descriptive statistics of the splitted inactivity rates (2002, 2011)

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
			2002			
inactwr	139 373	2 179 730	0.055	0.048	0.000	0.404
inactnwr	139 373	2 179 730	0.234	0.045	0.058	0.559
ln_inactwr	138 994	2 173 643	-3.173	0.731	-5.811	-0.907
ln_inactnwr	139 373	2 179 730	-1.471	0.191	-2.840	-0.582
			2011			
inactwr	157 546	2 518 788	0.056	0.051	0.000	0.488
inactnwr	157 546	2 518 788	0.210	0.037	0.068	0.380
ln_inactwr	156 448	2 499 845	-3.185	0.778	-5.721	-0.717
ln_inactnwr	157 546	2 518 788	-1.577	0.180	-2.695	-0.968

The rate of inactives willing to work was between 4 and 6% of the working-age population, while that of inactives unwilling to work was between 21 and 23.5% on average. The Figure presents the development of these labor force rate averages together:

Figure 3: Development of unemployment, inactivity and the splitted inactivity rates, 2002-2011



We can see how unemployment rate, inactivity rate and the splitted inactivity rates developed over the period 2002-2011. Left y axis stands for inactivity rate and the unwilling-to-work inactivity rate (inactnwr), while the right y axis stands for unemployment rate and the willing-to-work inactivity rate (inactwr). The 2008 "crisis" line is only to distinguish the trends: after which the unemployment rate rose as expected (or even more), while the ratio of inactives did not, although one could normally expect. In line with the stimulus to active job search – which is generally advantageous for the economy, although not for the inactivity wage curve, as we will see later – more inactives in LFS indicated a will to work as well, even more after 2010, while the ratio of unwilling-to-work inactives began to fall.

4.2. The correlation of unemployment and inactivity

Since unemployment and inactivity grasp similar labor market phenomena to some extent, they might have a too strong connection, which would cause multicollinearity problems in the regression analysis. Although in Subsection 2.3 we could see that there are usually considerable differences between the two variables, we also have to make sure that the correlation of the unemployment rate and inactivity rate is not too high before running wage regressions with both of them. If it was, we could not include them in the same regression: because of multicollinearity, the results would be biased.

Table 5: Correlation of (log) unemployment rate and (log) inactivity rate

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
0.569	0.613	0.701	0.735	0.636	0.644	0.744	0.664	0.733	0.611

*All of them significant on the 0.1% level

As we can see in the table, the correlations are all below 0.75, which is not too high a correlation. We can conduct the regression analysis without the fear of biases coming from multicollinearity.

4.3. Regressions

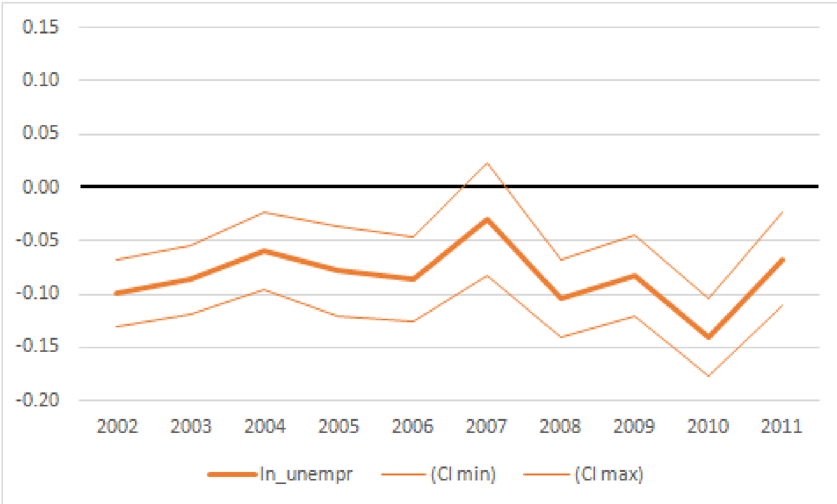
Our framework is an OLS regression model on the log of individual workers' wages, with the following explanatory variables: (log) unemployment rate, (log) inactivity rate, individual characteristics, such as gender, experience and its square, education, and company characteristics, such as industry (NACE2), company size, company ownership and region, with locality-clustered (NUTS3) robust standard errors. Except for experience, all individual and company characteristics variables are coded as binary variables from the different categories (e.g. cscat4 was coded to four company size dummies: companies with 5-20, 20-50, 50-300 and 300 or more employees) The variables are described in details in the Data description and methodology chapter[5].

4.3.1. Regression on unemployment rate

First we only include the unemployment rate and the individual and company characteristics in the regression. The coefficients we get for the control variables are in line with the economic intuition: men earn 11-13% higher than women ceteris paribus, higher educated workers, employees with more experience, employees of bigger companies, of foreign-owned companies have higher wages after controlling for other characteristics. The coefficients and significance of these control variables can be seen in the Appendix, Table I. However, here we confine our attention only to the coefficient of the (log) unemployment rate, which is the elasticity of wage on unemployment, and its 5% confidence interval for the different years:

[5]In 2005 and 2007 I identified too many missing settlement IDs. It was possible to fill up some of them in the following way. We know the time-invariant anonimized ID of all the companies, so we can apply the settlement ID from the neighboring years - but only if it is the same in the previous and the following year. I did this for years 2005 and 2007, and I won 3 and 8 thousand extra observations respectively. However, the coefficients and their significance did not change considerably (not surprising in case of 160 thousand observations per year). The table already contains the results of the filled-up data.

Figure 4: The unemployment elasticity of wages estimated by OLS regressions (2002-2011)

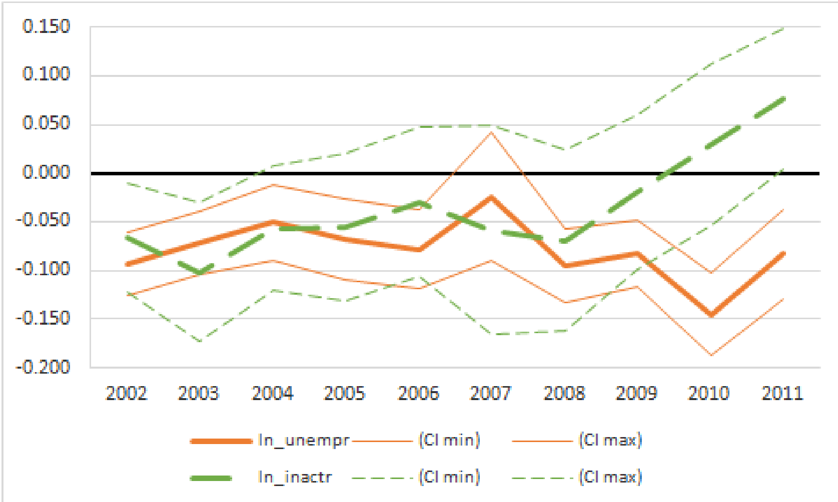


As the graph shows, the empirical law of the wage curve also exists for Hungary, for the period 2002-2011. This coefficient varies mainly around 0.1, the ”magic number” of the wage curve literature, being -0.083 on average. However, for 2007 the coefficient is not significant, which can induce the „why” question. The answer to this question requires a more detailed analysis, which I postpone to a separate chapter after the main regressions.

4.3.2. Regression on unemployment rate and inactivity rate

Secondly, we also include the (log) inactivity rate in the same type of regression model. The resulting coefficients of the (log) unemployment rate and (log) inactivity rate can be seen in the table. (The coefficients on other control variables did not change much.)

Figure 5: The unemployment and inactivity elasticity of wages estimated by OLS regressions (2002-2011)



As the figure shows, the coefficient of unemployment rate did not change much, and remained significant. The inactivity rate also had a negative coefficient on wages for years until 2009, but this was far less significant, and after 2007, we observe a dramatic increase, it even changes sign for 2011. The average for 2002-2008 was -0.063, while for 2009-2011 it was 0.029. The huge difference between the two indicates that there were structural changes in the labor market, at least in the composition of inactive people: the mentioned changes in social policy in Hungary, and partly the restructuring of the labor market after the 2008 crisis. All in all, we cannot claim the clear evidence of an „inactivity wage curve" for the whole period, but for years before 2009 there seems to be a negative relationship, the extent of which is similar to that in case of the unemployment rate, but its significance is far lower.

Since both the unemployment and inactivity rate affects wages negatively (at least in the pre-2009 period), we might want to test if their coefficients are significantly different from each other. In an extreme case, unemployed and inactive persons could have a similar probability to enter the labor, meaning the same threat to workers in the labor market to replace them, who would therefore accept similarly lower wages. The table with the P values of the Wald tests shows that it could be the case: the coefficients of unemployment and inactivity are significantly different on the 5% level only for the last two years:

Table 6: P values of Wald tests on the coefficients

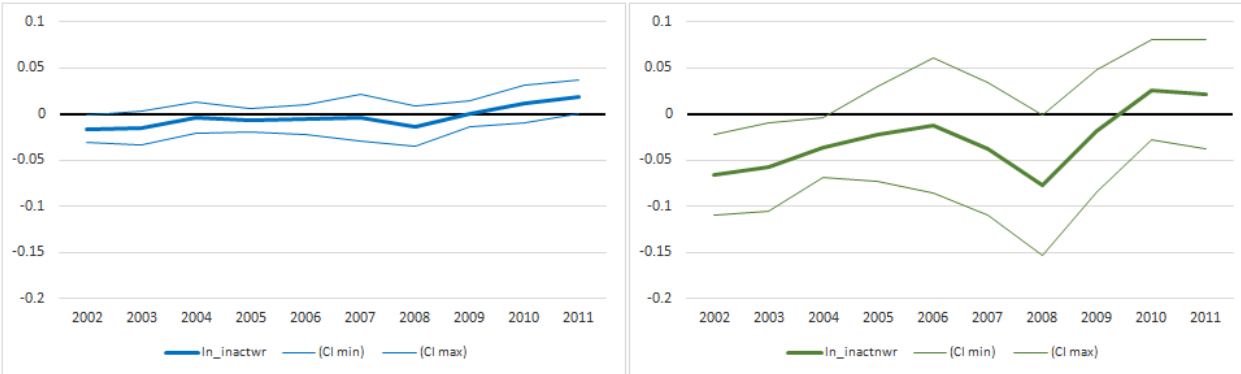
2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
0.448	0.484	0.895	0.831	0.282	0.537	0.649	0.145	0.002	0.003

However, this is not surprising, since significance of the coefficient of inactivity was quite low for most of the years.

