The Czech Labour Market: Documenting Structural Change and Remaining Challenges

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ECONOMICS DEPARTMENT WORKING PAPERS No. 1213

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ABSTRACT/RÉSUMÉ

THE CZECH LABOUR MARKET: DOCUMENTING STRUCTURAL CHANGE AND REMAINING CHALLENGES

The Czech labour market has undergone significant changes as a consequence of economic restructuring. This paper analyses these changes, highlighting both the impact of the recent economic crisis and some of the longer-run determinants of the Czech labour market. The higher share of tertiary education graduates has increased the supply of skills. Simultaneously, the development of services and the integration into global value chains have changed the composition of employment, away from construction and agriculture, and with significant shifts within the manufacturing sector. Although at an aggregate level the labour market performs well, a deeper analysis reveals several weaknesses. In particular, long-term and youth unemployment are persistent and especially affect the lower-skilled. Skill and occupational mismatches of vocational education graduates show that the education system fails to provide the qualifications required by the labour market. At the same time, regional differences in labour market performance have grown. Raising the low employment rate of women with young children would mitigate labour force ageing and prevent skill deterioration of a highly educated labour force. Over time, the labour market has been responding faster to output shocks and output growth consistent with constant unemployment has dropped significantly. Young people are more vulnerable to fluctuations in economic output than the rest of the labour force. The volume of labour market flows increased substantially during the recent years, both for short- and long-term unemployment.

JEL classification codes: J16, J21, J24, J31, J60.

Keywords: Czech Republic, labour market, unemployment, youth unemployment, labour market dynamics, female labour market participation, skills, vocational education and training.

LE MARCHÉ DE TRAVAIL TCHÈQUE: DOCUMENTATION DU CHANGEMENT STRUCTUREL ET DES DEFIS RESTANTS

Le marché du travail tchèque a subi des changements importants dans un contexte de restructuration économique. Ce document analyse ces changements, et notamment l'impact de la crise économique récente ainsi que certains des déterminants à plus long terme du marché du travail tchèque. Le taux plus élevé de diplômés de l'enseignement supérieur a augmenté l'offre de compétences. Dans le même temps, le développement des services et l'intégration dans les chaînes de valeur mondiales ont changé la composition de l'emploi, avec une diminution de la part dans la construction et l'agriculture, et des changements importants dans le secteur manufacturier. Bien qu'au niveau agrégé la performance du marché du travail est bonne, une analyse plus fine révèle certaine faiblesses. En particulier, le chômage de long terme et celui des jeunes sont une caractéristique persistante, affectant surtout ceux ayant des compétences faibles. L'inadéquation des compétences et des occupations des diplômés de la formation professionnelle met en évidence une difficulté du système d'éducation à offrir les qualifications demandées par le marché du travail. En même temps, les différences régionales dans la performance du marché du travail se sont accentuées. Augmenter le faible taux d'emploi des femmes avec de jeunes enfants permettrait de contrecarrer le vieillissement de la main-d'œuvre et de prévenir la détérioration des compétences d'une main-d'œuvre hautement qualifiée. Au fil du temps, le marché du travail est devenu plus réactif aux chocs et la croissance de la production compatible avec un chômage constant a baissé de manière significative. Les jeunes sont plus vulnérables aux fluctuations de la production économique que le reste de la population active. Le volume des flux du marché du travail ont augmenté considérablement au cours des dernières années, tant pour le chômage de courte que de longue durée.

Classification JEL: J16, J21, J24, J31, J60.

Mots clefs: République Tchèque, marché du travail, chômage, chômage des jeunes, dynamique du marché du travail, participation au marché du travail des femmes, compétences, enseignement et formation professionnels.

TABLE OF CONTENTS

Tables

Figures

THE CZECH LABOUR MARKET: DOCUMENTING STRUCTURAL CHANGE AND REMAINING CHALLENGES

by Sónia Araújo and Petr Maleček[1]

1.   The Czech labour market has undergone many significant changes over the past decade, in terms of participation, employment and unemployment rates and the skill composition of its labour force. This paper offers an overview of the key characteristics of the Czech labour market, highlighting changes that occurred following the economic transition and remaining key structural weaknesses of the Czech labour market.

2.   The paper starts by describing the structure of the Czech labour market, focusing on long-term structural changes and underlying differences vis-à-vis other OECD countries. In the second section, the paper discusses dynamic features of the Czech labour market with a focus on changes that emerged during the years following the 2009 economic crisis. These include an analysis of the flows between employment and unemployment spells and the sensitivity of unemployment to cyclical shocks and how the latter affect unemployment of workers in different age cohorts. The last section discusses persisting structural weaknesses of the Czech labour market, with a particular focus on the interface between the secondary education system and the labour market, the low employment rate of women with small children and the existence of wide differences of labour market performance across Czech regions.

3.   A number of conclusions can be drawn from the analysis:

Long-term trends and characteristics

- The Czech Republic has undergone large structural changes of its economic activities during the last decade, which include a shift towards more advanced services and reducing the share of workers employed in the construction and agriculture sectors. At the same time, the integration of the Czech industry in global value chains led to significant changes in the industry composition of employment, increasing the share of workers employed in motor vehicles, electronics, computer and optics industries.

- Large increases in tertiary education enrolment in the past decade led to higher shares of workers with university degrees, edging closer to the OECD and EU standards. Nevertheless, net private returns associated with tertiary education are still very high, suggesting that inflows of secondary education graduates into tertiary education are likely to stay high.

- Labour market outcomes crucially depend on the level of education attained, with unemployment disproportionally affecting those with primary and lower secondary education, which comprise however only about 5% of the labour force.

- Long-term unemployment affects about half of those unemployed and is asymmetrically distributed across regions, being pervasive in those regions which did not witnessed a sufficient reconversion of its economic activities following transition.

- Wage setting has been largely decentralized and collective bargaining power has been rather subtle. In spite of this, there has been a remarkable stability of wages with respect to the average wage, by occupations and also across regions (when abstracting from the capital region), in spite of large regional differences in employment and unemployment rates.

- The minimum wage has been one of the lowest in OECD countries. More significant increases may cause risks for the employability especially for lowest-skilled workers and possibly also for young persons under 20 years of age.

- The current tax system has spurred the phenomenon of fake self-employment, which may account for a significant share of self-employment.

Labour market dynamics

- Real output growth consistent with the stagnation of the unemployment rate has significantly dropped and the response to output shocks has shortened. This may be the result of the market reform enacted in 2012, which allowed for more overall flexibility, and the decreasing working age population putting a greater accent on intensive factors of economic growth. The volume of labour market flows increased substantially after the 2009 crisis, both within the short- and the long-term unemployment, on the back of employers' uncertain prospects during the recession period of 2012/13, manifested by increased share of temporary workers.

- Unemployment rate of young people tends to be more sensitive to the business cycle, given their comparatively lower skills and higher incidence of temporary contracts.

- The labour market participation rate has been countercyclical, which is an extraordinary feature among OECD countries. From a structural point of view, increases in the statutory retirement age and changes in demographic factors will drive the trend part of the participation rate upwards at least until 2020.

Structural weaknesses

- Youth unemployment is high. It affects mostly the small proportion of youth leaving the education system without upper secondary education. However, the vocational education and training system, the traditionally mainstay of Czech education, can be significantly improved to allow a better matching of fields of study and skills learnt to the needs of the labour market.

- There exist significant and persistent regional disparities in labour market outcomes. These are the result of a mix of low employment opportunities in less dynamic regions, which coincide with a structure of population with low education attainment, and low worker mobility.

- Raising the low employment rate of women with young children will contribute to mitigating the effect of an ageing workforce and prevent skill deterioration. This can be achieved especially by increasing the provision of formal childcare.

A bird's eye view on the Czech labour market

Employment and unemployment rates are closely tied with education attainment

4.   The employment rate in the Czech Republic has been heavily influenced by structural factors, whereas cyclical effects have been playing a relatively minor role. After steadily declining during the second half of the 1990s on the back of restructuring from centrally planned to a standard market economy, the employment rate stabilised around 65% during the first decade of the twenty first century (Figure 1). The employment rate reached a halt in 2008, led by a period of strong economic growth, after which it declined for two consecutive years as a consequence of the 2009 crisis. Employment started expanding in 2011 and showed a remarkable resilience in the course of the second recession (2012-13). On average, the employment rate of the working age population (15-64 years old) stood at 66% in the period 2009-2013, slightly more than 1 percentage point higher than the OECD average.

5.   Unemployment has risen markedly in the second half of the 1990s and has stayed around 7-8% until 2006, after which it dropped for two consecutive years of strong economic growth (Figure 1). The 2009 crisis had an immediate effect on the unemployment rate, which rose by nearly 3 percentage points between 2008 and its peak in 2010. This increase was driven in part by households' effort to increase labour supply in order to secure additional income, which boosted labour force participation. Further unemployment increases during both the 2009 and 2012-13 recessions were prevented by labour hoarding behaviour of firms, whereas hours worked per person employed decreased in each of these three crisis years. This outcome may have been facilitated by the reform of the Labour Code, effective from 2012, which increased the overall flexibility of the labour market, especially by easing non-standard working time arrangements.

Figure 1. Main indicators of the Czech labour market
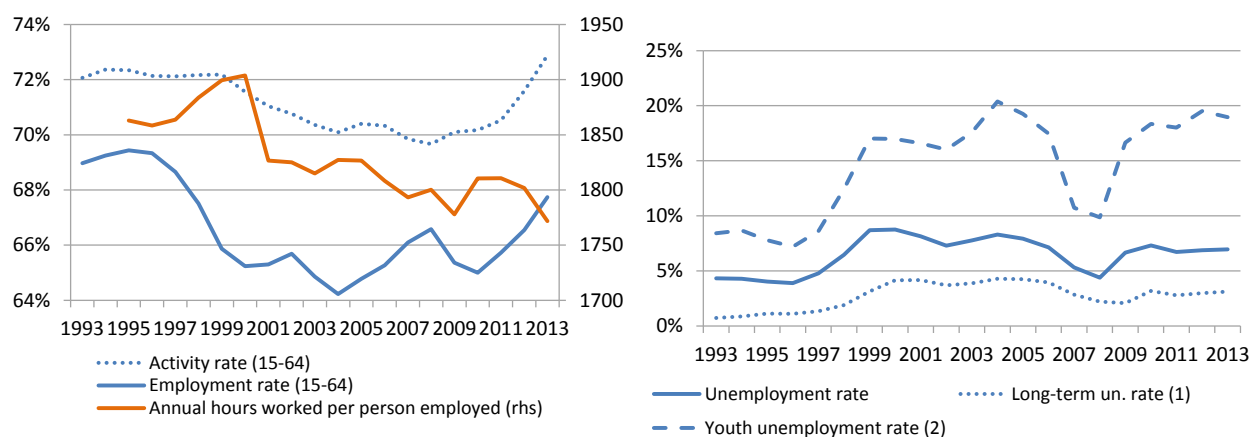
1.   Long-term unemployment rate refers to unemployment spells of one year and over.

2.   Youth unemployment rate is the proportion of youth unemployed aged 15-24 in the youth labour force aged 15-24.

Source: OECD Economic Outlook database and OECD Labour Force Statistics database, Czech Statistical Office.

6.   The incidence of long-term unemployment is particularly high. On the rise since the early 1990s, it hits almost half of those unemployed since the 2000s (Figure 1). In 2013, long-term unemployment affected 45% of those unemployed, 10 percentage points above the OECD average. The youth unemployment rate (15-24 years old) is also above the OECD average: it reached 19% in 2013, against the OECD average of 16%. It is also much higher than the national unemployment rate of 7%. Youth unemployment seems to be particularly sensitive to the business cycle (see section 2 of this paper). However, it also reflects a compositional change in the labour force participation of this age group over the

past decade. Youth unemployment affects disproportionally those with lower skills, as more youngsters pursue tertiary education studies and workers with lower qualifications are less demanded in the labour market.[2]

7.   Indeed, labour market outcomes are largely dependent on the level of education attained (Table 1). Unemployment affects disproportionally those with primary and lower secondary education. However, this group only comprises about 5% of the labour force. In turn, the unemployment rate among those with upper secondary education is more than twice that of those with a tertiary education degree. Unemployment rate of tertiary-educated persons has been very much stable and never surpassed 3%, suggesting that there has been sufficient demand for the increasing number of tertiary educated workers.

Table 1.   Labour market outcomes by educational attainment

Persons aged 25-64, % 2012

	Unemployment rate	Employment rate	Share of labour force	Share of registered unemployed[1]
Primary and lower secondary education	28.8	21.1	5.6	29.3
Upper secondary education:	6.5	71.8	74.6	64.9
Apprenticeships	8.0	72.6	37.6	41.5
Technical vocational training	5.0	71.0	36.8	21.2
Gymnasia	7.4	51.5	0.2	2.2
Tertiary education	2.9	81.1	19.8	5.8
Total	**7.0**	**66.5**	**100**	**100**

1. As of Q4/2012. These figures reflect unemployed persons registered at employment offices, as opposed to the self-reported unemployed in the *Labour Force Survey*.

Source: OECD; LSO Network (Labour market, economic and social outcomes of learning), *Labour Force Survey*.