4.3.3. Splitting the group of inactives

As Nagy-Micklewright (1999) and Köllő (2003) suggests, two groups of inactives have to be analysed separately: those who indicated in LFS that they „want to work" and those who answered they „do not want to work". The argument for this was that the former group is more likely to get a job, and so the rate of those inactives who want to work might have a bigger negative impact on wages. So I run the regressions on the unemployment rate and the two rates of inactives, plus the usual control variables. The coefficient of the unemployment did not change much. Figure 6 shows the coefficient of the two inactivity rates and their 5% confidence intervals for years 2002-2011:

Figure 6: The elasticity of wages on the splitted inactivity rates estimated by OLS regressions (2002-2011)



The results after splitting the group of inactives are contrary to our expectations: we did not find any evidence that the inactivity rate of those wanting to work really affects wages negatively. It is rather the ratio of inactives not wanting to work which shows a bit more significant negative relationship with wages, at least for the period until 2008[6]. We cannot exclude however, that this relationship shows something else. The rate of inactives without motivation to work can correlate with other non-observable factors of a settlement, such as insufficient job opportunities, bad infrastructure or other disadvantageous factors of the local labor market, which might affect individual wages negatively (as noted in James (2012) for the rate of long-term unemployed). Wecan also run Wald tests to test if the coefficients are significantly different:

Table 7: P values of the Wald tests

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
0.023	0.056	0.047	0.543	0.851	0.232	0.058	0.569	0.551	0.920

[6]Only around 10% of inactives were „wanting to work"in each year, so the effect we saw in the inactivity rate is dominated by the rate of inactives „not wanting to work".

The P values show that there are only 4 years where the coefficients were significantly different on a 10% level. (Not surprising, we have seen the insignificance of both before.)

The coefficients and standard errors of the unemployment and inactivity rates from the three regressions above can be found in the table (together with the observations and R-squared of the respective regression, whole regression outputs can be found in Appendix):

Table 8: Regression outputs of the main specifications

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
VARIABLES	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear
ln_unempr	-0.0993***	-0.0862***	-0.0599***	-0.0784***	-0.0858***	-0.0298	-0.104***	-0.0820***	-0.141***	-0.0675***
	(0.0163)	(0.0164)	(0.0186)	(0.0215)	(0.0205)	(0.0269)	(0.0183)	(0.0193)	(0.0186)	(0.0224)
Observations	142,033	156,930	173,714	170,461	175,780	162,688	162,210	156,467	159,522	158,611
R-squared	0.506	0.465	0.476	0.486	0.463	0.484	0.469	0.461	0.472	0.452
ln_unempr	-0.0931***	-0.0723***	-0.0509**	-0.0682***	-0.0783***	-0.0243	-0.0950***	-0.0825***	-0.145***	-0.0831***
	(0.0164)	(0.0165)	(0.0198)	(0.0216)	(0.0205)	(0.0336)	(0.0191)	(0.0175)	(0.0217)	(0.0235)
ln_inactr	-0.0667**	-0.102***	-0.0569*	-0.0560	-0.0297	-0.0585	-0.0695	-0.0197	0.0294	0.0764**
	(0.0286)	(0.0365)	(0.0327)	(0.0389)	(0.0392)	(0.0547)	(0.0476)	(0.0405)	(0.0425)	(0.0369)
Observations	139,211	153,161	170,040	166,655	172,454	159,522	158,977	155,287	158,260	157,503
R-squared	0.505	0.466	0.475	0.484	0.461	0.484	0.469	0.462	0.472	0.453
ln_unempr	-0.0891***	-0.0762***	-0.0575***	-0.0719***	-0.0773***	-0.0289	-0.0991***	-0.0861***	-0.147***	-0.0913***
	(0.0168)	(0.0172)	(0.0204)	(0.0220)	(0.0218)	(0.0345)	(0.0186)	(0.0189)	(0.0221)	(0.0259)
ln_inactwr	-0.0163**	-0.0149	-0.00385	-0.00586	-0.00596	-0.00416	-0.0132	7.60e-05	0.0110	0.0182**
	(0.00748)	(0.00947)	(0.00878)	(0.00674)	(0.00825)	(0.0130)	(0.0112)	(0.00727)	(0.0102)	(0.00919)
ln_inactnwr	-0.0662***	-0.0580**	-0.0365**	-0.0197	-0.0125	-0.0334	-0.0770**	-0.0182	0.0258	0.0215
	(0.0221)	(0.0244)	(0.0163)	(0.0265)	(0.0371)	(0.0360)	(0.0389)	(0.0337)	(0.0276)	(0.0303)
Observations	138,832	151,270	169,355	165,459	170,983	157,095	156,305	155,026	158,093	156,405
R-squared	0.505	0.466	0.475	0.484	0.462	0.485	0.472	0.462	0.472	0.453
Robust standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

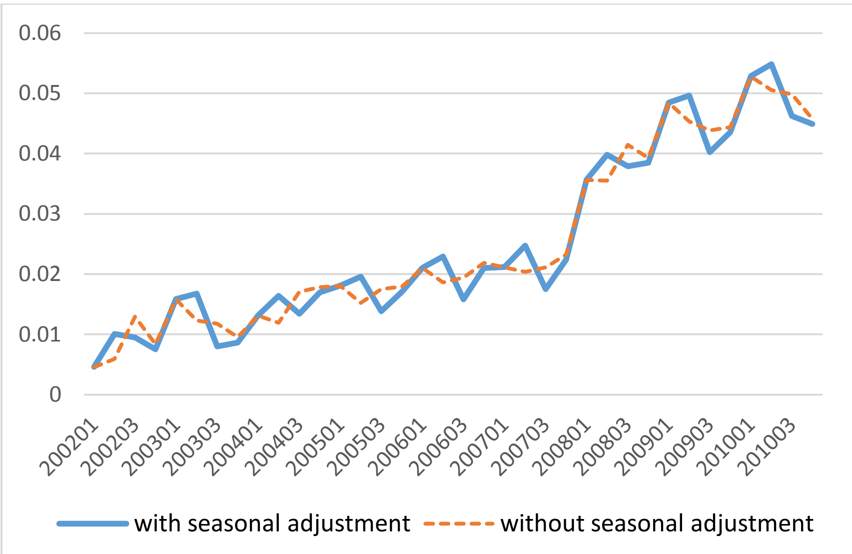
4.3.4. The probability of switching from inactivity to unemployment

Did the probability of switching from inactivity to unemployment change significantly during the period of our analysis? If yes, then it can explain why the coefficient of inactivity grew insignificant, and even changed sign in the wage regression during the years. As we mentioned in the literature review, there were major changes in the social and employment policy in Hungary during our period of interest. We want to have evidence if these policy changes really affected the behavior of inactive persons: e.g. knowing that they will get the "unemployment benefit" only if they report they are searching for a job, they will tend to actually report so, even if they are not searching. If this is the case, the effect we measure in the wage regression in the years after the policy change is the effect of a differently defined group already.

The classic Jenkins discrete logistic probability model would be the appropriate choice to check whether the probability of an inactive to enter the labor market by self-reporting job search, however, we do not have enough observations for this purpose. For a discrete Jenkins model we would need the time (number of months) already spent inactive, but we do not know the exact time of losing the previous job for many non-working participants of the survey. In the end, only 250-500 inactive persons would remain for the different months, which do not allow us to conduct reliable analysis.

That is why I had to be satisfied with the following models: a pooled OLS with control variables, and a simple probit with worker fixed effects on those inactives, who were observed in 5 consecutive waves[7], with the "unemployed ('job searcher') after 1 year" dummy as the outcome variable. After these two regressions, I plotted the residuals. These show how the probability to transfer from inactivity to unemployment in 1 year developed, after controlling for the observable characteristics of workers.

Figure 7: Residuals of pooled probit on job search after 1 year (present inactives), explanatory variables: age groups, gender, region, education, year quarter



We can see from both graphs that the transfer probability – after filtering out the effects of other factors – jumped from 2007Q4 to 2008Q1 from 2% to nearly 4%, and increased further in 2009, remaining high after that. This jump cannot be attributed to any individual observable factors, but can be attributed to the changes in the institutions of Hungarian labor and social policy. The doubling (and to 2010-2011 trebling) of the probability of switching status can explain our findings why the coefficient of inactivity

[7] Note: this is only the 27-29% of the quarterly sample, because of the rolling panel feature of LFS: only 5/6 of the sample remains for each consecutive year, after four waves passed, only the 1/3 of the original sample remains. The number of denials reduces this proportion usually below 30% (Bálint 2011, 326)

lost its significance and changed sign even in the large company employees' subsample after 2007.

The picture we see from the residuals of the probit regression with fixed effects is very similar, although the magnitude of changes is smaller, because with controlling for individual fixed effects we might have filtered out essential information on job search behavior of inactive individuals. (Regression outputs are available on request.)

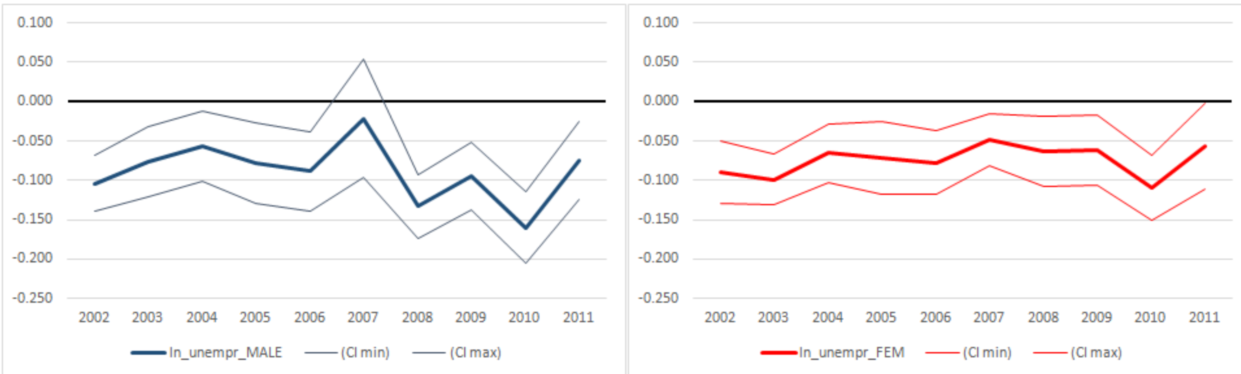
4.3.5. Regressions on worker subgroups

We might want to test if the wage curve is the same for different subgroups of the worker population, as many of the wage curve papers mentioned in the literature review did. I will test the wage curve on subgroups by three dimensions: education, regions and company size, in order to see if different subgroups are more responsive to changes in unemployment and/or inactivity rates.