The Czech Republic has an accentuated hump-shaped labour force structure

8.   The Czech Republic has the highest employment rate of persons aged 40-49 among OECD countries (Figure 2). However, employment rates of other age groups are rather low, resulting in a particular accentuated hump-shaped age profile of employment. Several factors contribute to this outcome. Low employment of persons above 50 years old goes back to the lower effective retirement ages for both men and women relative to the OECD average (by 1.1 and 3.2 years, respectively, in 2012). This is motivated mostly, but not only, by still lower statutory retirement ages, despite quite rapid increases in recent years, especially for women. Next, employment of women aged 30-39 is hampered by deficiencies in the system of childcare, which results in one of the highest employment impact of motherhood out of the EU OECD countries (see section 3).

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2.   Sections 2 and 3 will shed more light on the characteristics and dynamics of long-term and youth unemployment in the Czech Republic.

Figure 2. Employment rate by age cohorts

Percentage of population, 2009-13 average
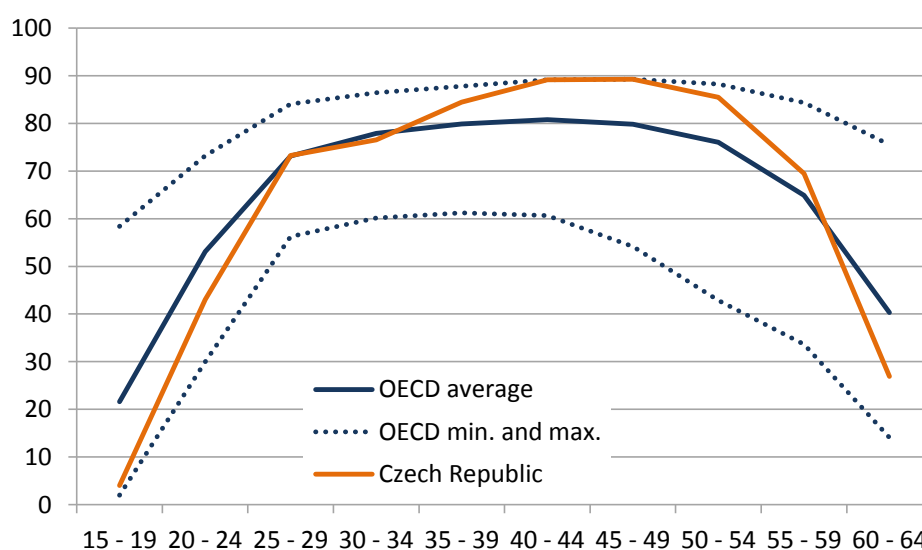
Source: OECD Labour Force Statistics database.

9.   At the lower end of the age profile of the labour force, the particularly low employment rate of young persons up to 24 years of age is caused by high enrolment rates especially in upper secondary education; the Czech Republic has had the largest share of population with at least upper secondary education out of OECD countries (92% in 2012). The NEETs rate is below the OECD average for all age groups, being particularly low for the 15-18 year olds, which is consistent with the high upper-secondary education enrolment rates (Figure 3).

Figure 3. NEETs in the OECD countries, 2011

In percentage of the population by age group
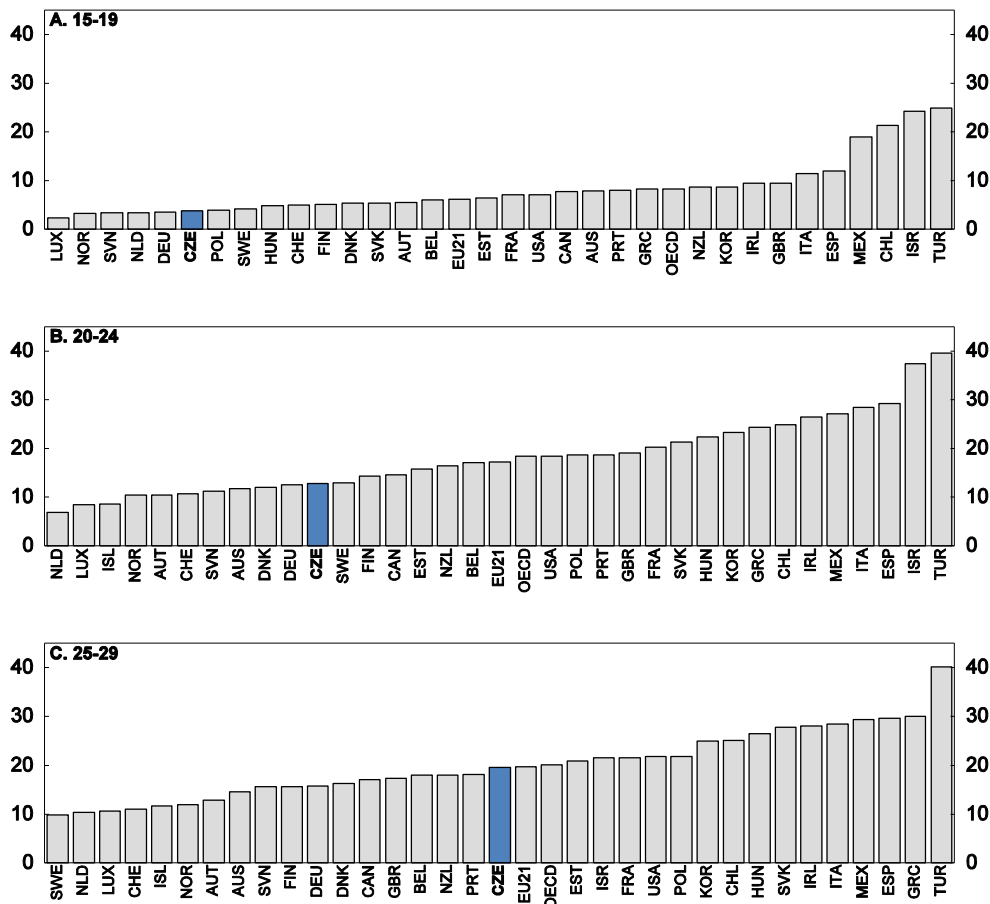
Note: NEETs are young people neither in employment nor in education or training.

Source: OECD, Education at a Glance 2013, Table C5.4a.

The skill composition of employment has changed significantly in the past decade

10. The Czech labour market has undergone substantial structural changes in recent years, not least due to a large influx into tertiary education. The proportion of persons aged 25-34 with a university degree stood at 29.2% in 2013, increasing more than twofold in one decade and reducing the gap vis-à-vis its EU peers (from 14.2 percentage points in 2004 to 6.9 percentage points in 2013). Nevertheless, the proportion of tertiary-educated persons aged 25-64 years-old is still one of the lowest out of the OECD countries (Figure 4). Not surprisingly, net private returns from tertiary education are the second highest in OECD countries, suggesting that demand for this level of education shall continue in the near future (OECD, 2014). A recurring issue in the policy debate in the Czech Republic is whether the increasing proportion of tertiary educated workers could result in crowding-out effects of comparatively less educated workers, as new job vacancies may not fully reflect the changing education structure of the population. As discussed

by Zelenka and Ryška (2011), the steadily growing number of university graduates caused that they were increasingly employed in job positions that had not been originally intended for tertiary educated persons; the quality of work positions[3] held by Czech university graduates was one of the lowest out of the OECD countries in 2010. This is supported by the first published results of a recent follow-up survey conducted by Charles University in Prague (Koucký, 2013) stating that an increasing number of university graduates are employed in less skill-demanding occupations. For instance, in 2006, below ½ percent of upper tertiary education graduates were working as clerical support officers and in service and sales. By 2013, these shares have risen substantially to 16.2% and 7%, respectively. This trend may nevertheless coincide with the fact that the same occupations today may require more complex skills than in the past. In fact, the level of education mismatch is lower in the Czech Republic than in many OECD countries (this issue is discussed in greater detail in the third section).

Figure 4. Population who has attained tertiary education, 2012

Percentage of the 25-64 year-olds
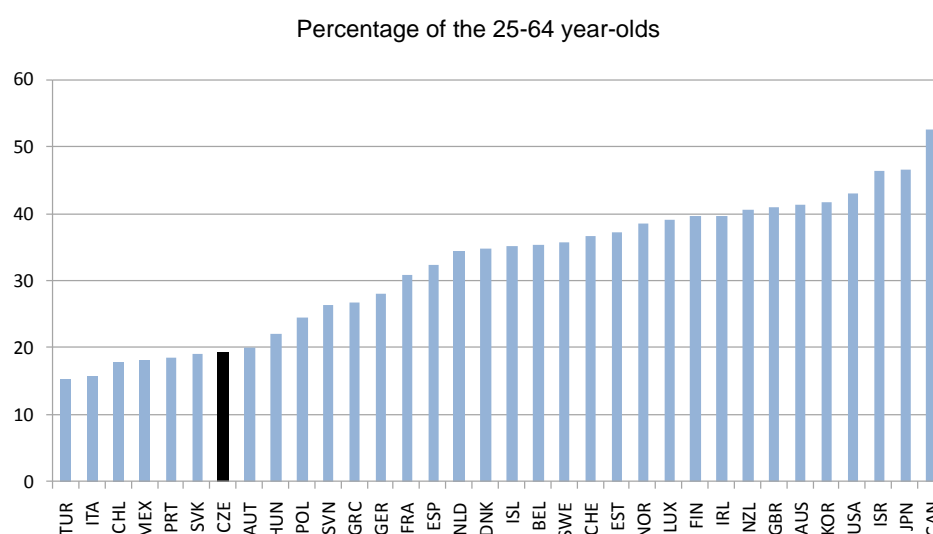
Source: OECD, Education at a Glance 2014.

11.   The increase in tertiary education attainment led to an increase of the share of tertiary-educated employed persons by 8.3 percentage points during the last decade (Figure 4, panel A). At the same time, the share of employed persons with apprentice certificates (i.e. those with upper secondary VET without the "*maturita*" certificate) dropped by roughly the same magnitude.[4] The increasing share of workers with higher education has coincided with changes in the structure of employment by sectors (Figure 4, panel B and Table 2). In the past decade, the share of those employed in business services increased significantly, especially in higher value added sectors such as IT, professional activities and finance, while the share of those employed in construction and agriculture has decreased. The proportion of workers in manufacturing as a whole stagnated over the same period, although a structural shift occurred away from the metallurgy

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3.   Measured by the International Socio-Economic Index of Occupational Status (ISEI).

4.   The *maturita* exam allows persons with secondary education to continue studies at universities. Thus, without loss of generality, upper secondary education without *maturita* can be understood as apprentice programmes (ISCED 3C) and upper secondary with *maturita* as either vocational or general programmes (ISCED 3A). The proportion of employed people whose highest level of education attained is a general programme (part of ISCED 3A) is nevertheless very small in the Czech Republic, as the great majority of these persons continue their studies at universities.

and textile industries, towards automotive and electronics, as a consequence of the integration of the Czech industry into the German supply chain (OECD, 2014).

Figure 5. Structural change has led to an increase in the skill content of employment

Change 2004-13 in shares of employment, in percentage points

A. By level of education attainment

B. By sectors
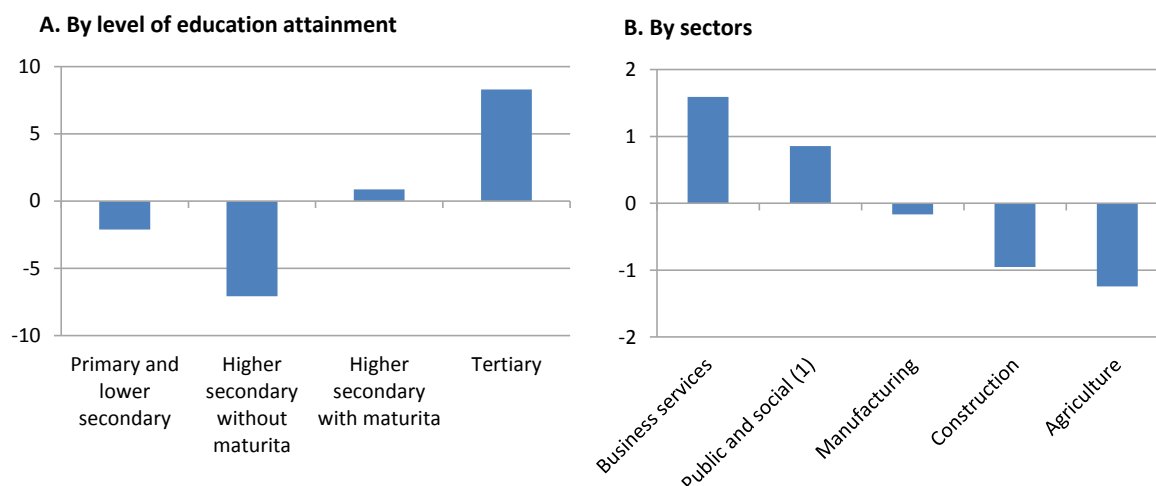
1. Public administration and defence; compulsory social security; education; human health and social work activities.

Source: Eurostat and Czech Statistical Office, own calculations.

Table 2. The manufacturing sector also experienced a structural shift

Percentage of total employment and changes between 2004 and 2013

	2004	2013	diff. (pps.)
Food, beverages, tobacco	2.8%	2.4%	-0.4
Textiles, leather and apparel	2.4%	1.2%	-1.2
Paper, coke, petroleum, rubber, plastics	2.1%	1.9%	-0.2
Chemicals, pharmaceuticals	1.1%	1.0%	-0.1
Metallurgy and mineral products	6.7%	6.2%	-0.5
Electronics, computer, optics	2.6%	3.9%	01-Mar
Motor vehicles	2.1%	3.5%	01-Apr
Other manufacturing	7.3%	7.0%	-0.3
Total manufacturing	**27.2%**	**27.1%**	**-0.1**

Source: Eurostat, own calculations.