4.3.5.1. By gender

I conducted the same yearly OLS regressions with locality-clustered standard errors for years 2002-2011 on the subsample of male and female employees. The table and Figure 8 show the coefficients and their 5% confidence intervals.

Figure 8: The unemployment elasticity of wages estimated by the regressions on the subgroups by gender (2002-2011)



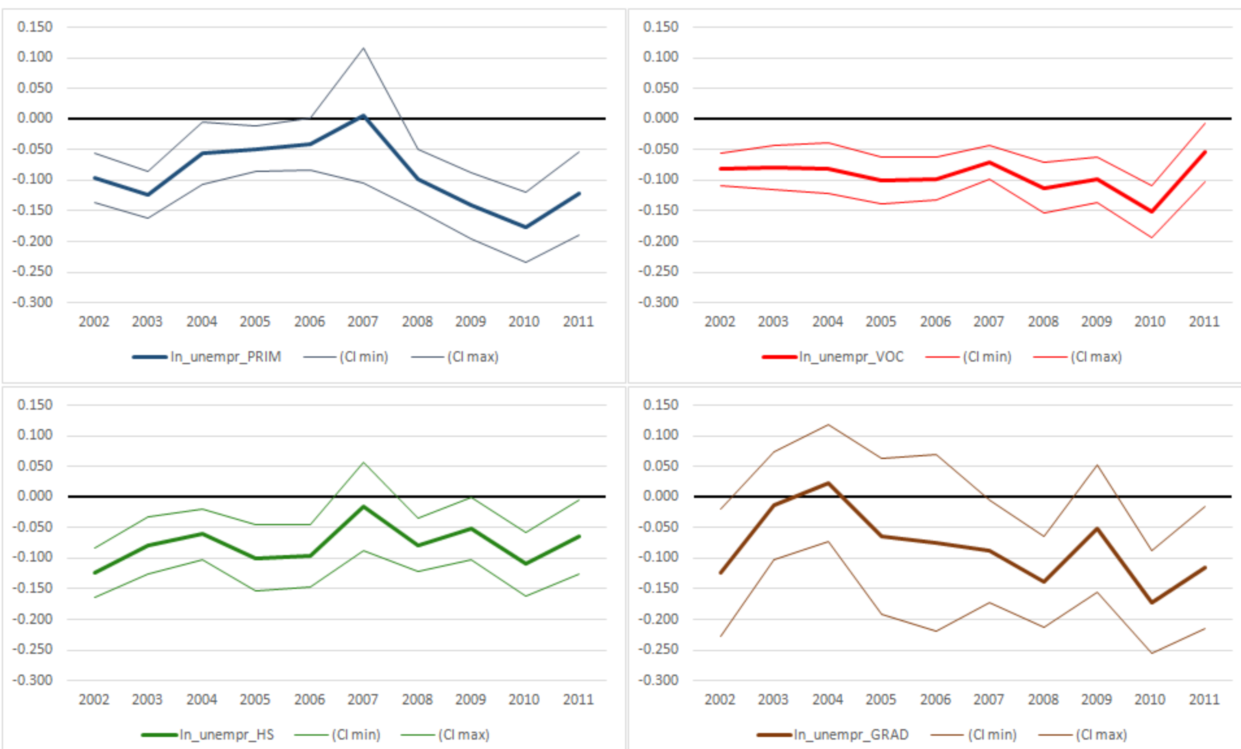
According to the graphs, the coefficient of unemployment rate was more volatile on the subsample of men, reaching its most negative point in 2010 (-0.16), and being insignificant in 2007 (-0.02). While the wage curve of women was very stable, and remained between -0.05 and -0.1 in every year of the period. Bigger difference in wage responsiveness was observed in the post-2006 period: this might be due that the economic crisis hit industries differently with mainly male/female workers, or that the post-2006 social policy changes affected the labor participation decisions of men more heavily.

Figure 9: The unemployment and inactivity elasticity of wages estimated by the regressions on the subgroups by gender (2002-2011)

We see the same unemployment-wage curve in the regressions augmented with the inactivity rate, and we can also observe the differences between the coefficient of inactivity: in case of men, we can observe a coefficient changing between -0.05 and -0.1 until 2009, although it is rather insignificant, while for women, we cannot see any effect from 2005 onwards. In 2011, both changed sign.

4.3.5.2. By education

Figure 10: The unemployment elasticity of wages estimated by the regressions on the subgroups by education (2002-2011)



As the graphs show, there are major differences of the wage curves of employee subsamples by education. The group with vocational education has the most steady wage curve, between -0.08 and -0.12 almost for all the years. This is the only group where the wage curve is also significant in 2007. The wage curve is also quite stabile for the workers with high school degree: mainly between -0.05 and -0.1, but insignificant in 2007. For the subsample of workers with a maximum of 8 classes of primary school education, the wage elasticity on unemployment changes between -0.05 and -0.15, while that of those with graduate or post-graduate degree is highly volatile and mainly insignificant negative.

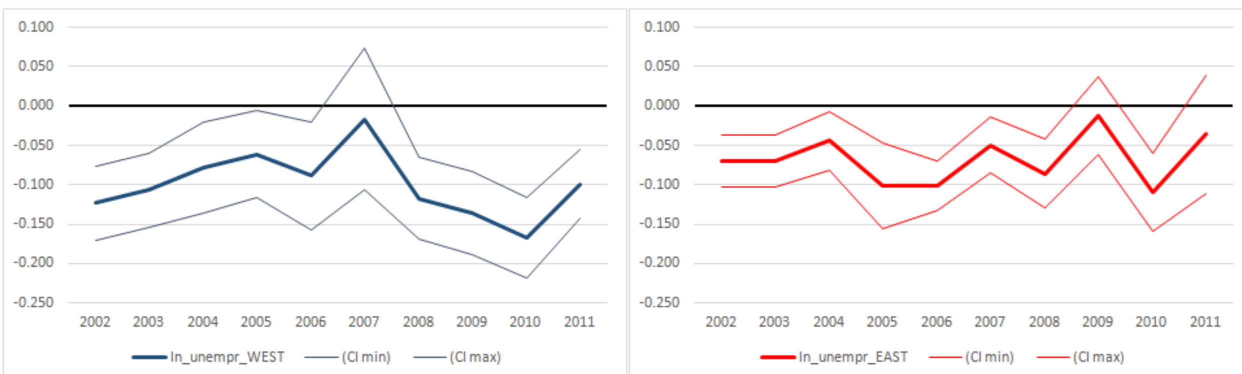
Figure 11: The unemployment and inactivity elasticity of wages estimated by the regressions on the subgroups by education (2002-2011)

The graphs show the coefficients of unemployment and inactivity from the augmented regressions. The inactivity rate is only significant for 2002 and 2003 for the high school and the graduate subsample, otherwise insignificant negative, changing sign for 2010-2011, with no more remarkable differences by education level.

4.3.5.3. By regions

Concerning the division of Hungarian regions into two groups, I did the following: I created a „Western regions" group (Transdanubia and Central Hungary) and an „Eastern regions" group (Big Plain and Northern Hungary), expecting different results because of the obvious difference in wealth and living standard in a gross generalisation:

Figure 12: The unemployment elasticity of wages estimated by the regressions on the subgroups by regions (2002-2011)



Generally, Western regions had a more negative wage elasticity on unemployment, changing mainly between -0.15 and -0.05, while in Eastern regions the wage responsiveness was lower, between -0.1 and -0.05. So, the former wage curve was more volatile, being insignificant in 2007, while the more stable latter was insignificant in 2009 and 2011.

Figure 13: The unemployment and inactivity elasticity of wages estimated by the regressions on the subgroups by regions (2002-2011)

The coefficient of inactivity was only significant in both part sin 2002-2003, and for the Eastern also in 2004. For other years, it is mainly insignificant negative, as usual, changing sign in the last years. Inactivity did not alter much the coefficient of unemployment.

4.3.5.4. By company size

The two subgroups of workers are the following: those employed by companies with less than 50 employees, and those with 50 or more employees. The difference is remarkable: there is no strong wage curve for the employees of small companies: except for 2010-2011, the coefficient is around -0.05, sometimes even insignificant in many years. At the same time, the wage curve for the employees of bigger companies is very stable, changing between -0.8 and -0.15. We can assume that „bigger" employers can react more intensively to the changes of the labor market, adjusting the wages in a way that the empirical law of the wage curve prevails.

Figure 14: The unemployment elasticity of wages estimated by the regressions on the subgroups by company size (2002-2011)

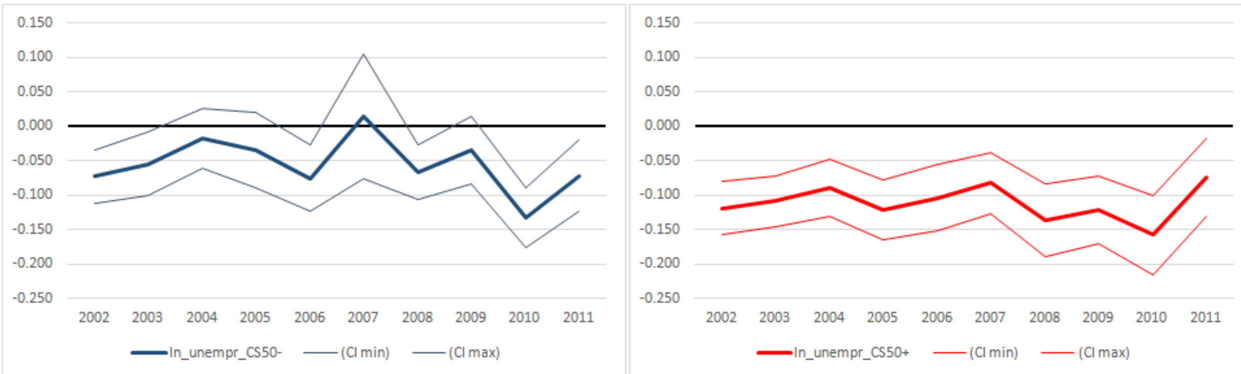


Figure 15: The unemployment and inactivity elasticity of wages estimated by the regressions on the subgroups by company size (2002-2011)

While for small companies the coefficient of inactivity is very volatile and insignificant for the whole period, there is a significant inactivity-wage curve for the bigger companies until 2006, and the coefficient is almost the same -0.1 as it is for the unemployment rate. However, the changes in social and employment policy in the post-2006 period have affected this relation heavily: the coefficient began to increase and changed sign for the latter years. It really might be the case that the inactives we measured before 2007 are not the same group by definition, as those measured after 2007, as already showed in the analysis of labor market status transfer probabilities from inactivity into unemployment.[8]

4.3.6. Panel regression on locality level

The wage curve is an empirical connection between level of (log) wages and level of (log) unemployment rate, which can be observed when the labor market is in equilibrium. So far I only showed this connection between the levels. We might want to test if the changes of unemployment also affect changes of wages. For this purpose I created a locality-level panel dataset containing the mean of years of experience and its square, and the percentage of employees by gender, education, company size, settlement type for the 174 localities for each year of the period 2002-2011.