12.   A more in-depth analysis of the skill composition of employment can be drawn by looking into the structure of employment by occupations (see Table A8 in the Annex). Although this analysis is hampered by the existing break in the time series in 2011 due to a statistical reclassification of workers, it confirms the findings of the analysis of the sectoral composition of the labour force and education data, revealing three clear trends. First, a steady decline in the proportion of craftsmen, skilled agricultural workers and machine operators between 2004 and 2013, which is consistent with the drop of the number of workers having attained ISCED 3C level of education; second, a rise in the share of professionals and technicians and finally, the stability in the proportion of workers in elementary occupations during the last decade, comprising just under 6% of total employment.

14

The share of non-standard jobs has risen

13.   In 2013, the Czech Republic had the sixth largest share of own account workers (OAWs)[5] among European OECD countries. Typically, countries with a particularly large share of such employment tend to have a prominent agricultural sector with a tradition of small-scale farmers (Turkey, Greece, Poland, Portugal), or receive significant inflows of tourists as self-employment is common in tourism and related activities such as wholesale and retail and/or accommodation (Italy, Greece, Spain and Turkey). In this sense, the Czech Republic has a rather exceptional structure of the pool of OAWs, with the second-highest share of such type of employment in construction (after Slovakia) and a particularly marked share in manufacturing (Figure 6).

Figure 6. The share of own account workers is high

In percentage of total employment, 2013
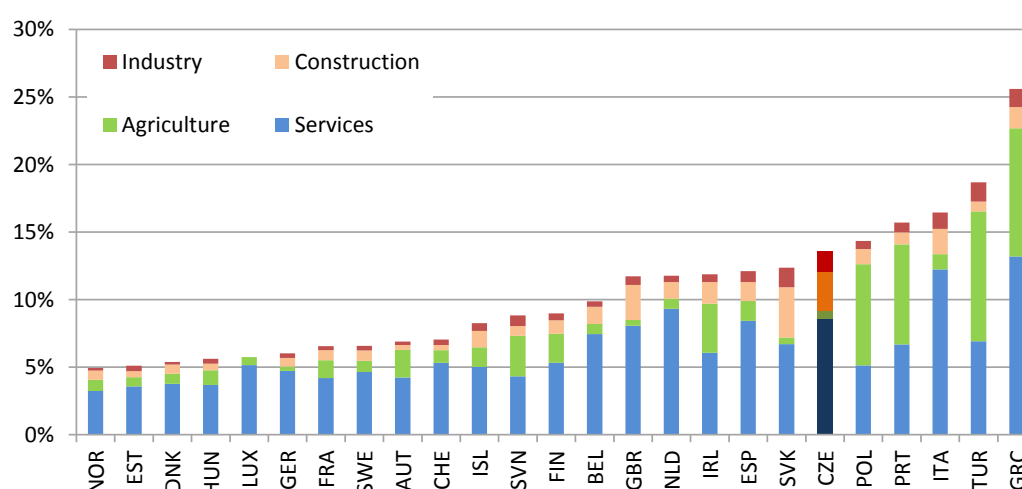
Source: Eurostat.

14.   Self-employment is favoured by the preferential tax treatment granted to this type of employment, at the expense of a higher tax burden of employees, and as opposed to the predominance of traditional working practices present e.g. in Mediterranean countries. As discussed by Dušek, Kalíšková and Münich (2013), the total tax burden for an average employee in the Czech Republic (personal income tax together with social security contributions) reached 37% in 2013, as opposed to 28.1% in the case of an average own-account worker, despite the fact that own-account workers have much higher average gross earnings than regular employees (34% higher). Furthermore, the distribution of taxes for own-account workers is also quite non-standard. Due to the minimum tax bases for social security contributions, own-account workers face a tax burden comparable to employees in the lowest income bands. However, the tax system for OAWs is regressive thereafter up to a certain point, resulting in a tax rate differential of 10 to 15 percentage points for the rest of the income distribution with the exception of the lowest income bands.

15.   This tax treatment is enabled by the system of lump-sum tax deductions, which increased from 25% in 2004 to 80% from 2009 onwards for craftsmen, and from 25% to 60% in the case of "other businesses", which is the one most commonly used by OAWs (Průša *et al.*, 2013). Additionally, and

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5.   Own account workers refer to those workers who engage independently in a profession or trade, either alone or with the help of unpaid labour force (typically family members). They comprise one of the two distinct groups of self-employed persons recorded in Labour Force Surveys, the other being employers who hire one of more employees.

similarly to regular employees, OAWs are eligible for a number tax deductions such as mortgage interest and pension insurance.

16.   The low tax burden for the self-employed has led to a widespread phenomenon of fake self-employment (commonly referred to as "švarcsystém" in Czech), with regular employees not benefitting from a standard contract with their employer, working instead as a self-employed worker, even if in the premises of the employer. This practice is beneficial for the "employer" as he does not need to pay any social contributions for these workers. The magnitude of such phenomenon is not possible to gauge accurately, as the boundary between "proper" and "fake" self-employment is rather blurry. In a study conducted by Vlach *et al.* (2013), 10% of surveyed employers reported to have hired fake self-employed, which can be significantly understated; the study presents an expert estimate of between 100-200 thousand persons, which accounts for between 15% to 30% of the total number of self-declared OAWs in the Labour Force Survey in 2013. In what regards occupations, fake self-employment seems to be more pervasive among construction workers, professionals and technicians as changes in the number of self-employed over time tends to be coupled with opposite developments in the number of employees (see Figure A1 in the Annex).

17.   This phenomenon has a negative impact on OAWs' future pensions, as their contributions to the PAYG pillar is very low (only one quarter of them pays more than the minimum value for social contributions) and only one third of them participates in private pension pillars (Vlach *et al.*, 2013). It has also led to widespread tax evasion resulting in losses in government revenues, the amount of which is nevertheless very hard to quantify. In surveys of subjective income, self-employed perceive themselves as enjoying a higher income than regular employees, with three-quarters reporting no current subjective income problems, which is at odds with the fact that only one-quarter actually pays more than minimum social contributions (Vlach *et al.*, 2013). Given the negative effect of self-employment in tax revenues and the PAYG pension pillar, an amendment of the Act on Income Taxes imposing ceilings for flat-rate tax deductions for OAWs is effective from 2015, which should somewhat reduce the attractiveness of fake self-employment.

18.   Apart from the issue of fake self-employment, there is also a concern that an increasing number of jobs are actually being created in the informal sector of the economy, spurred by the worsened economic situation and deteriorated regular employment prospects during the 2012/13 recession. This trend can be demonstrated by the growing disparity between the number of unemployed registered at labour offices and the number of unemployed in Labour Force Statistics, which increased from 95 thousands of persons in 2008 to the record high of 195 thousands of persons 2013.There is a legal requirement that a job seeker cannot be registered at Labour Offices if his or her income from employment exceeds half the minimum wage. Given the low minimum wage level, it is likely that an increasing part of persons are actually employed for more than the legally permitted threshold, which was apparently driven by decreases in households' real disposable income during 2011-2013.

Part-time employment is low

19.   The Czech Republic has the third lowest share of part-time jobs among OECD countries (Figure 7). As 17% of part-time jobs in 2012 were involuntary, there seems to be no immediate demand pressures for increasing the share of this type of employment. Nevertheless, increases can be expected in the future, in line with further structural shifts of employment towards the services sector or rising pressing needs for better alignment between family responsibilities and work life.

Figure 7. Share of part-time jobs has been one of the lowest in the OECD

Part-time jobs as a percentage of total employment

Source: Calculations based on data from the OECD Labour Force Statistics database.

The wage bargaining system is quite decentralised but wage differentiation is low

20.   The Czech wage bargaining system can be characterised as quite decentralised, with collective bargaining taking place predominantly at a company or industry level (Visser, 2013). The government determines the general legal framework, whereas its direct interventions have been limited to the setting of the minimum wage. Collective agreements may be either company-based (but not necessarily limited to a single company), or "higher degree", i.e. concluded between trade unions and employer associations. The latter have been typically sectoral. Wage growth is often set in terms of wage tariffs, with a possibility to differentiate between employees but not allowing for a full reconciliation of wage formation with the specific economic and financial situation of individual companies (Brádler *et al.*, 2010). These agreements are binding only for companies which are members of an employer association involved in the negotiation. Non-member companies in the sector are not covered, unless asked by an employer association, which necessitates the Ministry of Labour approval. However, this practice has seldom been used.

21.   Typically, slightly more than half of collective agreements concern wage increases, predominantly in terms of nominal wages or tariffs, while agreements involving real wage increases are relatively uncommon (Table 3). Nominal wage increases achieved through collective bargaining agreements have broadly mirrored aggregate wage growth in the business sector since 2010, pointing to a rather limited bargaining power, as the 2012/13 recession unfolded (Table 4). On the other hand, bargained real wages were significantly higher as compared to the aggregate, but with a limited impact on the economy due to their small prevalence. The year 2013 was rather exceptional due to the introduction of an extra personal income tax bracket for highest-income earners. This led to a massive shift in the disbursement of bonuses already in 2012, substantially contributing to the decrease in nominal wage growth in 2013.

Table 3.   Main characteristics of wage bargaining in the business sector

	2007	2008	2009	2010	2011	2012	2013
Bargained minimum wage as a % of statutory	109.6	116.6	118.9	121.5	122.8	125.6	116.3
Pay increases considered (% of collective agreements)	66.4	74.0	56.2	42.4	56.1	59.7	59.4
- increase in wage tariffs	19.7	28.0	20.9	12.5	18.4	20.8	20.4
- increase in nominal wages	41.9	41.3	26.1	15.6	21.7	22.8	22.1
- increase in real wages	3.4	4.0	1.9	1.4	1.9	1.9	1.7
Limits for agency workers (% of collective agreements)	0.9	1.7	1.5	2.1	1.8	2.2	2.2
Uneven working hours (% of collective agreements)	23.6	30.6	31.0	35.9	36.8	40.8	39.4

Source: Ministry of Labour and Social Affairs, Working Conditions Information System surveys, 2007-2012.

Table 4.   Outcomes of wage bargaining in the business sector

	2007	2008	2009	2010	2011	2012	2013
Bargained nominal wage growth (%)	4.2	5.4	4.4	3.1	2.9	2.8	2.8
Actual nominal wage growth (%)	7.4	8.6	3.0	2.7	3.0	2.6	-0.2
Difference (pp.)	*-3.2*	*-3.2*	*1.4*	*0.4*	*-0.1*	*0.2*	*3.0*
Bargained real wage growth (%)	2.4	2.2	2.4	2.2	2.3	2.0	1.8
Actual real wage growth (%)	4.5	2.2	2.0	1.2	1.1	-0.7	-1.6
Difference (pp.)	*-2.1*	*0.0*	*0.4*	*1.0*	*1.2*	*2.7*	*3.4*

Source: Ministry of Labour and Social Affairs, Working Conditions Information System surveys, 2007-2012, Czech Statistical Office.

22.   In spite of the apparent decentralised nature of wage setting and the changes in the composition of employment, there has been a remarkable overall stability of relative wages. The coefficient of variation for all wages remained virtually constant over 2003-2013 (Tables A9 and A10 in the annex) and ratios of average wages for individual occupations to the overall average wage have also remained relatively constant, in particular for low-skilled occupations. As an example, the average wage of craftsmen remained at just above 80% the aggregate average wage during 2003-2013, despite their diminishing share in total employment and the diminishing share of persons with apprenticeship certificates. Relative wages within individual occupations have also remained virtually identical, when measured by coefficients of variation in each category. This issue deserves further scrutiny, beyond the scope of this paper. On one hand, the Czech wage bargaining system is unlikely to have purposefully contributed to this outcome, due to the low collective bargaining power. However, firms not involved in collective agreements may simply copy the wage increases determined under collective bargaining. Another possibility is that there may be a general tendency to follow the wage increases proposed by the largest trade unions. Another possible explanation is that there are persisting patterns in relative unemployment to vacancy ratios by occupations, contributing to the stability of the wage distribution over time. For instance, this ratio for clerical support workers has consistently surpassed the overall figure, whereas the opposite has held true for technicians and professionals (Table A11 in the annex).

The minimum wage has been kept low but is rising

23.   The statutory minimum wage has been kept constant from January 2007 to July 2013 at 8 000 CZK/month (around € 320). In 2012, the Czech Republic had the fifth lowest statutory minimum wage out with respect to median wage across OECD countries, which was also caused by the stagnation of its nominal level since January 2007. In fact, the Slovak and the Czech Republics were the only EU OECD countries where the level of minimum wage was below the poverty threshold (defined as 60% of median equalized income for a single person). In the case of the Czech Republic, the minimum wage was 16%

below the poverty threshold in 2012. Since the institution of the minimum wage in 1991, lower levels of the minimum wage were established for disabled and also for young workers.[6] The youth-specific minimum wage was abolished in 2013 on the grounds of equal pay for equal work. That year was also marked by the first increase of minimum wage in 7 years, to 8 500 CZK. The minimum wage further increased in 2015 to 9 200 CZK.