On this dataset I run a pooled OLS regression on (log) wages with the locality averages of the usual explanatory variables, year dummies and locality-clustered robust standard errors. Secondly, I run a panel regression with locality-fixed effects, year dummies and the same usual variables.[9] The first specifications contained only the unemployment, the second also the inactivity rate. We can see that the coefficients are not significant even on the 10% level, which means that the changes of unemployment and inactivity did not affect the changes of wages.

I also run the fixed effects regression on a panel of locality-industry pairs, which did not alter the coefficients considerably.

[8] See Appendix for regression outputs, number of observations and R-squared on the subgroups.

[9] See the results in Appendix: Table XI

4.4. Robustness checks

4.4.1. Analysis with an unemployment rate from a different database

To check the robustness of our findings, we can also conduct the analysis for the unemployment rate from the TSTAR database (settlement-level unemployment rate). The correlation of this unemployment rate with the formerly used unemployment rate (NMH, locality-level) is 0.91-0.95 for all years.

First of all, we have to see if our settlement-level unemployment rate is highly correlated with the inactivity rate, because of the danger of multicollinearity:

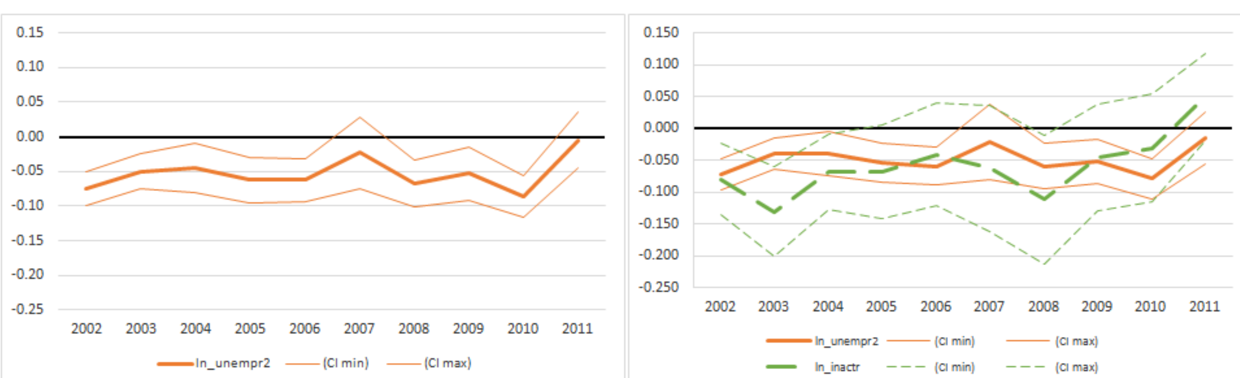
Table 9: Correlation of (log) unemployment rate (TSTAR) and (log) inactivity rate (LFS)

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
0.536	0.58	0.652	0.695	0.615	0.625	0.69	0.628	0.683	0.578

*All of them significant even on the 0.1% level

The correlations are not too high, all of them are below 0.7, which is not too high correlation, so there is no danger of multicollinearity.

Figure 16: The unemployment (TSTAR) and inactivity elasticity of wages estimated by the regressions (2002-2011)



The graphs show the coefficients of unemployment rate and inactivity rate resulting from the regressions specified in the same way as above. The coefficient of the alternative unemployment rate (settlement-level, TSTAR) is between -0.5 and -0.7 for most of the years, this also shows a wage curve, although a weaker one. For years 2007 and 2011, the relation is not significant. If we also include the inactivity rate into the regression, w eget almost the same coefficient for unemployment, and a coefficient on inactivity usually between -0.05 and -0.1, however, this is only significant for the earlier years. After 2008 it increases gradually, as we have seen above already with the previously used unemployment rate (locality-level, NMH). (See the regression table in Appendix.)

4.4.2. Further robustness checks

I also conducted the following robustness checks on the yearly analysis:

- Lagged unemployment rate and lagged inactivity rate
- Inclusion of the rate of longer-term unemployed (those who registered at least 180 days ago)
- Regression without Budapest

The inclusion of the lags of the unemployment and inactivity rates can cure the possible problem of simultaneity in the regression: if unemployment and inactivity data of the same year as the wage data are included in the model, wage might have an effect on both rates, because people’s decisions about their labor force status can be influenced by the prevailing wages on the labor market. That is why I run the wage regressions also with the one-year-lags of these labor force rates. The results did change very slightly.

On the example of the Welsh wage curve (James (2012) included the long-term unemployed in the regression), I also included the ratio of longer-term unemployed (registered at least 180 days ago) in the 18-59 year-old population (settlement-level, TSTAR). We can see minor and very insignificant negative effects (even on the 40-50% level).

In the case of Hungary, Budapest the capital might dominate the results of economic analyses sometimes, that is why I also run the regressions on the sample of employees without those working in Budapest. The coefficients and their significance did not change at all.

4.4.3. Panel regression with random effects

We might want to test if the panel regression model with random effects give the same results as with fixed effects seen above. For this purpose, I run the same panel regression with random effects, and then run the Hausman test. (Detailed regression outputs in the Appendix.) The results of the test:

Test: Ho: difference in coefficients not systematic

chi2(22) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 100.24

Prob>chi2 = 0.0000

Fixed effect model: consistent under Ho and Ha; obtained from xtreg

Random effect model: inconsistent under Ha, efficient under Ho; obtained from xtreg

The results of the test indicate that the two models are significantly different even on the 0.1% level. This means that wages (in our data but also in general) have a time-invariant locality-specific component, therefore we commit a mistake if we do not control for this issue with locality fixed effects in our model.

4.4.4. Effect of permanent changes in unemployment

So far we have only analysed if short-run deviations of the local unemployment rate and inactivity rate influence wages, and found that minor fluctuations of the unemployment rate from its equilibrium level do not have an influence on the fluctuations of individual wages.

However, we can also test if permanent changes influence wages on the long run. For this purpose, I generated yearly ranks in unemployment rates to see in which locality there happened a bigger permanent change in unemployment. Then I kept only those observations, where there was a jump or fall of at least 10 places in the unemployment rate rank, and it prevailed for at least two more years (so, for 3 years altogether, the locality fell short of or “overshot” its rank of year 0 with at least 10 places). Only 261 observations remained (about 30-30 localities with at least 4 years), where there were such permanent striking changes in unemployment. I run the same panel regression with fixed effects on them, and also a difference-in-differences model (dependent variable: difference of average wage in t+3 and t, main explanatory variable: difference of unemployment rate in t+3 and t), however, the coefficient of unemployment remained highly insignificant. (Regression outputs available on request.)

CHAPTER 5: CONCLUSIONS

The wage curve is an empirical law of the labor market, a negative connection between local unemployment rate and individual wages, introduced by Blanchflower and Oswald (1994). The wage curve was empirically showed for several countries, also for the Hungary for previous years (1992-2003), and it proved to be in line with the -0.1 elasticity in the international literature.

The definition of the labor force supply is key in measuring the wage curve. Although most wage curve studies use only the ILO definition of unemployed, Fazekas and Köllő (2008) argues that this is not enough: we have to take the inactives into account. Although formally not being part of the labor supply, many inactives return to the labor market by entering a job. According to LFS there is a clear distinction between those who „want to work" and those who do not, so it is worth separating these two groups in the analysis.

In my empirical analysis I estimate the wage curve on individual worker data of the corporate sector of Hungary, for the period 2002-2011. I use yearly databases of the Hungarian Wage Cost Survey (Bértarifa) for yearly cross-section regressions explaining (log) real wages with the (log) unemployment rate of the locality, controlling for individual and company characteristics. Secondly, I augment the model with the (log) inactivity rate, thirdly I split inactivity rate along the will to work. Finally, I also estimate the wage curve with inactivity on different subsamples by gender, education, company size and regions; also a panel regression model with locality fixed effects and a pooled OLS, then check for robustness in several ways.

The results show that the wage curve in the Hungarian corporate sector really exists for the analyzed period, and is in line with the international literature: the unemployment elasticity of wage was -0.083 on yearly average, the only „insignificant year" being 2007. However, we do not have strong evidence that the inactivity rate is relevant for the wage curve in Hungary: generally we can see a negative coefficient, gradually losing significance over the years, even changing sign for 2010-2011. On average it was -0.063 for the period 2002-2008, and 0.029 for the period 2009-2011. We find the most significant results for companies with at least 50 employees, but after 2006 they became also insignificant. A possible explanation for this insignificance is the changes of Hungarian employment policy from end-2005, which made inactives actively look for jobs. Thus the increasing rigor of unemployment benefit entitlement changed the definition of inactivity, which can be a reason for these findings.

In the panel regression models I did not find evidence that the changes in unemployment would also affect the changes in wages.