Figure 8. Minimum wage relative to median wage

2012
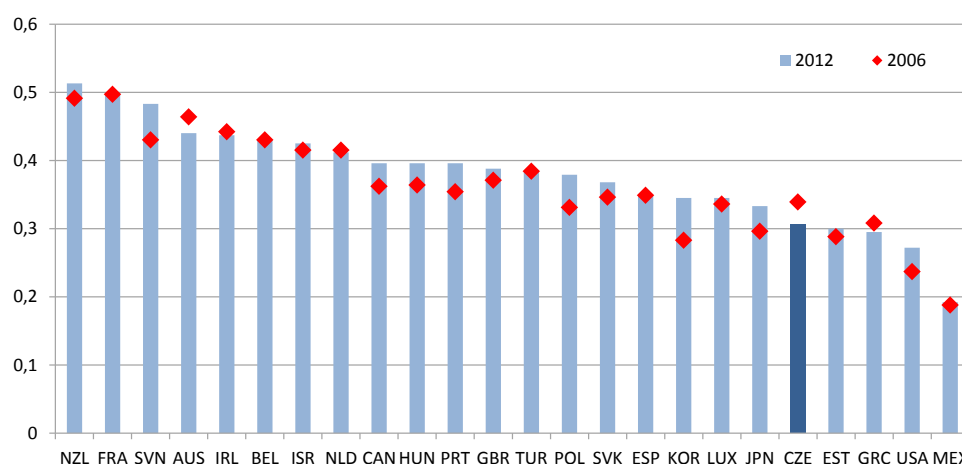
Source: OECD Labour Force Statistics database.

24.   So far, the increase in the minimum wage in 2013 seems not to have hampered the overall wage distribution. As shown in Figure 9, it was 37% below the lowest decile of income distribution in the business sector. Nevertheless, further increases could be prohibitive for several groups of employees in finding and/or retaining their jobs. Younger employed persons (under 20 years) seem to still have a "buffer" against increases in minimum wage: the Czech Statistical Office (2012) reports that just 4.5% of persons aged 15-21 were earning wages close to the minimum wage in 2011 (i.e. up to 8 799 CZK). However, a further rise of the minimum wage such as that in 2015 could prove to be somewhat problematic for those with lower qualifications – young or not, as the least skilled workers' lowest decile (those in "elementary occupations") was just below 9 200 CZK in 2013.

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6.   Specifically, since 2000, the nominal minimum wage was reduced by 10% for persons 18-21 years and by 20% for persons younger than 18 years. Before this date, youth minimum wage applied only to persons younger than 18 years.

Figure 9. Wage distribution of selected groups of employees in the business sector

0.1, 0.25, 0.5, 0.75 and 0.9 centiles, CZK/month, minimum wage = 8 500 CZK, 2013
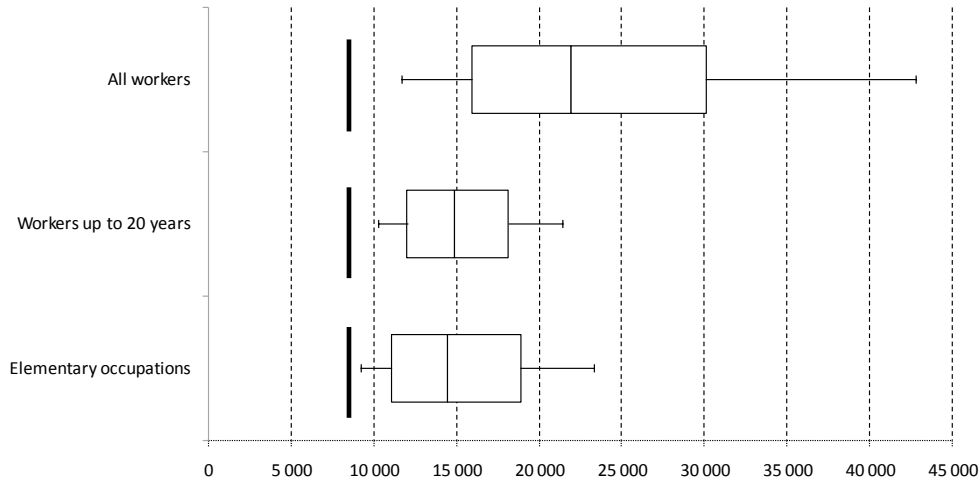
Source: Average Earnings Information System.

Labour market dynamics

25.   This section provides an overview of labour market dynamics in the Czech Republic. These have changed over time, led by the shifts within the labour market, both in terms of an increasing share of persons with tertiary education and towards placements with higher skill demand.

Unemployment rate dynamics

26.   There are two additional reasons to expect a different dynamics of the labour market in recent years: first, the declining working age population (15-64 years old) which began in 2010 could present an additional pressure in terms of the relative scarcity of labour as a factor of production; second, the labour market reform enacted in 2012 allowed for more overall flexibility, especially in a more adaptive use of working hours to demand. It is expected that these effects combined have reduced the real GDP growth rate necessary for a stagnation of the unemployment rate during the last years, which can be tested and quantified by a framework of the difference version of Okun's law as in Knotek (2007), here presented as unemployment rate being dependent on real GDP growth lagged by one and two periods (quarters):

$$\Delta un_t = \beta_0 + \beta_1 \Delta \log GDP_{t-1} + \beta_2 \Delta \log GDP_{t-2} + \varepsilon_t \tag{1}$$

27.   Estimates of 6-year rolling regression are shown in Figure 10. The left panel shows that the real output growth rate consistent with stable unemployment has continuously been dropping since 2009. The panel on the right shows a shortened response of the unemployment rate to developments in real output growth, which is consistent with the increased labour market flexibility brought by a greater use of adapting working hours to demand conditions, together with higher flows within the labour force (see the

next section): GDP growth lagged by 2 quarters ceased to be statistically significant after the 2009, while the converse holds for a lag of just one quarter.[7]

Figure 10.   Real output growth consistent with a stable unemployment rate has considerably dropped and the response has shortened

Left panel: real output growth (y-o-y) consistent with stable unemployment rate, 6-year rolling regressions
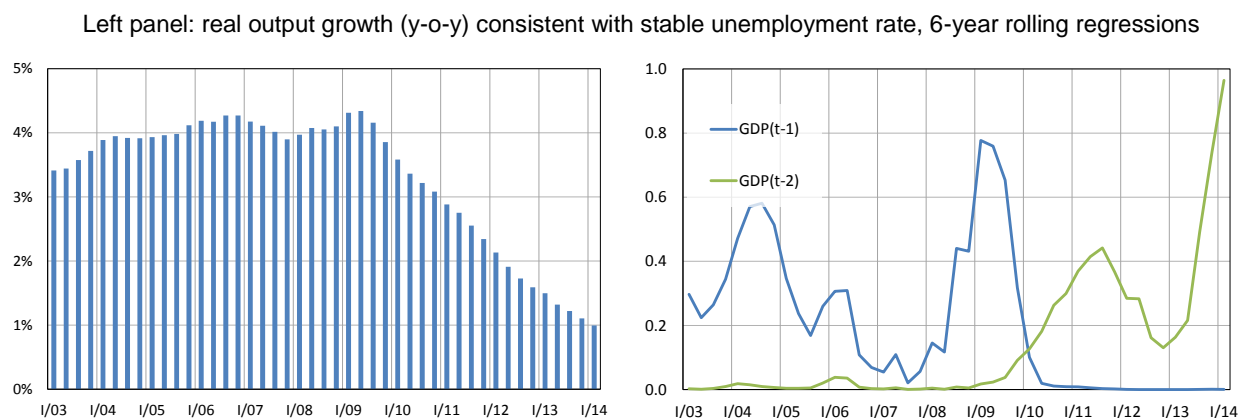
Source: Eurostat, own calculations.

28.   These findings are confirmed by the vector autoregression technique, which allows for a joint mapping of both the magnitude and the time distribution of a simulated shock. Using a system with two endogenous variables and two lags, we investigate the effects of one percentage point shock to real output growth.[8]

$$
\begin{bmatrix} \Delta un_t \\ \Delta \log GDP_t \end{bmatrix} = \begin{bmatrix} \beta_{1,0} \\ \beta_{2,0} \end{bmatrix} + \begin{bmatrix} \beta_{1,1} & \beta_{1,2} \\ \beta_{2,1} & \beta_{2,2} \end{bmatrix} \begin{bmatrix} \Delta un_{t-1} \\ \Delta \log GDP_{t-1} \end{bmatrix} + \begin{bmatrix} \beta_{1,3} & \beta_{1,4} \\ \beta_{2,3} & \beta_{2,4} \end{bmatrix} \begin{bmatrix} \Delta un_{t-2} \\ \Delta \log GDP_{t-2} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{bmatrix} \tag{2}
$$

29.   Results on the basis of data from two selected time periods are presented in Figure 11. The choice of the two time periods was motivated by results in Figure 10, which shows responses to shocks within two quite distinct environments (smaller sensitiveness and a slower response of the unemployment rate to developments in real output prior to the year 2009). The start of the second time period was deliberately chosen at the third quarter of 2009 in order to disregard immediate effects of the Great Recession. It is clear that the response of the unemployment rate to the shock in real output growth is much faster following the 2009 crisis and it also seems to be more pronounced, although there is an inherent uncertainty associated with the results, expressed by the error bands.

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7.   The equation with two GDP growth coefficients was picked as the setup which allows for a sound interpretability of the lag structure. With a greater number of lags, there are instances with negative coefficients, which would unnecessarily complicate the display of results in Figure 10.

8.   The number of lags was picked on the basis of Schwarz information criterion.

Figure 11. **The unemployment rate responds to output shocks more rapidly after 2009**

Response of the change in unemployment rate (y-o-y) to 1 pp. shock in real output growth: deviation from the baseline, the x-axis represents quarters from the initial shock; +/- 2 standard error bands
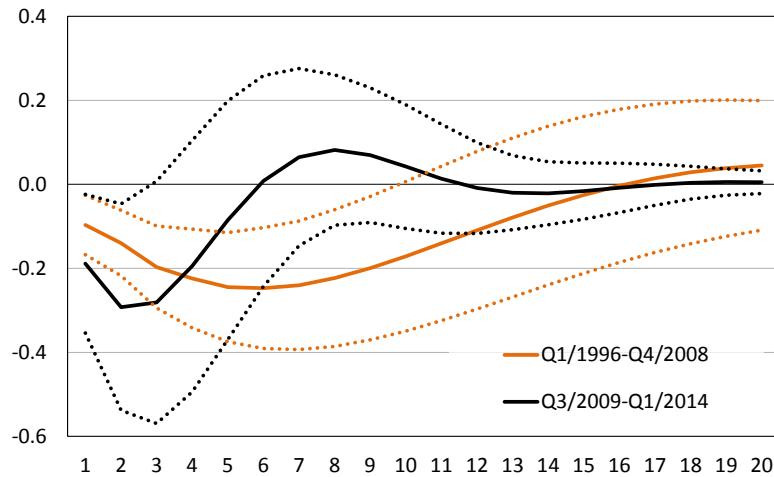
Source: Eurostat, own calculations.

30.   Young people tend to be more vulnerable to fluctuations in economic output than the rest of the labour force, as demonstrated by many authors and recently by e.g. Hutgens and Stadtmann (2013). This is due to multiple reasons such as the reluctance of employers to hire young people during recessions which may stem from a tendency of hoarding core and experienced employees. Additionally, young persons have had a greater share of temporary contracts in most countries, suggesting a higher job separation rate during recessions. In the Czech Republic, 28.9% of employees aged 15-24 years old had temporary contracts in 2013, as opposed to 8.3% for those 25 years and older.

31.   We investigate the possibility that young workers are more sensitive to output fluctuations than older workers by estimating the Okun's law separately for workers of different age groups. Table 5 reports the results. It shows a greater response of the youth unemployment rate to real output fluctuations than for the whole working age population whereas at the other end of the age spectrum, the sensitivity of unemployment rate of persons aged 55-64 is comparable to the rest of the population. This result is also driven by the importance that education attainment has in determining labour market outcomes in the Czech Republic: there is a low proportion of tertiary-educated persons aged 15-24 (6% in 2013); many of these persons are still inactive due to education so that only those with comparatively lower skills actually enter the labour market.

Table 5.   Age-specific Okun's law estimates for the Czech Republic, Q1/1998-Q1/2014

Okun's law estimates for the Czech Republic (Q1/1998-Q1/2014)				
	15-24	**25-54**	**55-64**	**15-64**
$\Delta GDP_{(t)}$	-0.206*	-0.059*		-0.060*
$\Delta GDP_{(t-1)}$	-0.258**	-0.165***	-0.150***	-0.173***
$\Delta GDP_{(t-2)}$	-0.395***	-0.065**	-0.097**	-0.075**
AR(1)	1.176***	0.925***	0.896***	1.269***
AR(2)	-0.276**			-0.359***
D-W stat.	1.978	1.633	2.132	2.197
Adj. R^2	0.858	0.893	0.693	0.920

Source: Eurostat, own calculations.

22

Participation rate dynamics

32.	This section investigates the dynamics of the labour force participation rate in the Czech Republic from two distinct angles. First, it shows reactions of the participation rate to the position of the Czech economy within the business cycle. The second part is devoted to unravelling long-term forces steering the participation rate which include demographic factors and other distinct structural aspects.

33.	In the Czech Republic, the labour market participation rate has been clearly countercyclical especially since 2006 (see Figure 12). More specifically, it increased both during the 2009 and 2012/13 recessions and decreased in the boom times preceding the 2009 crisis. This behaviour is rather non-standard among OECD countries, where participation rates tend either to be neutral to the business cycle or procyclical.