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APPENDIX

Table I: Explanation of the variable codes used

loc174	Locality (NUTS3) code: 174 cat.
year	Year of survey (2002-2011)
cid_anon	Anonymized company ID (time-invariant)
wid	Individual worker ID (time-variant)
lnftrear	(Log) Full-time average gross monthly REAL earnings (in constant 2005 HUF)
ln_unempr	(Log) Ratio of unemployed people within the working age population (18-59 years) - locality level data (NMH, average of quarterly rates)
ln_unempr2	(Log) Ratio of unemployed people within the working age population (18-59 years) - settlement level data (TSTAR, yearly)
ln_inactr	(Log) Ratio of inactive people within the working age population (18-59 years) - locality level data (LFS, average of quarterly rates)
ln_inactwr	(Log) Ratio of inactive people "wanting to work" within the working age population (18-59 years) - locality level data (LFS, average of quarterly rates)
ln_inaktnwr	(Log) Ratio of inactive people "not wanting to work" within the working age population (18-59 years) - locality level data (LFS, average of quarterly rates)
male	Gender (0 = female, 1 = male)
age	Age (year of birth - year of survey)
exp	Estimated years of experience (age - years of educ -6)
exp2	Estimated years of experience squared
educ4	Highest degree of (completed) educational attainment: 4 cat.
educ_1	Highest education: maximum eight classes of primary school
educ_2	Highest education: vocational school
educ_3	Highest education: high school degree ("érettségi")
educ_4	Highest education: graduate or post-graduate degree (BA/BSc, MA/MSc, PhD)
settyp4	Settlement type: 4 cat. (based on TSTAR 2008 population data)
settyp_1	Settlement type: Budapest
settyp_2	Settlement type: county seat
settyp_3	Settlement type: town/city (2008)
settyp_4	Settlement type: village
cscat4	Company size by number of workers: 4 cat.
cscat_1	Company size: 5-20 workers
cscat_2	Company size: 21-50 workers
cscat_3	Company size: 51-300 workers
cscat_4	Company size: Over 300 workers
nace1998_2	Industrial sector: 2-digit ("TEÁOR" valid from 1998)
nace2003_2	Industrial sector: 2-digit ("TEÁOR"valid from 2003)
nace2008_2	Industrial sector: 2-digit ("TEÁOR" valid from 2008)
public	Majority state or municipal ownership
foreign	Majority foreign ownership
privmixed	Majority private domestic, or mixed ownership
rcode2008	Region 2008: 7 cat. (NUTS 2)
setid	Corrected, TSTAR-harmonized settlement identification code ("tazon")

Table II: Descriptive statistics for the main variables (2002-2011)

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
2002						
ftrear	145,300	2,270,801	127,890	144,127	45,011	8,252,705
unempr	142,195	2,223,417	0.051	0.034	0.013	0.235
inactr	139,373	2,179,730	0.310	0.067	0.198	0.674
lnftrear	145,300	2,270,801	11.538	0.576	10.715	15.926
ln_unempr	142,195	2,223,417	-3.187	0.636	-4.375	-1.449
ln_inactr	139,373	2,179,730	-1.191	0.195	-1.619	-0.395
2003						
ftrear	159,794	2,355,465	137,988	150,155	45,002	7,126,842
unempr	157,120	2,317,335	0.053	0.036	0.012	0.241
inactr	153,350	2,265,246	0.299	0.058	0.185	0.541
lnftrear	159,794	2,355,465	11.608	0.591	10.714	15.779
ln_unempr	157,120	2,317,335	-3.146	0.641	-4.415	-1.422
ln_inactr	153,350	2,265,246	-1.224	0.179	-1.690	-0.613
2004						
ftrear	176,618	2,425,591	135,880	146,119	45,010	11,200,000
unempr	173,944	2,387,697	0.055	0.036	0.013	0.245
inactr	170,268	2,333,406	0.298	0.066	0.198	0.559
lnftrear	176,618	2,425,591	11.592	0.596	10.715	16.234
ln_unempr	173,944	2,387,697	-3.097	0.622	-4.321	-1.407
ln_inactr	170,268	2,333,406	-1.232	0.205	-1.617	-0.581
2005						
ftrear	176,387	2,391,623	142,905	158,331	45,600	11,600,000
unempr	167,507	2,269,592	0.060	0.039	0.015	0.247
inactr	163,700	2,216,759	0.289	0.065	0.147	0.576
lnftrear	176,387	2,391,623	11.632	0.607	10.728	16.270
ln_unempr	167,507	2,269,592	-3.009	0.629	-4.174	-1.398
ln_inactr	163,700	2,216,759	-1.264	0.208	-1.919	-0.551
2006						
ftrear	178,960	2,607,141	144,745	162,192	45,418	7,764,420
unempr	176,027	2,565,134	0.056	0.039	0.016	0.232
inactr	172,697	2,516,027	0.285	0.061	0.116	0.667
lnftrear	178,960	2,607,141	11.645	0.600	10.724	15.865
ln_unempr	176,027	2,565,134	-3.096	0.659	-4.139	-1.460
ln_inactr	172,697	2,516,027	-1.275	0.196	-2.155	-0.405

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
2007						
ftrear	169,710	2,505,719	155,140	184,765	45,096	9,702,135
unempr	154,711	2,348,279	0.061	0.042	0.017	0.248
inactr	151,545	2,297,991	0.286	0.055	0.176	0.543
lnftrear	169,710	2,505,719	11.709	0.600	10.717	16.088
ln_unempr	154,711	2,348,279	-3.020	0.652	-4.049	-1.396
ln_inactr	151,545	2,297,991	-1.268	0.178	-1.736	-0.611
2008						
ftrear	164,933	2,689,158	156,149	177,898	45,014	24,900,000
unempr	162,224	2,652,880	0.061	0.044	0.018	0.253
inactr	158,991	2,598,621	0.290	0.056	0.155	0.667
lnftrear	164,933	2,689,158	11.730	0.588	10.715	17.029
ln_unempr	162,224	2,652,880	-3.018	0.658	-4.002	-1.373
ln_inactr	158,991	2,598,621	-1.256	0.179	-1.864	-0.405
2009						
ftrear	159,773	2,484,072	156,024	182,228	45,257	22,500,000
unempr	156,630	2,442,720	0.079	0.047	0.029	0.264
inactr	155,450	2,421,166	0.287	0.054	0.121	0.635
lnftrear	159,773	2,484,072	11.727	0.590	10.720	16.927
ln_unempr	156,630	2,442,720	-2.697	0.573	-3.540	-1.331
ln_inactr	155,450	2,421,166	-1.263	0.175	-2.111	-0.454
2010						
ftrear	159,522	2,579,351	154,921	177,974	45,166	18,300,000
unempr	159,547	2,579,694	0.083	0.043	0.031	0.253
inactr	158,285	2,559,736	0.277	0.049	0.184	0.527
lnftrear	159,522	2,579,351	11.719	0.592	10.718	16.721
ln_unempr	159,547	2,579,694	-2.611	0.485	-3.477	-1.375
ln_inactr	158,285	2,559,736	-1.296	0.161	-1.695	-0.641
2011						
ftrear	158,611	2,538,410	154,261	171,378	45,558	10,600,000
unempr	158,654	2,539,205	0.088	0.049	0.026	0.292
inactr	157,546	2,518,788	0.279	0.055	0.172	0.599
lnftrear	158,611	2,538,410	11.719	0.589	10.727	16.181
ln_unempr	158,654	2,539,205	-2.565	0.510	-3.668	-1.230
ln_inactr	157,546	2,518,788	-1.294	0.184	-1.758	-0.513

Table III: Descriptive statistics for splitted inactivity rates (2002-2011)

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max		Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
2002								2007						
inactwr	139,373	2,179,730	0.055	0.048	0.000	0.404		inactwr	151,545	2,297,991	0.042	0.039	0.000	0.286
inactnwr	139,373	2,179,730	0.234	0.045	0.058	0.559		inactnwr	151,545	2,297,991	0.230	0.042	0.102	0.500
ln_inactwr	138,994	2,173,643	-3.173	0.731	-5.811	-0.907		ln_inactwr	149,118	2,262,707	-3.477	0.796	-6.092	-1.250
ln_inactnwr	139,373	2,179,730	-1.471	0.191	-2.840	-0.582		ln_inactnwr	151,545	2,297,991	-1.484	0.180	-2.280	-0.694
2003								2008						
inactwr	153,350	2,265,246	0.051	0.042	0.000	0.426		inactwr	158,991	2,598,621	0.043	0.038	0.000	0.354
inactnwr	153,350	2,265,246	0.232	0.043	0.078	0.413		inactnwr	158,991	2,598,621	0.233	0.042	0.116	0.667
ln_inactwr	151,459	2,238,608	-3.223	0.713	-5.124	-0.853		ln_inactwr	156,319	2,558,279	-3.430	0.740	-5.276	-1.037
ln_inactnwr	153,350	2,265,246	-1.480	0.192	-2.556	-0.884		ln_inactnwr	158,991	2,598,621	-1.473	0.175	-2.158	-0.405
2004								2009						
inactwr	170,268	2,333,406	0.052	0.045	0.000	0.374		inactwr	155,450	2,421,166	0.044	0.037	0.000	0.382
inactnwr	170,268	2,333,406	0.230	0.048	0.032	0.423		inactnwr	155,450	2,421,166	0.230	0.036	0.099	0.475
ln_inactwr	169,583	2,324,484	-3.244	0.741	-5.198	-0.984		ln_inactwr	155,189	2,417,191	-3.418	0.790	-6.640	-0.962
ln_inactnwr	170,268	2,333,406	-1.494	0.223	-3.448	-0.860		ln_inactnwr	155,450	2,421,166	-1.483	0.152	-2.316	-0.743
2005								2010						
inactwr	163,700	2,216,759	0.048	0.043	0.000	0.406		inactwr	158,285	2,559,736	0.046	0.038	0.000	0.380
inactnwr	163,700	2,216,759	0.227	0.047	0.066	0.405		inactnwr	158,285	2,559,736	0.219	0.037	0.055	0.384
ln_inactwr	162,503	2,198,300	-3.357	0.823	-6.360	-0.901		ln_inactwr	158,118	2,556,480	-3.339	0.735	-6.286	-0.967
ln_inactnwr	163,700	2,216,759	-1.505	0.213	-2.725	-0.904		ln_inactnwr	158,285	2,559,736	-1.535	0.174	-2.894	-0.956
2006								2011						
inactwr	172,697	2,516,027	0.044	0.042	0.000	0.413		inactwr	157,546	2,518,788	0.056	0.051	0.000	0.488
inactnwr	172,697	2,516,027	0.227	0.043	0.105	0.667		inactnwr	157,546	2,518,788	0.210	0.037	0.068	0.380
ln_inactwr	171,226	2,491,432	-3.478	0.846	-5.906	-0.883		ln_inactwr	156,448	2,499,845	-3.185	0.778	-5.721	-0.717
ln_inactnwr	172,697	2,516,027	-1.499	0.177	-2.250	-0.405		ln_inactnwr	157,546	2,518,788	-1.577	0.180	-2.695	-0.968