**Figure 12.	The participation rate has been largely countercyclical**

Change in participation rate (15-64, y-o-y, pps.) and output gap based on the HP filter (% of potential output, rhs, opposite direction)
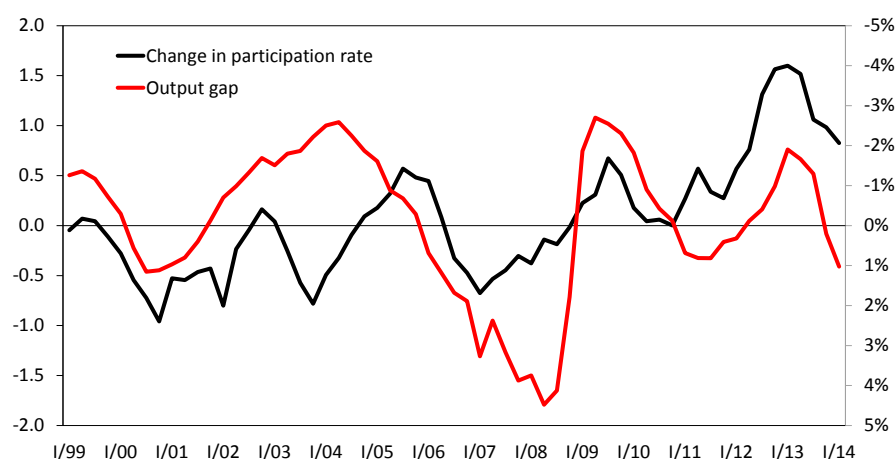
Source: Eurostat, own calculations.

34.	From a theoretical perspective, there are two main determinants of the participation rate with respect to an economy's position in business cycle, which have been thoroughly researched by numerous authors. The first effect is that during economic downturns, the apparently low increases in unemployment tend to coincide with the channelling of excess labour supply into inactivity (see e.g. Elmeskov and Pichelmann, 1995). A typical example would be a discouraged worker who stopped actively looking for a job, thus not fulfilling a condition for being unemployed. Other channels to inactivity include increased participation in education and training, longer maternity leaves or a higher proportion of early retirements which are all typical during economic downturns. The second effect exerts its driving force in the opposite direction and is commonly referred to as the "added worker effect" (see e.g. Lundberg, 1985), whereby when a head of a household becomes unemployed, other members of the household increase their labour supply in order to compensate for the decrease in real disposable income. An example of such effect is a temporary increase in the labour supply of married women whose husbands have become unemployed.

35.	Typically, these two effects tend to compensate each other in many countries. We investigate the response of labour market participation rates in OECD countries between the first quarter of 1998 and 2014 (reflecting the availability of underlying data). The year-on-year change in the participation rate of the working age population (15-64 years olds) is regressed against lagged changes in output gap, defined as

a ratio of real to trend output calculated on the basis of the Hodrick-Prescott filter.[9] Results reveal that in 19 OECD countries the participation rate shows signs of neutrality to the business cycle, with non-significant output gap coefficients (results are not displayed for these countries), while it is procyclical in 11 countries (Table 6). Only in 4 OECD countries the participation rate exhibits a countercyclical behaviour, pointing for a stronger added worker effect relative to the discouraged worker effect: the Czech Republic, France, Luxembourg and Mexico (the crucial coefficients are denoted in bold). Finally, a panel regression for the whole OECD area shows that the aggregate participation rate is clearly procyclical.

Table 6.   Participation rates tend to be either neutral to the business cycle or procyclical in OECD countries

Q1/1998-Q1/2014

	const.	ΔGAP	ΔGAP_{t-1}	ΔGAP_{t-2}	AR(1)	adj. R^2	D-W stat.
CAN			0.079**		0.873***	0.721	1.784
CHL	0.799*		0.183***		0.783***	0.665	1.555
CZE			-0.075***		0.944***		1.508
DNK				0.124**	0.612***	0.367	1.862
EST			0.118***		0.594***		1.903
FIN			0.101***		0.563***	0.456	
FRA	0.173***	-0.116***			0.479***	0.539	2.010
IRL		0.045**			0.850***	0.767	2.286
KOR		0.105***			0.820***	0.528	1.892
LUX	0.578***			-0.112**		0.092	
MEX				-0.166**	0.617***		2.211
NOR		0.092**				0.701	1.311
PRT				0.144***	0.730***	0.560	2.173
SWE	0.293**			0.085**	0.509***		2.189
USA	-0.303***			0.065**	0.690***	0.578	1.971
OECD	**0.229***		**0.035***		**0.660***	**0.487**	**1.928**

Source: OECD National Accounts and Labour Force Statistics database.

36.   Apart from the regression analysis, the presence (and prominence) of the "added worker effect" in the Czech Republic can be seen in Figure 12, where women aged 25-54 accounted for the major part of cyclical variations from 2003 onwards. The higher contribution of women has been facilitated by a notable increase in the proportion of part-time jobs in this demographic segment. Furthermore, the second protracted recession in 2012-2013 was also marked by the increase in participation rates of men aged 25-54, suggesting that the years of consecutive decrease of households' real disposable income between 2011-2013 (by 1.6% on average) necessitated the increase of labour supply also in this demographic segment. There are remaining two notable trends depicted in Figure 12, which are of structural nature, rather than driven by cyclical factors. First, the rapid influx of young people into tertiary education allowed for a dramatic contribution of young people aged 15-24 to the overall participation rate. Secondly, consistent with rising statutory retirement age, the number active of persons 55-64 has also steadily increased.

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9.   The lambda parameter was set at the conventional value of 1600 for quarterly data. (*) denotes significance at 10% level, (**) at 5% level and (***) at 1%. Only parameters with 10% level of significance or higher were included in regressions.

Figure 13.   The participation rate has also been driven by long-term factors

Change in participation rate and contributions (15-64, y-o-y, pps.)
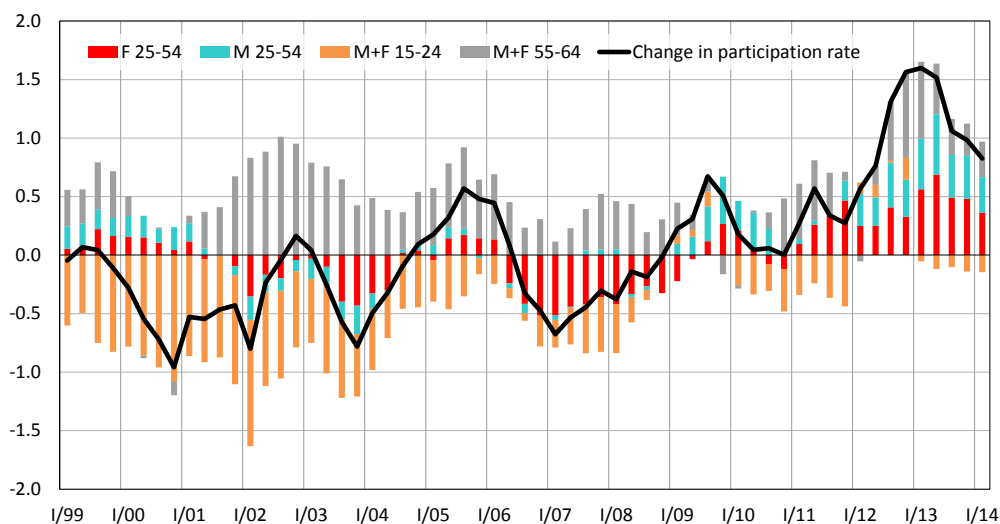
Source: Eurostat, own calculations.

37.   Changes in the demographic structure also play a role in participation rate dynamics. Specifically, the age group of persons aged 40-49 has been gaining weight in the total working age population (15-64), which implies a positive contribution to the overall participation rate (15-64), as the proportion of retired persons aged 40-49 years old is very low and, at the same time, these persons have typically finished their education and are less likely to be inactive to take care of young children, a situation that drives many women out of the labour market. On the other hand, the proportion of persons aged 60-64 has also been gaining weight overtime, with opposite pressures towards the overall participation rate, as the inactivity rate of this age cohort has traditionally been high due to old-age and disability retirements.

38.   To investigate the effects of changing demographics, we decompose the total change in the participation rate into the "demographic effect", which captures just demographic changes over a selected time period (with fixed age-specific participation rates), and the "participation effect", which in turn captures the changes in participation rates of each age group, with fixed population weights:[10]

39.
$$\frac{A_t}{P_t} - \frac{A_{t-4}}{P_{t-4}} = \underbrace{\sum_{i=1}^{10} \left(w_{i,t} - w_{i,t-4} \right) \frac{A_{i,t}}{P_{i,t}}}_{\text{demographic effect}} + \underbrace{\sum_{i=1}^{10} w_{i,t-4} \left(\frac{A_{i,t}}{P_{i,t}} - \frac{A_{i,t-4}}{P_{i,t-4}} \right)}_{\text{participation effect}}, \tag{3}$$

where $w_{i,t} = \dfrac{P_{i,t}}{P_t}$

---

10. A_t denotes the number of active persons aged 15-64 at time t, P_t the total number of persons aged 15-64. The index I represents a 5-year age group, and w_i is then the ratio of a given age group on the total population 15-64.

40.   The results of this decomposition are then shown in Figure 13. It is clear that the surge in participation rate from 2012 onwards has been supported by a marked contribution of changes in demographic structure, which contributed to the participation rate (15-64) by 0.4 percentage points on average between the first quarters of 2012 and 2014. Another interpretation of this decomposition is that even if all age-specific activity rates were constant during these years, the participation rate of persons aged 15-64 would still be rising by around 0.4 percentage points.

Figure 14.   Demographic structure plays a vital role in participation rate dynamics

Change in participation rate and contributions (15-64, y-o-y, pps.)
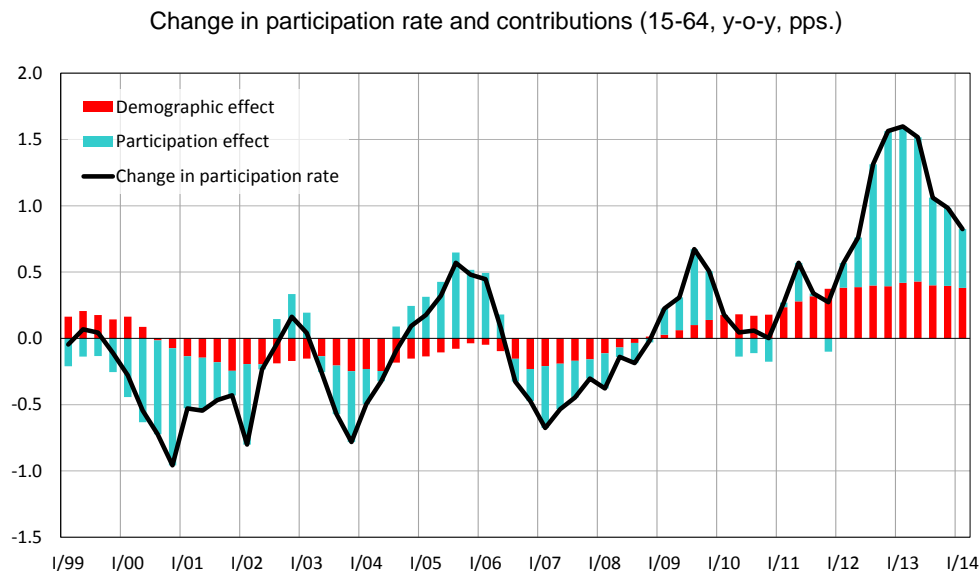
Source: Eurostat, own calculations.

41.   As hinted at in previous paragraphs, there are several important trend factors related to the participation rate. Since 1996, statutory retirement age has been increasing. At that time, it was 60 years for men and between 53-57 years for women, depending on the number of children. According to the current legislation, statutory retirement ages should be unified for all persons at the age of 67 in 2044, implying an increase by 2 months each year of birth for men and at a considerably faster pace for women. Notably, the existing legislation has also translated itself to decreasing number of actual pensioners, which is shown in Figure 14. If the long-term relationship between the statutory retirement age and the results of the Labour Force Survey continues to hold, activity rates for persons aged 55-64 should *ceteris paribus* increase by 9% for men and 20% for women between 2013 and 2020. This is particularly important as this age segment is projected to gain weight in the following years.

Figure 15.   Falling inactivity of persons aged 55-64 coincides with the rise of statutory retirement age

Old-age and disability pensioners (Labour Force Survey) vs statutory pensioners (% of population 55-64)
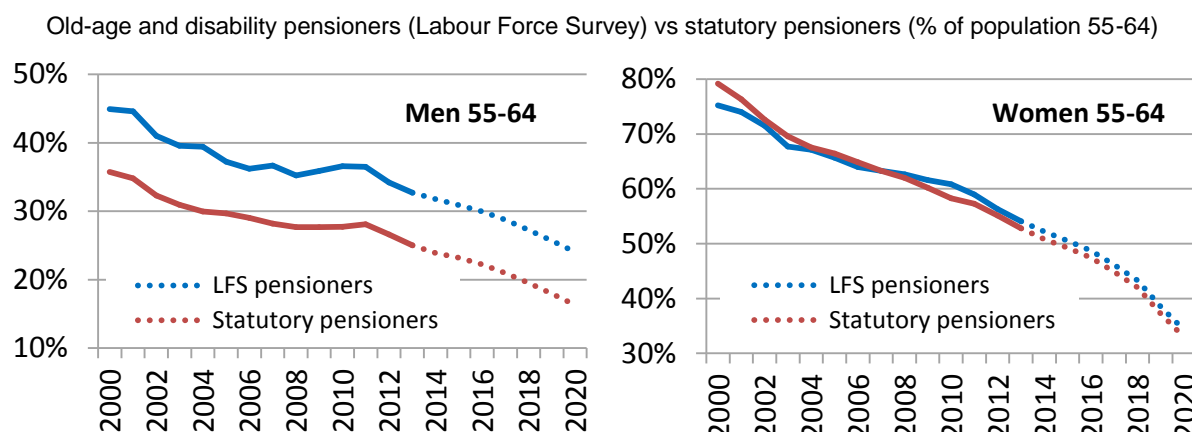
Source: Eurostat, Ministry of Finance of the Czech Republic, Demographic projection of the Czech Statistical Office (middle variant), Own calculations.