Table IV: Regression output of the regression with unemployment rate

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
VARIABLES	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear
ln_unempr	-0.0993***	-0.0862***	-0.0599***	-0.0784***	-0.0858***	-0.0298	-0.104***	-0.0820***	-0.141***	-0.0675***
	(0.0163)	(0.0164)	(0.0186)	(0.0215)	(0.0205)	(0.0269)	(0.0183)	(0.0193)	(0.0186)	(0.0224)
male	0.132***	0.121***	0.121***	0.111***	0.111***	0.145***	0.127***	0.111***	0.130***	0.118***
	(0.0132)	(0.00958)	(0.0140)	(0.00876)	(0.00960)	(0.0130)	(0.00878)	(0.00636)	(0.00769)	(0.00672)
exp	0.0169***	0.0115***	0.0131***	0.0135***	0.0106***	0.0147***	0.0143***	0.0148***	0.0165***	0.0146***
	(0.00125)	(0.00121)	(0.00218)	(0.00204)	(0.00188)	(0.00209)	(0.00228)	(0.00260)	(0.00176)	(0.00246)
exp2	0.000247**	0.000102**	0.000147**	0.000158**	-9.41e-05**	0.000196**	0.000171**	0.000192**	0.000221**	0.000186**
	(2.18e-05)	(2.23e-05)	(4.02e-05)	(3.96e-05)	(3.63e-05)	(3.89e-05)	(4.36e-05)	(4.64e-05)	(3.36e-05)	(4.56e-05)
2.educ4	0.114***	0.104***	0.131***	0.123***	0.106***	0.115***	0.135***	0.149***	0.124***	0.135***
	(0.00866)	(0.0133)	(0.0112)	(0.00954)	(0.00868)	(0.0206)	(0.0106)	(0.0163)	(0.00905)	(0.00853)
3.educ4	0.332***	0.312***	0.326***	0.318***	0.297***	0.329***	0.339***	0.344***	0.305***	0.306***
	(0.0169)	(0.0270)	(0.0204)	(0.0181)	(0.0149)	(0.0251)	(0.0152)	(0.0269)	(0.0163)	(0.0139)
4.educ4	0.920***	0.916***	0.910***	0.902***	0.853***	0.881***	0.878***	0.884***	0.859***	0.869***
	(0.0367)	(0.0551)	(0.0404)	(0.0374)	(0.0383)	(0.0349)	(0.0402)	(0.0509)	(0.0394)	(0.0375)
2.settyp4	-0.0779***	-0.104***	-0.0942***	-0.0838***	-0.0467	-0.0844***	-0.0699**	-0.0735***	-0.0769***	-0.0723***
	(0.0229)	(0.0239)	(0.0240)	(0.0249)	(0.0335)	(0.0179)	(0.0289)	(0.0236)	(0.0249)	(0.0223)
3.settyp4	-0.0695***	-0.0795***	-0.0834***	-0.0835***	-0.0524	-0.0915***	-0.0507*	-0.0384	-0.0516*	-0.0605***
	(0.0229)	(0.0255)	(0.0245)	(0.0251)	(0.0368)	(0.0191)	(0.0275)	(0.0251)	(0.0265)	(0.0218)
4.settyp4	-0.121***	-0.110***	-0.119***	-0.0939***	-0.0847**	-0.0853***	-0.0854***	-0.0489*	-0.0841***	-0.0424
	(0.0214)	(0.0277)	(0.0242)	(0.0273)	(0.0340)	(0.0209)	(0.0296)	(0.0274)	(0.0311)	(0.0265)
2.cscat4	0.122***	0.140***	0.138***	0.144***	0.101***	0.0752***	0.0634***	0.0969***	0.0965***	0.109***
	(0.0135)	(0.0208)	(0.0121)	(0.0111)	(0.0100)	(0.0170)	(0.0214)	(0.0182)	(0.0189)	(0.0125)
3.cscat4	0.258***	0.253***	0.269***	0.264***	0.209***	0.175***	0.161***	0.177***	0.189***	0.178***
	(0.0269)	(0.0245)	(0.0224)	(0.0215)	(0.0171)	(0.0206)	(0.0246)	(0.0310)	(0.0324)	(0.0208)
4.cscat4	0.318***	0.322***	0.325***	0.333***	0.275***	0.263***	0.257***	0.279***	0.291***	0.289***
	(0.0116)	(0.0162)	(0.0133)	(0.0135)	(0.0128)	(0.0146)	(0.0135)	(0.0110)	(0.0117)	(0.0171)
public	0.0750***	0.0671***	0.0905***	0.129***	0.147***	0.135***	0.126***	0.133***	0.143***	0.128***
	(0.0154)	(0.0151)	(0.0162)	(0.0154)	(0.0193)	(0.0242)	(0.0201)	(0.0242)	(0.0301)	(0.0264)
foreign	0.259***	0.282***	0.296***	0.312***	0.315***	0.251***	0.239***	0.198***	0.167***	0.206***
	(0.0262)	(0.0370)	(0.0187)	(0.0311)	(0.0390)	(0.0289)	(0.0211)	(0.0137)	(0.0186)	(0.0173)
Constant	10.89***	11.00***	10.95***	10.99***	11.07***	11.09***	11.16***	11.16***	11.26***	11.14***
	(0.0434)	(0.0641)	(0.0538)	(0.0553)	(0.0518)	(0.0530)	(0.0547)	(0.0719)	(0.0618)	(0.0606)
Observations	142,033	156,930	173,714	170,461	175,780	162,688	162,210	156,467	159,522	158,611
R-squared	0.506	0.465	0.476	0.486	0.463	0.484	0.469	0.461	0.472	0.452

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table V: Regression output of the regression with unemployment rate and inactivity rate

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
VARIABLES	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear
ln_unempr	-0.0931***	-0.0723***	-0.0509**	-0.0682***	-0.0783***	-0.0243	-0.0950***	-0.0825***	-0.145***	-0.0831***
	(0.0164)	(0.0165)	(0.0198)	(0.0216)	(0.0205)	(0.0336)	(0.0191)	(0.0175)	(0.0217)	(0.0235)
ln_inactr	-0.0667**	-0.102***	-0.0569*	-0.0560	-0.0297	-0.0585	-0.0695	-0.0197	0.0294	0.0764**
	(0.0286)	(0.0365)	(0.0327)	(0.0389)	(0.0392)	(0.0547)	(0.0476)	(0.0405)	(0.0425)	(0.0369)
male	0.132***	0.121***	0.121***	0.111***	0.113***	0.145***	0.128***	0.111***	0.129***	0.118***
	(0.0135)	(0.00984)	(0.0145)	(0.00907)	(0.0101)	(0.0132)	(0.00897)	(0.00642)	(0.00782)	(0.00668)
exp	0.0169***	0.0116***	0.0132***	0.0135***	0.0106***	0.0146***	0.0147***	0.0147***	0.0164***	0.0144***
	(0.00128)	(0.00121)	(0.00220)	(0.00207)	(0.00191)	(0.00213)	(0.00220)	(0.00263)	(0.00177)	(0.00253)
exp2	-0.000247***	-0.000103***	-0.000149***	-0.000161***	-9.36e-05**	-0.000194***	-0.000178***	-0.000192***	-0.000221***	-0.000180***
	(2.23e-05)	(2.24e-05)	(4.05e-05)	(4.00e-05)	(3.70e-05)	(3.99e-05)	(4.24e-05)	(4.67e-05)	(3.37e-05)	(4.71e-05)
2.iskveg4	0.114***	0.103***	0.131***	0.122***	0.104***	0.114***	0.134***	0.146***	0.122***	0.136***
	(0.00871)	(0.0136)	(0.0114)	(0.00998)	(0.00901)	(0.0206)	(0.0108)	(0.0169)	(0.00902)	(0.00842)
3.iskveg4	0.333***	0.312***	0.325***	0.316***	0.294***	0.327***	0.335***	0.342***	0.303***	0.306***
	(0.0170)	(0.0276)	(0.0212)	(0.0193)	(0.0157)	(0.0254)	(0.0160)	(0.0275)	(0.0166)	(0.0139)
4.iskveg4	0.919***	0.916***	0.911***	0.899***	0.853***	0.879***	0.878***	0.883***	0.859***	0.868***
	(0.0373)	(0.0557)	(0.0407)	(0.0390)	(0.0387)	(0.0353)	(0.0402)	(0.0514)	(0.0394)	(0.0376)
2.settyp4	-0.0925***	-0.105***	-0.0965***	-0.0864***	-0.0484	-0.0876***	-0.0681**	-0.0729***	-0.0776***	-0.0774***
	(0.0220)	(0.0244)	(0.0242)	(0.0260)	(0.0353)	(0.0181)	(0.0294)	(0.0234)	(0.0248)	(0.0217)
3.settyp4	-0.0799***	-0.0788***	-0.0843***	-0.0850***	-0.0542	-0.0933***	-0.0478*	-0.0361	-0.0530**	-0.0706***
	(0.0223)	(0.0265)	(0.0257)	(0.0272)	(0.0397)	(0.0190)	(0.0287)	(0.0249)	(0.0265)	(0.0207)
4.settyp4	-0.130***	-0.109***	-0.119***	-0.0930***	-0.0865**	-0.0873***	-0.0825***	-0.0504*	-0.0830***	-0.0556**
	(0.0208)	(0.0287)	(0.0245)	(0.0285)	(0.0365)	(0.0215)	(0.0308)	(0.0271)	(0.0310)	(0.0242)
2.cscat4	0.122***	0.140***	0.139***	0.145***	0.102***	0.0734***	0.0631***	0.0978***	0.0960***	0.110***
	(0.0136)	(0.0211)	(0.0122)	(0.0112)	(0.0101)	(0.0174)	(0.0218)	(0.0182)	(0.0191)	(0.0123)
3.cscat4	0.256***	0.249***	0.266***	0.263***	0.208***	0.171***	0.160***	0.177***	0.190***	0.178***
	(0.0278)	(0.0259)	(0.0236)	(0.0221)	(0.0176)	(0.0215)	(0.0252)	(0.0312)	(0.0323)	(0.0208)
4.cscat4	0.315***	0.319***	0.322***	0.331***	0.273***	0.259***	0.258***	0.279***	0.291***	0.289***
	(0.0116)	(0.0169)	(0.0139)	(0.0136)	(0.0128)	(0.0148)	(0.0137)	(0.0111)	(0.0117)	(0.0174)
public	0.0734***	0.0685***	0.0922***	0.132***	0.151***	0.139***	0.127***	0.131***	0.145***	0.130***
	(0.0157)	(0.0152)	(0.0164)	(0.0153)	(0.0186)	(0.0237)	(0.0206)	(0.0246)	(0.0297)	(0.0265)
foreign	0.260***	0.284***	0.296***	0.311***	0.315***	0.254***	0.240***	0.198***	0.166***	0.206***
	(0.0263)	(0.0371)	(0.0190)	(0.0318)	(0.0393)	(0.0283)	(0.0211)	(0.0136)	(0.0186)	(0.0173)
Constant	10.81***	10.85***	10.86***	10.91***	11.02***	11.01***	11.05***	11.13***	11.31***	11.28***
	(0.0683)	(0.0821)	(0.0763)	(0.0824)	(0.0719)	(0.103)	(0.0974)	(0.0889)	(0.0971)	(0.0911)
Observations	139,211	153,161	170,040	166,655	172,454	159,522	158,977	155,287	158,260	157,503
R-squared	0.505	0.466	0.475	0.484	0.461	0.484	0.469	0.462	0.472	0.453
Robust standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Whole regression output for the regression with splitted inactivity is available on request.

Table VI: Coefficients of unemployment rate and inactivity rate for males and females

MALE	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
ln_unempr	-0.104***	-0.0762***	-0.0570**	-0.0780***	-0.0887***	-0.0212	-0.133***	-0.0948***	-0.160***	-0.0750***
	(0.0179)	(0.0226)	(0.0229)	(0.0258)	(0.0259)	(0.0381)	(0.0208)	(0.0222)	(0.0231)	(0.0250)
Observations	85,684	88,793	99,340	99,119	100,351	95,920	95,185	90,194	92,554	91,865
R-squared	0.519	0.496	0.500	0.519	0.494	0.494	0.495	0.492	0.509	0.481
ln_unempr	-0.104***	-0.0616***	-0.0472*	-0.0609**	-0.0821***	-0.0112	-0.118***	-0.0884***	-0.173***	-0.0893***
	(0.0174)	(0.0217)	(0.0241)	(0.0247)	(0.0264)	(0.0456)	(0.0219)	(0.0199)	(0.0264)	(0.0261)
ln_inactr	-0.0497	-0.102**	-0.0606	-0.102**	-0.0333	-0.115	-0.0884	-0.0626	0.0615	0.0517
	(0.0346)	(0.0509)	(0.0419)	(0.0428)	(0.0505)	(0.0743)	(0.0566)	(0.0488)	(0.0502)	(0.0469)
Observations	83,772	86,419	97,121	96,845	98,307	93,874	93,164	89,615	91,890	91,193
R-squared	0.517	0.496	0.498	0.518	0.491	0.495	0.494	0.494	0.509	0.482
FEMALE	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
ln_unempr	-0.0900***	-0.0993***	-0.0652***	-0.0717***	-0.0779***	-0.0479***	-0.0630***	-0.0618***	-0.109***	-0.0565**
	(0.0203)	(0.0165)	(0.0190)	(0.0233)	(0.0206)	(0.0168)	(0.0225)	(0.0227)	(0.0212)	(0.0276)
Observations	56,349	68,137	74,374	71,342	75,429	66,768	67,025	66,273	66,968	66,746
R-squared	0.494	0.429	0.454	0.451	0.423	0.484	0.447	0.432	0.431	0.424
ln_unempr	-0.0780***	-0.0913***	-0.0570***	-0.0706***	-0.0677***	-0.0551***	-0.0611***	-0.0714***	-0.0994***	-0.0744***
	(0.0211)	(0.0170)	(0.0199)	(0.0252)	(0.0208)	(0.0177)	(0.0231)	(0.0228)	(0.0227)	(0.0276)
ln_inactr	-0.0854**	-0.0900***	-0.0529	-0.00511	-0.0389	0.0361	-0.0488	0.0340	-0.0195	0.106***
	(0.0335)	(0.0332)	(0.0326)	(0.0403)	(0.0379)	(0.0427)	(0.0494)	(0.0445)	(0.0490)	(0.0403)
Observations	55,439	66,742	72,919	69,810	74,147	65,648	65,813	65,672	66,370	66,310
R-squared	0.494	0.432	0.454	0.449	0.424	0.482	0.449	0.432	0.432	0.425

Table VII: Coefficients of unemployment rate for employees with different education

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
VARIABLES	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear
PRIMARY										
ln_unempr	-0.0962***	-0.123***	-0.0552**	-0.0486**	-0.0409*	0.00651	-0.0991***	-0.141***	-0.177***	-0.121***
	(0.0202)	(0.0196)	(0.0260)	(0.0192)	(0.0219)	(0.0564)	(0.0257)	(0.0278)	(0.0295)	(0.0349)
Observations	22,835	26,797	28,270	27,054	27,176	25,345	24,448	21,009	21,454	20,098
R-squared	0.324	0.260	0.265	0.257	0.256	0.212	0.283	0.238	0.219	0.195
VOCATIONAL										
ln_unempr	-0.0818***	-0.0789***	-0.0801***	-0.101***	-0.0972***	-0.0696***	-0.112***	-0.0991***	-0.151***	-0.0545**
	(0.0137)	(0.0182)	(0.0207)	(0.0196)	(0.0179)	(0.0141)	(0.0214)	(0.0188)	(0.0218)	(0.0243)
Observations	50,554	52,503	56,721	57,801	57,344	56,187	53,998	50,143	49,977	50,659
R-squared	0.404	0.359	0.384	0.386	0.346	0.311	0.301	0.267	0.282	0.255
HIGH SCHOOL										
ln_unempr	-0.123***	-0.0791***	-0.0608***	-0.0998***	-0.0962***	-0.0150	-0.0780***	-0.0512**	-0.109***	-0.0645**
	(0.0206)	(0.0234)	(0.0211)	(0.0277)	(0.0259)	(0.0366)	(0.0224)	(0.0258)	(0.0265)	(0.0309)
Observations	49,784	55,980	62,447	60,740	62,052	55,502	56,271	57,357	58,734	58,006
R-squared	0.355	0.312	0.340	0.357	0.331	0.333	0.316	0.298	0.329	0.294
GRADUATE										
ln_unempr	-0.123**	-0.0141	0.0225	-0.0641	-0.0745	-0.0882**	-0.139***	-0.0513	-0.172***	-0.115**
	(0.0532)	(0.0451)	(0.0489)	(0.0655)	(0.0737)	(0.0430)	(0.0381)	(0.0527)	(0.0430)	(0.0512)
Observations	18,860	21,650	26,276	24,866	29,208	25,654	27,493	27,958	29,357	29,848
R-squared	0.371	0.367	0.359	0.362	0.357	0.358	0.352	0.364	0.382	0.354

Table VIII: Coefficients of unemployment rate and inactivity rate for company size under 50 employees, and 50 employees and above

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
VARIABLES	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear
COMPSIZE 50-										
ln_unempr	-0.0733***	-0.0547**	-0.0173	-0.0347	-0.0754***	0.0138	-0.0665***	-0.0345	-0.133***	-0.0718***
	(0.0194)	(0.0237)	(0.0224)	(0.0278)	(0.0245)	(0.0462)	(0.0203)	(0.0251)	(0.0223)	(0.0268)
Observations	65,019	74,751	86,904	87,943	59,137	77,537	76,955	69,516	72,984	68,456
R-squared	0.363	0.341	0.342	0.352	0.347	0.332	0.362	0.339	0.315	0.319
ln_unempr	-0.0654***	-0.0308	0.00638	-0.0290	-0.0757***	0.0315	-0.0595**	-0.0314	-0.137***	-0.0919***
	(0.0195)	(0.0263)	(0.0238)	(0.0299)	(0.0248)	(0.0570)	(0.0234)	(0.0257)	(0.0251)	(0.0258)
ln_inactr	-0.0457	-0.107**	-0.0926**	-0.0131	0.0569	-0.0988	-0.0257	-0.0556	0.0202	0.0712
	(0.0328)	(0.0459)	(0.0429)	(0.0504)	(0.0432)	(0.0867)	(0.0602)	(0.0480)	(0.0501)	(0.0526)
Observations	63,808	73,033	85,143	86,026	57,924	75,834	75,146	68,980	72,284	68,055
R-squared	0.363	0.343	0.342	0.352	0.349	0.334	0.362	0.339	0.315	0.321
COMPSIZE 50+										
ln_unempr	-0.119***	-0.109***	-0.0887***	-0.122***	-0.104***	-0.0823***	-0.137***	-0.121***	-0.158***	-0.0747**
	(0.0198)	(0.0190)	(0.0212)	(0.0223)	(0.0243)	(0.0227)	(0.0268)	(0.0250)	(0.0295)	(0.0289)
Observations	77,014	82,179	86,810	82,518	116,643	85,151	85,255	86,951	86,538	90,155
R-squared	0.532	0.511	0.520	0.531	0.490	0.554	0.528	0.525	0.554	0.529
ln_unempr	-0.116***	-0.0993***	-0.0844***	-0.113***	-0.0896***	-0.0888***	-0.130***	-0.123***	-0.170***	-0.0919***
	(0.0198)	(0.0180)	(0.0214)	(0.0225)	(0.0241)	(0.0262)	(0.0291)	(0.0237)	(0.0311)	(0.0302)
ln_inactr	-0.0693**	-0.104**	-0.0769**	-0.0786*	-0.0965*	-0.00375	-0.0847	0.00290	0.0676	0.0890*
	(0.0350)	(0.0487)	(0.0370)	(0.0413)	(0.0519)	(0.0528)	(0.0682)	(0.0539)	(0.0597)	(0.0466)
Observations	75,403	80,128	84,897	80,629	114,530	83,688	83,831	86,307	85,976	89,448
R-squared	0.532	0.513	0.520	0.529	0.490	0.556	0.530	0.526	0.554	0.531