42.   Younger age segments experienced the contrary motion of activity rates. There has been a notable influx of persons into tertiary education, resulting in a rise of inactivity due to education and training of persons aged 20-29 by more than 10 percentage points between 2000-2013. Nevertheless, this indicator, together with the ratio of students enrolled at universities to population 20-29, peaked already in 2011. Furthermore, the increasing fertility rates in the last decade were consistent with a rise of the proportion of women aged 25-39 looking after children or other family members. The sharp increase of activity in 2013 is consistent with the added worker effect, as discussed in previous sections, and may be thus to a large extent driven by cyclical factors. Going forward, there are hardly any pressures towards increasing inactivity rates for young women. First, fertility rates are assumed to be increasing only slightly (on the basis of the Czech Statistical Office's demographic projection), and recent endeavor of the Czech government to increase supply of pre-school institutions–the new Act on Child Group together with higher public investments– should allow for increases in their labour market participation.

Figure 16. Further substantial increases in inactivity of younger persons are unlikely
  Left panel: persons in educ. or training (LFS) vs number of students enrolled in tertiary education (% of pop. 20-29)

Right panel: women inactive due to family reasons (LFS, % of population 25-39) vs total fertility rate
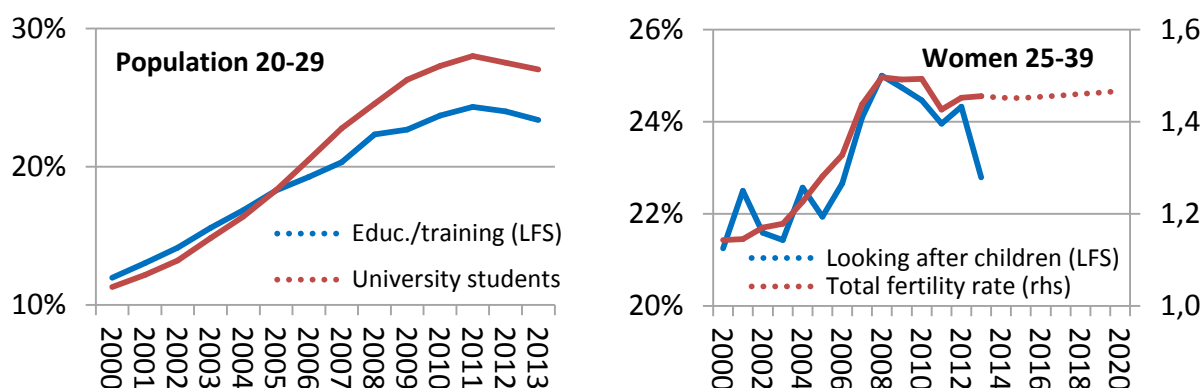
Source: Eurostat, Ministry of Education, Youth and Sports, Demographic projection of the Czech Statistical Office (middle variant), Own calculations.

43.	These trends should result in further increases of the trend part of the participation should at least until 2020. To this point, increases in statutory retirement age and stalled dynamics of participation rates of younger age groups should remain the most important underlying factors. Also, the demographic effect should also contribute positively to this outcome at least until the end of the decade: the proportion of young persons aged 15-24 (i.e. with high inactivity rates) is projected to decrease by 2.2 percentage points between 2013-2020, and the proportion of persons 35-54 with naturally lower inactivity rates should in turn increase by 4.8 percentage points.[11]

Flows between employment and unemployment

44.	Flows within the labour force constitute another aspect labour market dynamics. At every time, there exist simultaneous job creation and job destruction, even if the aggregate figures for (un)employment rate may remain constant. While analysing labour market flows, many underlying forces can be unravelled. For instance, their volume can be an indicator of labour market flexibility as in Elsby, Hobijn and Sahin (2011), who found that Nordic and Anglo-Saxon countries tend to have greater flows than countries in continental Europe. The oldest models, which go back to the 1970s (Clark and Summers, 1979) have traditionally analysed flows between employment, unemployment and inactivity, which however need the use of microdata, making cross-country comparisons more difficult. It is nevertheless still possible to analyse flows within the labour force (employed and unemployed) using information concerning the length of unemployment spells. Based on the novel approach of Shimer (2007), we decompose the change in employment[12] in two parts, the part representing the unemployed who found a job, and the other part representing the employed that lost a job and similarly for the change in unemployment:[13]

$$\Delta E_t = \lambda_{t-1}^{UE} U_{t-1} - \lambda_{t-1}^{EU} E_{t-1}$$

$$\Delta U_t = \lambda_{t-1}^{EU} E_{t-1} - \lambda_{t-1}^{UE} U_{t-1} \qquad (4)$$

45.	This system of equations has infinitely many solutions. It can be uniquely determined by imposing an identity stating that the number of unemployed with a spell shorter than a given time period (in this study we chose 3 months, i.e. one quarter) equals the probability of an employed person losing her job times the number of persons employed (in the previous period). The Shimer (2007) approach has several caveats, the most fundamental one is that this model only follows developments in the labour force, abstracting away from inactivity. Each of the two labour force flows (to and from unemployment) then inherently contains an admixture of flows to and from inactivity, which is impossible to separate out without the use of microdata. A second important restriction of this approach is that it assumes that no person changes its labour status within the reference period, which in the case of this paper is one quarter, and that persons are homogenous in terms of transition probabilities:

$$\lambda_{t-1}^{EU} E_{t-1} = U_t^{<3m} \qquad (5)$$

46.	Figures 16 and 17 show the results for EU OECD countries. The rise of unemployment rates after the 2008/09 global economic crisis in most countries resulted from both an increase in the probability of losing a job and a decrease in the probability of finding one. A striking example is Spain, where the probability of finding a job decreased by more than a half when comparing to the pre-crisis period. Perhaps

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11.	According to the Czech Statistical Office's demographic projection, middle variant.

12.	In this section, both employment and unemployment are always expressed as a ratio to the labour force.

13.	The λ parameters represent the respective transition probabilities; e.g. λ^{UE} represents the probability of transition from unemployment to employment.

more importantly, the volume of flows also increased quite markedly in many countries, especially in those with already high flows: Finland, Iceland, Sweden and Denmark, a finding consistent with Elsby, Hobijn and Sahin (2011). The decomposition for the Czech Republic reveals a different dynamics: both the probability of becoming unemployed and of becoming employed have risen during the global economic crisis. While the increase in the probability of becoming employed may be counterintuitive, it may be at least partly driven by the already mentioned reform of the Labour Code which facilitated the use of non-standard working time arrangements.

47.   The Czech Republic has had one of the lowest volumes of flows in the EU OECD countries between employment and unemployment (Figure 17). As discussed by Arpaia and Curci (2009), a broadly accepted view is that gross flows increase when unemployment increases: the increase in inflows into unemployment causes a rise in the stock of unemployed which then leads to a rise in the volume of total outflows. In other words, the effect of the larger unemployment pool tends to outmatch the effect of lower rate of outflows from unemployment in times of adverse economic conditions. There are conflicting views whether increased labour market churning is beneficial for the labour market or not. One stream of thought emphasises that higher turnover corresponds to higher transaction costs (Bleakley and Fuhrer, 1997), whereas authors such as Lazear and Spletzer (2012) point out that churning is an important part of the process of creative destruction that moves resources from less productive to more productive economic activities.

Figure 17.   The probability of becoming unemployed increased and the probability of becoming employed decreased in most EU OECD countries after 2009

Left panel: probability of transition from employment to unemployment

Right panel: probability of transition from unemployment to employment
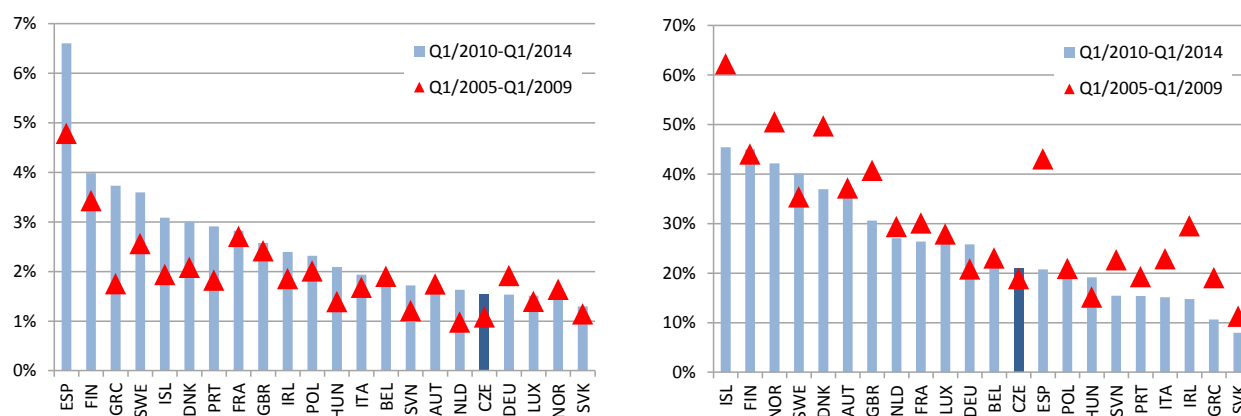
Source: Eurostat, own calculations.

Figure 18.   The volume of flows within the labour force has generally increased in EU OECD countries after 2009

Sum of flows from employment to unemployment and vice versa (average over a time period, % of labour force)
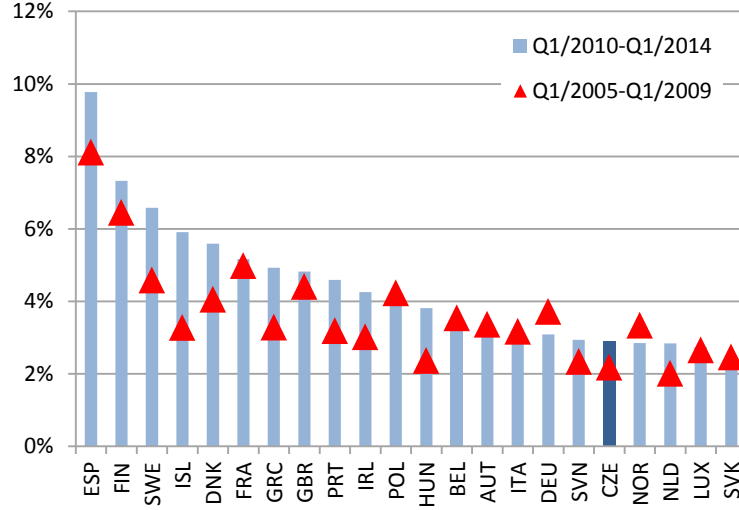
Source: Eurostat, own calculations.

48.   To shed more light on the nature of labour market churning by incorporating information regarding long-term unemployment, it is possible to decompose labour force flows even further without the use of microdata and still using information for unemployment spell duration (Maleček, 2014). By extending the model of Shimer (2007), it is possible to observe three states: employment (E), short-term unemployment (S) and long-term unemployment (L), keeping the assumption that no person changes its status within a single quarter. The system can be identified with six transition probabilities:

$$\Delta E_t = \lambda_{t-1}^{SE} S_{t-1} + \lambda_{t-1}^{LE} L_{t-1} - \lambda_{t-1}^{ES} E_{t-1}$$

$$\Delta S_t = \lambda_{t-1}^{ES} E_{t-1} - \left(\lambda_{t-1}^{SE} + \lambda_{t-1}^{SL}\right) S_{t-1} \tag{6}$$

$$\Delta L_t = \lambda_{t-1}^{SL} S_{t-1} - \lambda_{t-1}^{LE} L_{t-1}$$

49.   Figures 18 and 19 present the decomposition of the level of the unemployment rate, as well as changes in short- and long-term unemployment rates. It is clear from the decomposition below that the volume of flows within the labour force is high relative to the pre-2009 period, due to both increased job separations and job findings. During 2009, significant inflows of job seekers were the predominant cause of the sharp rise in the unemployment rate, which was eventually attenuated by an increase in the number of persons who found a job. Importantly, the volume of flows into long-term unemployment also increased substantially in the aftermath of the 2009 crisis while the decrease in long-term unemployment rate after 2013 was allowed by an increase in job finding by the long-term unemployed.

50.   One of the possible explanations for increased labour market flows are uncertain prospects of employers during the recession of 2012/13, which caused an increase in the share of temporary workers from 7.5% in 2009 to 9.1% in 2013. The apparent increase in non-standard jobs discussed already in the first section (fake self-employed, informal jobs) is also likely to have contributed to a large extent to this outcome, as these positions are likely to be comparatively shorter-lived than regular contracts.

Figure 19.   Decomposition of the unemployment rate in the Czech Republic

Q1/1999-Q1/2014, % of labour force

- long-term unemployed who did not find a job
- short-term unemployed who became long-term un.
- short-termunemployed who did not change status
- employed who lost their job
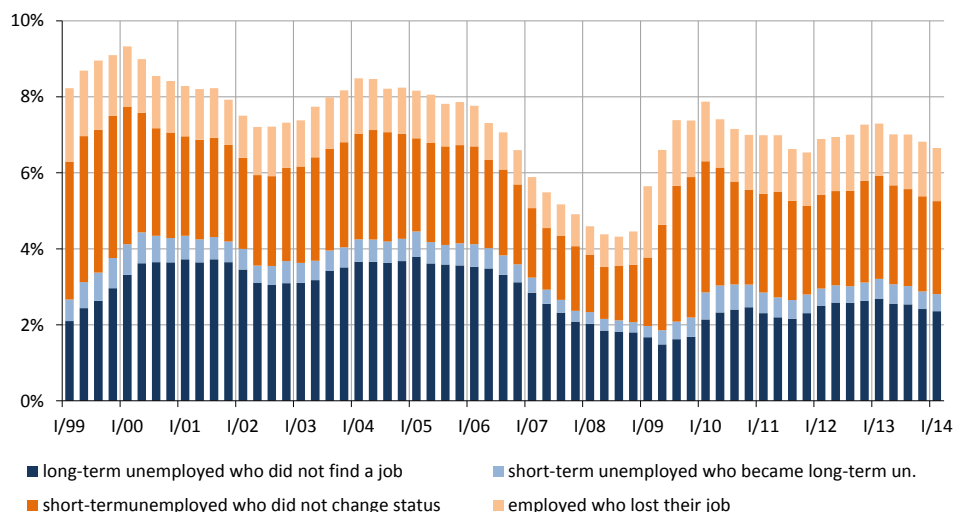
Source: Eurostat, own calculations.

Figure 20.   Decomposition of changes of short- and long-term unemployment rates in the Czech Republic

Q1/2004-Q1/2014, % of labour force

- employed who lost their job
- short-term unemployed who became long-term un.
- short-term unemployed who found a job
- change in short-term un. rate (pps.)

- short-term unemployed who became long-term un.
- long-term unemployed who found a job
- change in long-term un. rate (pps.)
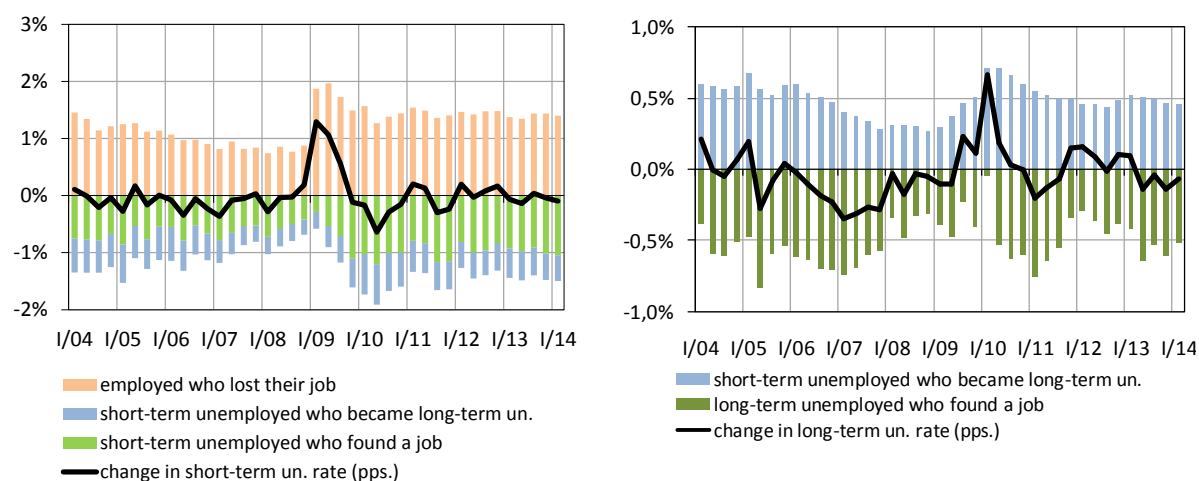
Source: Eurostat.

Structural rigidities

51.   Although the Czech labour market has weathered the economic crisis relatively well, especially when compared with other EU countries, the steep rise in youth unemployment and the persistently high long-term unemployment rate reveal important structural weaknesses. These include an increasing difficulty of vocational educational and training, the centrepiece of the Czech education system, to provide the skills set demanded by the labour market, and large geographical differences in labour market

performance. Also, mothers of young children face increasing difficulties in reconciling work and family life, spending large spells away from the labour market, with negative consequences in terms of skills deterioration, productivity losses and career paths. Addressing remaining pockets of inactivity is a pressing issue in the Czech Republic whose working age population has started to shrink since 2010 and is projected to substantially diminish by 2060, resulting in a significant rise in old-age dependency ratio (population older than 65 as a share of population 15-64), from 26% in 2015 to 55% in 2060. Therefore, tapping existing gaps in labour utilisation constitutes an increasingly urgent need, not only as a driver of economic growth but also to ensure the sustainability of the pension scheme, which has been largely dependent on the defined benefit pillar. Before moving into these issues, this section starts by offering an overview of labour market mismatches over time in the Czech Republic and comparing also the current situation with that of other OECD countries.

Measuring labour market mismatches

52.   Figure 21 shows the Beveridge curve for the Czech Republic using data for vacancies from the Ministry of Labour and Social Affairs and (un)employment figures from the monthly Labour Force Survey. The Beveridge curve displays the standard downward-sloping pattern, i.e. low unemployment and high vacancy rates at the peak of the business cycle in 2008. The highest unemployment rate in 2000 was caused by lagged effects of the Asian crisis resulting in a recession during 1997-98 and the transformation of the Czech economy at that time was coupled by a depressed vacancy rate. There is a notable shift of the Beveridge curve when comparing the 2003-07 and 2008-14. For a given vacancy rate, the unemployment rate in the post-2008 era is around 1½ to 2 percentage points smaller, suggesting an improvement in the matching process.[14] A possible source of such outcome could be the markedly increased churn following the 2009 crisis, which could have contributed to the efficiency of matching according to the Lazear and Spletzer (2012). Also, the added worker effect has likely contributed to the very small levels of vacancy rates during the 2012-2013 recession, as the labour supply was clearly elevated and households strived for additional income.

Figure 21.   The Beveridge curve
January 1995 to June 2014
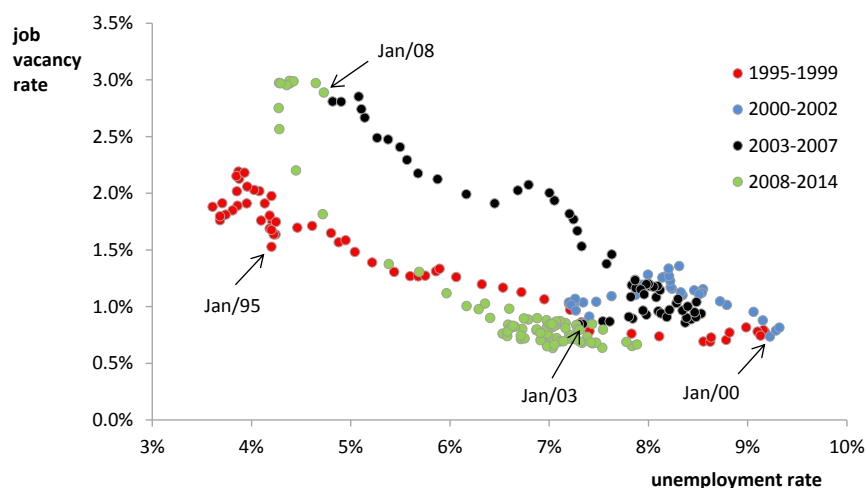
Source: Czech Statistical Office, Ministry of Labour and Social Affairs, own calculations

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14   From 2012, the obligation for employers to report vacancies to Labour Offices was changed to voluntary basis, so that their level can be somewhat understated.

53.   Looking in more detail at the relative structure of vacancies reveals that professions with relatively low embedded skills exhibit high unemployment to vacancy ratios (e.g. clerical support and elementary occupations), as opposed to those requiring tertiary education or more specific skills (e.g managers, professionals, technicians and machinery operators).

Figure 22.   Unemployed to vacancy ratios by occupations

Ratios of unemployed to appropriate vacancies, status as of 30 June 2014
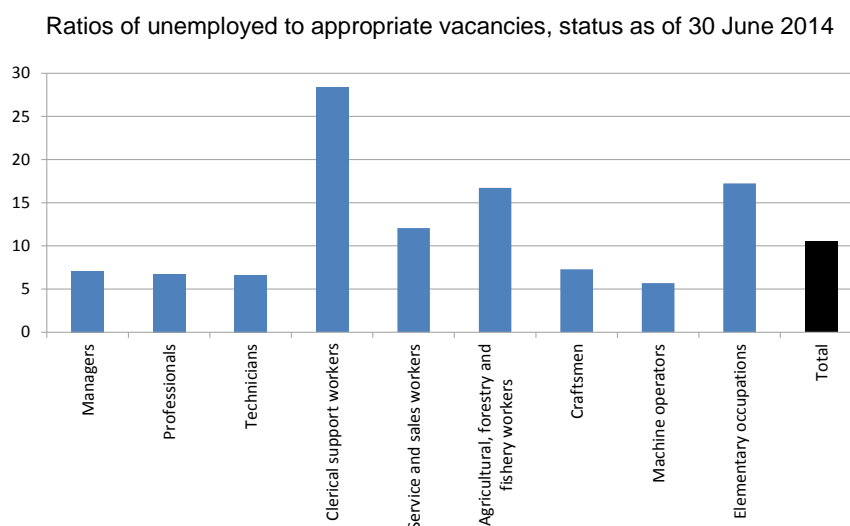
Source: Ministry of Labour and Social Affairs, own calculations.

54.   Figure 23 presents indicators of vertical (educational) and horizontal (occupation) mismatches as defined by Berkhout *et al.* (2012) using data for education and occupational structure of employment from Labour Force Surveys.[15] Vertical mismatches capture under- or over-qualification of persons at a given occupation, given a pre-defined optimal level of education for a particular occupation. Horizontal mismatches refer to whether or not a worker is employed in the field related to his or her field of study. Figure 23 shows that in 2009 the Czech Republic exhibited a rather small mismatch in terms of the structure of education, which seems to be rather persistent: a study by the OECD (2011) employing the same approach to 2005 data finds that the Czech Republic had third lowest proportion of over-qualified and the fifth lowest proportion of under-qualified workers across OECD countries. However, occupational mismatches are more severe, as 34% of workers were employed outside their original field of study in 2009.

55.   Workers' self-reported (dis)conformity of skills to work duties taken from the 2010 European Working Conditions Survey are in line with the findings of Berkhout *et al.* (2012): the Czech Republic's share of workers that reported a correspondence of skills to duties was above the EU OECD average (see Table A12 in the Annex). As regards occupational mismatches, there has been a significant drop in self-reported matching of high-skilled manual workers (skilled agricultural and forestry workers and craftsmen), whereas the high-skilled clerical workers (managers and professionals) exhibit a higher matching of skills to duties when compared to the EU OECD average.

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15.   See Quintini (2011) for a revision of existing techniques to detect education and occupational mismatches.

Figure 23.   Indicators of labour mismatches (2009)

Left panel: education mismatch; Right panel: occupational mismatch
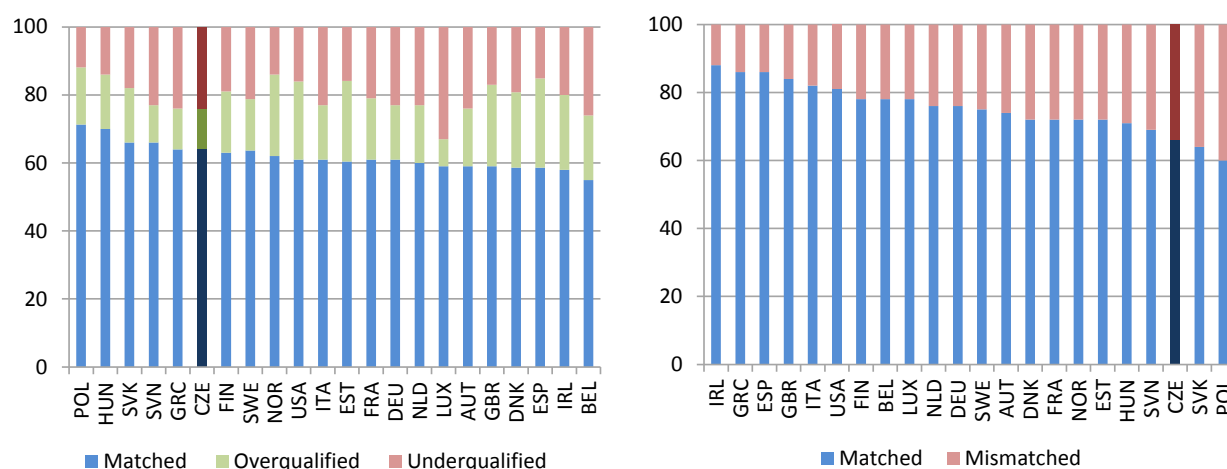
Source: Berkhout et al. (2012).