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table IX: Coefficients of unemployment rate and inactivity rate for „Western” and „Eastern” regions: („West”: Transdanubia and Central Hungary, „East”: Big Plain and Northern Hungary)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
VARIABLES	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear
WEST										
ln_unempr	-0.123***	-0.107***	-0.0784***	-0.0608**	-0.0886**	-0.0168	-0.117***	-0.136***	-0.167***	-0.0991***
	(0.0241)	(0.0242)	(0.0296)	(0.0286)	(0.0350)	(0.0459)	(0.0269)	(0.0270)	(0.0262)	(0.0223)
Observations	92,302	101,519	113,475	110,555	115,250	109,024	109,898	106,713	110,785	99,413
R-squared	0.503	0.471	0.479	0.496	0.473	0.488	0.474	0.461	0.484	0.470
ln_unempr	-0.126***	-0.104***	-0.0796***	-0.0561**	-0.0815**	-0.0126	-0.113***	-0.130***	-0.169***	-0.0982***
	(0.0230)	(0.0217)	(0.0285)	(0.0266)	(0.0347)	(0.0507)	(0.0251)	(0.0232)	(0.0289)	(0.0226)
ln_inactr	-0.0945**	-0.125**	-0.0639	-0.0814*	-0.0768	-0.0764	-0.112	-0.0971	0.0171	0.0201
	(0.0397)	(0.0549)	(0.0467)	(0.0472)	(0.0629)	(0.0652)	(0.0741)	(0.0591)	(0.0584)	(0.0387)
Observations	89,963	98,972	110,886	107,829	112,764	106,658	107,525	106,261	110,247	98,918
R-squared	0.501	0.471	0.477	0.495	0.472	0.486	0.473	0.462	0.483	0.470
EAST										
ln_unempr	-0.0698***	-0.0704***	-0.0442**	-0.101***	-0.101***	-0.0495***	-0.0858***	-0.0117	-0.109***	-0.0359
	(0.0172)	(0.0169)	(0.0189)	(0.0277)	(0.0160)	(0.0180)	(0.0224)	(0.0253)	(0.0252)	(0.0381)
Observations	49,731	55,411	60,239	59,906	60,530	53,664	52,312	49,754	48,737	59,198
R-squared	0.489	0.427	0.449	0.448	0.419	0.433	0.429	0.423	0.401	0.399
ln_unempr	-0.0619***	-0.0411**	-0.00928	-0.0955***	-0.103***	-0.0491**	-0.0725***	-0.0217	-0.110***	-0.0931*
	(0.0178)	(0.0175)	(0.0218)	(0.0300)	(0.0185)	(0.0228)	(0.0269)	(0.0264)	(0.0332)	(0.0492)
ln_inactr	-0.0418	-0.111**	-0.105**	-0.0202	0.0110	-0.0401	-0.0630	0.0221	0.0207	0.123**
	(0.0335)	(0.0424)	(0.0476)	(0.0608)	(0.0362)	(0.0522)	(0.0596)	(0.0430)	(0.0520)	(0.0589)
Observations	49,248	54,189	59,154	58,826	59,690	52,864	51,452	49,026	48,013	58,585
R-squared	0.488	0.431	0.450	0.446	0.418	0.437	0.430	0.427	0.403	0.402

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table X: Coefficients of alternative unemployment rate (TSTAR) and inactivity rate

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
VARIABLES	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear	lnftrear
ln_unempr2	-0.0749***	-0.0499***	-0.0450**	-0.0592***	-0.0626***	-0.0184	-0.0680***	-0.0526***	-0.0858***	-0.00474
	(0.0127)	(0.0131)	(0.0178)	(0.0161)	(0.0155)	(0.0268)	(0.0174)	(0.0196)	(0.0151)	(0.0203)
Observations	142,012	156,890	173,693	167,442	175,759	154,592	162,189	156,445	159,498	158,611
R-squared	0.506	0.464	0.476	0.483	0.462	0.484	0.468	0.460	0.471	0.452
ln_unempr2	-0.0715***	-0.0398***	-0.0388**	-0.0506***	-0.0588***	-0.0173	-0.0595***	-0.0512***	-0.0790***	-0.0149
	(0.0125)	(0.0124)	(0.0177)	(0.0156)	(0.0152)	(0.0304)	(0.0182)	(0.0179)	(0.0165)	(0.0208)
ln_inactr	-0.0797***	-0.131***	-0.0677**	-0.0679*	-0.0405	-0.0588	-0.111**	-0.0454	-0.0305	0.0494
	(0.0287)	(0.0359)	(0.0301)	(0.0368)	(0.0409)	(0.0519)	(0.0515)	(0.0427)	(0.0431)	(0.0352)
Observations	139,190	153,121	170,019	163,636	172,433	151,426	158,956	155,265	158,236	157,503
R-squared	0.505	0.465	0.474	0.481	0.461	0.485	0.469	0.462	0.471	0.452
Robust standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Whole regression outputs for all specifications are available on request.

Table XI: Output of the pooled OLS, the panel regression with fixed effects, random effects estimated for the whole period 2002-2011

	POOLED OLS	
VARIABLES	lnftrear	lnftrear
ln_unempr	0.0184	0.0176
	(0.0272)	(0.0286)
ln_inactr		-0.0254
		(0.0229)
male	0.103*	0.121*
	(0.0572)	(0.0652)
exp	-0.00506	0.000923
	(0.0476)	(0.0498)
exp2	0.000139	2.67e-05
	(0.000935)	(0.000976)
educ_2	0.0874	0.0660
	(0.0680)	(0.0719)
educ_3	0.403***	0.382***
	(0.0922)	(0.105)
educ_4	1.105***	1.185***
	(0.134)	(0.150)
settyp_3	0.0918	0.114
	(0.117)	(0.119)
settyp_4	0.0159	0.0165
	(0.0861)	(0.0836)
cscat_2	0.0653	0.0822*
	(0.0471)	(0.0454)
cscat_3	0.178***	0.142**
	(0.0573)	(0.0652)
cscat_4	0.461***	0.461***
	(0.122)	(0.138)
public	-0.112	-0.0766
	(0.110)	(0.135)
foreign	0.173***	0.182**
	(0.0647)	(0.0728)
2003.year	0.140***	0.134***
	(0.0112)	(0.0117)
2004.year	0.206***	0.203***
	(0.0120)	(0.0138)
2005.year	0.276***	0.276***
	(0.0121)	(0.0134)
2006.year	0.313***	0.310***
	(0.0114)	(0.0122)
2007.year	0.477***	0.474***
	(0.0222)	(0.0239)
2008.year	0.508***	0.503***
	(0.0127)	(0.0135)
2009.year	0.538***	0.536***
	(0.0182)	(0.0192)
2010.year	0.559***	0.560***
	(0.0189)	(0.0202)
2011.year	0.614***	0.608***
	(0.0207)	(0.0221)
Constant	10.91***	10.79***
	(0.547)	(0.553)
Observations	1,740	1,636
R-squared	0.855	0.860

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

	FIXED EFFECTS		RANDOM EFFECTS	
VARIABLES	lnftrear	lnftrear	lnftrear	lnftrear
ln_unempr	0.0184	0.0176	-0.0883***	-0.0752***
	(0.0285)	(0.0293)	(0.0154)	(0.0180)
ln_inactr		-0.0254		-0.0351
		(0.0233)		(0.0219)
male	0.103*	0.121*	0.152***	0.163***
	(0.0541)	(0.0626)	(0.0525)	(0.0575)
exp	-0.00506	0.000923	-0.0146	-0.00755
	(0.0506)	(0.0543)	(0.0497)	(0.0522)
exp2	0.000139	2.67e-05	0.000331	0.000198
	(0.000994)	(0.00106)	(0.000977)	(0.00102)
educ_2	0.0874	0.0660	0.0661	0.0478
	(0.0716)	(0.0698)	(0.0685)	(0.0658)
educ_3	0.403***	0.382***	0.403***	0.386***
	(0.0915)	(0.103)	(0.0865)	(0.0965)
educ_4	1.105***	1.185***	1.239***	1.299***
	(0.138)	(0.148)	(0.137)	(0.148)
settyp_3	0.0918	0.114	0.0296	0.0358
	(0.124)	(0.126)	(0.0304)	(0.0318)
settyp_4	0.0159	0.0165	-0.0284	-0.0318
	(0.0887)	(0.0844)	(0.0296)	(0.0314)
cscat_2	0.0653	0.0822	0.0895*	0.105**
	(0.0517)	(0.0498)	(0.0514)	(0.0509)
cscat_3	0.178***	0.142**	0.165***	0.141**
	(0.0590)	(0.0644)	(0.0549)	(0.0588)
cscat_4	0.461***	0.461***	0.454***	0.461***
	(0.106)	(0.120)	(0.0925)	(0.103)
public	-0.112	-0.0766	-0.0642	-0.0573
	(0.103)	(0.128)	(0.0899)	(0.105)
foreign	0.173**	0.182**	0.203***	0.209***
	(0.0665)	(0.0752)	(0.0633)	(0.0702)
2003.year	0.0939***	0.0876***	0.0991***	0.0921***
	(0.0100)	(0.0103)	(0.00987)	(0.00930)
2004.year	0.0939***	0.0909***	0.104***	0.101***
	(0.0117)	(0.0136)	(0.0110)	(0.0118)
2005.year	0.129***	0.128***	0.150***	0.146***
	(0.0115)	(0.0129)	(0.0106)	(0.0116)
2006.year	0.128***	0.125***	0.144***	0.139***
	(0.0110)	(0.0120)	(0.0104)	(0.0110)
2007.year	0.215***	0.211***	0.240***	0.231***
	(0.0219)	(0.0232)	(0.0210)	(0.0216)
2008.year	0.186***	0.182***	0.212***	0.203***
	(0.0132)	(0.0138)	(0.0120)	(0.0123)
2009.year	0.175***	0.173***	0.232***	0.221***
	(0.0194)	(0.0200)	(0.0144)	(0.0154)
2010.year	0.148***	0.150***	0.205***	0.197***
	(0.0197)	(0.0205)	(0.0158)	(0.0174)
2011.year	0.152***	0.147***	0.207***	0.191***
	(0.0207)	(0.0217)	(0.0164)	(0.0185)
Constant	11.06***	10.94***	10.90***	10.80***
	(0.584)	(0.614)	(0.596)	(0.622)
Observations	1,740	1,636	1,740	1,636
Within R-squared	0.411	0.418	0.403	0.411
Number of localities	174	174	174	174

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1