High unemployment and labour market mismatches among young workers

56.   The mainstay of the Czech labour market has traditionally been the pool of workers with vocational education and training (VET). As of 2012, 73% of persons aged 25-64 years old attained vocational education (OECD, 2014), while 73% of upper secondary students were attending vocational education programmes, the highest share among OECD countries and significantly above the average OECD average of 44%. Unemployment affects disproportionally those which have an apprenticeship degree, the lower track of VET (Table 1).[16] This differential emerges immediately after school leaving, Table 7 shows that the lower VET graduates have faced much higher unemployment than those having achieved higher curricula. Also, Table A13 in the Annex shows that there are substantial differences in unemployment ratios of graduates according to fields of study. Typically, graduates from technical subjects (machinery, electronics) enjoy much lower unemployment ratios than those from many service subjects (sales, catering and tourism). Yet, unemployment in some services has been typically very low, which is the case of healthcare. Nevertheless, the number of graduates in this field has dropped during the last year, which could be also the consequence of the necessity for tertiary education for nurses (Burdová and Vojtěch, 2013). It is clear that branches which are particularly vulnerable to the business cycle (e.g. construction) or leading to occupations in sectors which are shrinking due to structural change (e.g. textiles, metallurgy) exhibit particular high graduate unemployment ratios.

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16.   Apprenticeship education (ISCED 3C), the lower track of VET education, are typically three year programmes, ending with an apprenticeship certificate providing access to the labour market but not a direct transition to tertiary education, for which the apprentice graduate needs to take a two year follow-up course that leads to the *maturita* exam. Technical education, the higher track of VET, are typically four year vocational programmes leading to the *maturita* exam preparing the student either for the labour market or for tertiary education (Kuczera, 2010).

Table 7. Unemployment rates of graduates by type of education and branch of study

Percentage of persons who were unemployed within the year immediately following their graduation, values for April in the respective year

Type of education	Number of graduates (2012)	2006	2007	2008	2009	2010	2011	2012	2013
VET with a certificate	27,310	15.7%	10.5%	6.9%	13.4%	19.4%	18.7%	16.7%	27.4%
VET with certificate and maturita	5,524	14.0%	11.1%	7.5%	10.5%	17.0%	16.0%	12.4%	19.3%
Post-maturita education	3,727			8.0%	13.1%	21.7%	20.6%	17.6%	29.6%
VET with maturita	39,825	11.0%	7.8%	5.7%	7.8%	10.6%	11.4%	9.0%	14.8%
Gymnasia (i.e. with maturita)	23,888	4.4%	3.2%	2.5%	2.4%	3.0%	3.2%	3.1%	4.1%
Higher technical education	4,926	9.1%	6.6%	6.0%	6.8%	8.9%	9.4%	7.9%	11.9%

Source: Burdová and Vojtěch (2013).

57.   Students who complete their VET studies and do find a job are also facing significant labour market mismatches. A study by Trhlíková (2013) shows that more than half technical vocational training graduates – the higher track of VET (ISCED 3A) – work in a different branch than the one they have graduated in, although they had wished to remain in that branch at the end of their studies. The occupational mismatch among apprenticeship graduates (ISCED 3C) is slightly less severe, with 39% of graduates having reported to work in a different branch than the field of study. The most frequent reason for occupational mismatches among young graduates is the inability to find a job in the respective field of study (in 70% of cases), followed by the low pay in the respective field of study (42%). On the other hand, around one half of those working in a different field reported that their general knowledge was enough to master the job, whereas 20% reported that further training was needed.

Figure 24.   The occupation mismatch among secondary education school-leavers is severe

Match between fields of study and branch of work, 2012
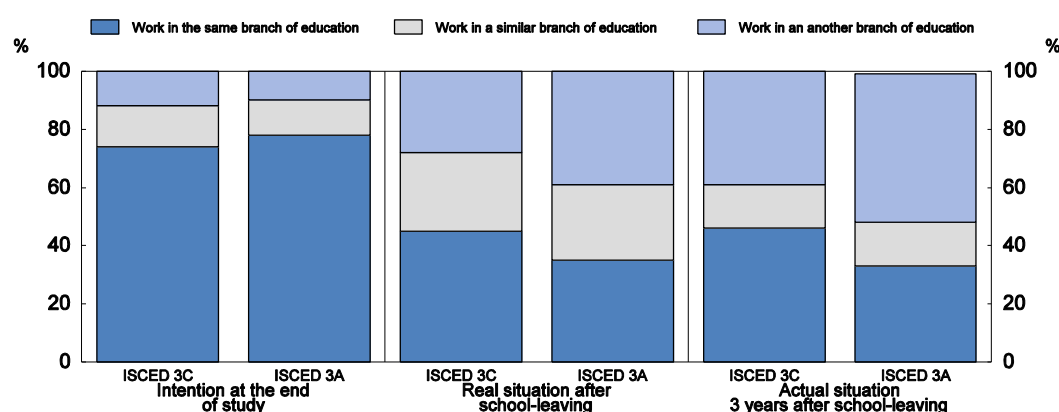
Source: Trhlíková (2013).

58.   Indeed, underskilling is another obstacle faced by young secondary education graduates. Comparing different editions of the European Working Conditions Survey reveals a worrying trend: while in the 2005 survey 16% of workers under 30 years old reported to lack appropriate skills to conduct their

job tasks, in the 2010 this figure had escalated to 28%, a share that is higher than EU OECD average in 2010 for this age group. Underskilling is particularly felt among graduates who opted for the apprenticeship track (Czesaná *et al,* 2007). Also, students in the apprenticeship track face a higher probability of dropping out of school before completing upper secondary education, leaving them in an extremely vulnerable situation in the labour market (Kuczera, 2010, Table 1).

59.　　　Furthermore, employers are also unsatisfied with both the composition and the instruction provided to VET graduates. A 2012 survey involving companies in industry revealed that entrepreneurs experienced a shortage of graduates in specific professions such as machine operators and construction workers and that 29% of them felt that graduates lacked both theoretical and practical skills to cope with their duties (Doležalová and Vojtěch, 2013). This outcome is likely to be the result of deterioration in the linkage between the VET education system and the labour market needs, including lack of workplace training and an inability of the education system to update vacancies in different fields and instruction to the changing needs of the labour market (OECD, 2014b).

Regional segmentation of the labour market

60.　　　The relatively benign aggregate outcome of the Czech labour market, with a low unemployment rate and increased labour market participation over the recent years masks large regional differences. Prague has been the traditional centre of economic activity, its regional GDP per capita (in PPPs) surpassing the EU-28 average by 71% in 2011, which in turn has translated into very low unemployment rates. However, labour market outcomes are quite different in other parts of the country. More specifically, unemployment, and long-term unemployment are persistently high in regions which have received low private investment and as consequence have not fully re-structured their economic base (see also Table A14 in the annex) and requalified their labour force (Ústecký, Karlovarský and Moravskoslezký). As a result, these laggard regions have had by far the lowest percentage of tertiary educated persons and a higher share of the population with just primary education. Given the high dependence of the level of education on the incidence of unemployment, different labour market outcomes of regions can be thus attributed to a great extent to the structure of population in terms of highest level of education attained. Furthermore, education differentials have been widening: the increase in tertiary educated persons in Prague is the highest among the Czech regions (from 22.1% in 2004 to 32% in 2013), whereas regions with lower shares experienced only minor increases. Additionally, relative labour demand in lagging regions is much lower when compared to the rest of the country, with unemployment to vacancy ratios ranging from 5.3 (Prague) to 25.7 (Moravia-Silesia) in 2013.

61.　　　It is not surprising that these differences then translate also to levels of long-term unemployment. This is demonstrated by Figure 27, regions with higher share of unemployment persons also tend to have higher proportion of long-term unemployed. This comes along with well-researched negative outcomes especially related to deterioration/lack of skills of such persons and other social and economic problems that further aggravate the situation in such regions.

Figure 25.   Regions with high unemployment also have higher long-term unemployment

Q3 2013, in percentages
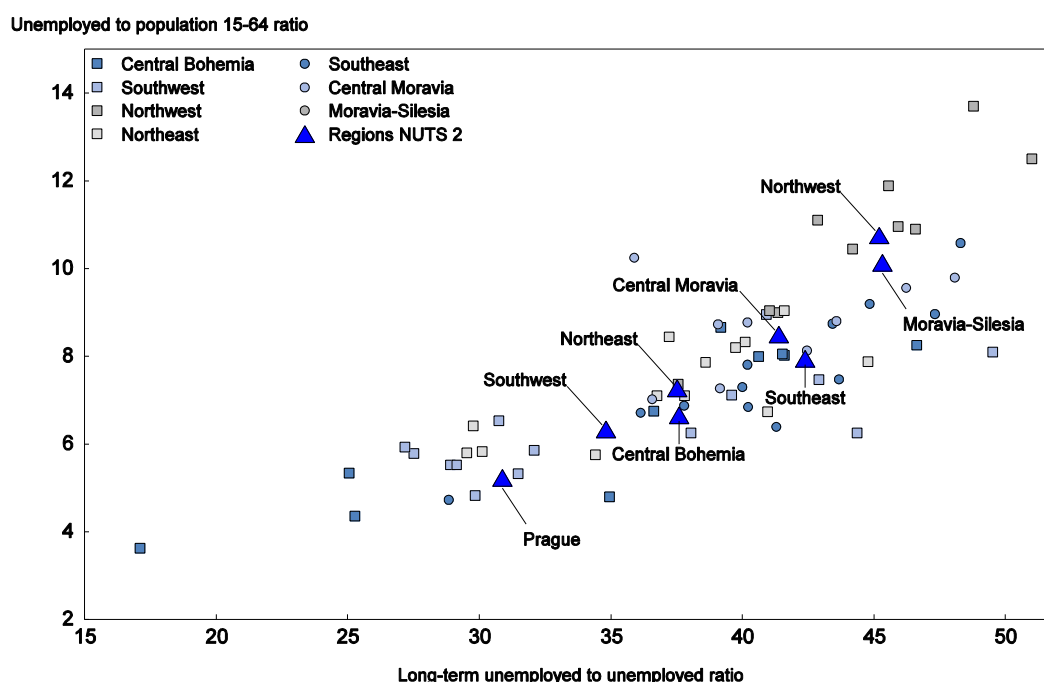
Source: Ministry of Labour and Social Affairs.

Figure 26.   There are sizeable and persistent differences in employment and unemployment rates across regions

Unemployment rate (y axis) and employment rate (x axis), NUTS 2 regions
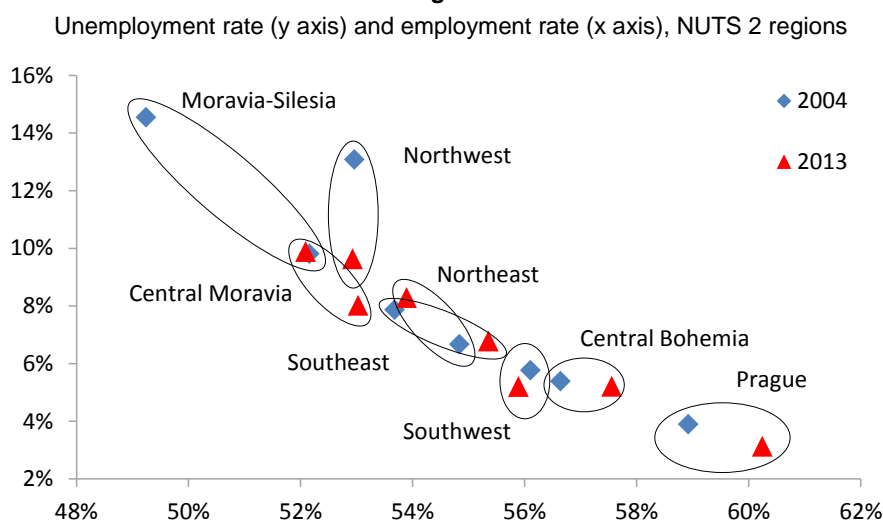
Source: Czech Statistical Office.

62.   Low mobility also hampers employability of low-skilled workers living in less dynamic areas. A prominent example of this phenomenon is the Prague region, where the unemployment to vacancy ratio for primary educated persons stood at 2.5 in June 2014, while the neighbouring Kladno region (distant of around 40 minutes by bus) had in turn 30.5 times more primary-educated unemployed than suitable

vacancies. The Czech Statistical Office (2014) found that mobility is associated with workers' education attainment: persons who attained primary or lower secondary education accounted for just 3% of all persons commuting for work purposes outside their home NUTS II region in 2013; whereas the share of workers with education up to ISCED 2 and permanent residence in the Czech Republic was 4.2%. A similar outcome emerges when comparing the share of commuting workers in elementary professions (2.9%) to their share in employment (5.6%).

63.   As discussed by OECD (2014), one of the underlying reasons why such persons are reluctant to take jobs even in close regions is that commuting costs may be too high for low-income earners. As an example, monthly public transport costs from Kladno to Praha amount to 7% of the minimum wage (as of 2014), compared with average passenger transportation spending by rail and road of 1.3% for all households, as measured in the 2013 Czech HICP basket. Indeed, a survey conducted by Sirovátka and Šimíková (2013) shows that employees at Labour Offices consider the lack of affordable transport services as one of the most important sources of structural unemployment.

64.   A rising problem in the Czech Republic is the growing number of socially excluded areas, which is further aggravated by the fact that they tend to be located in regions with already pressing unemployment problems. According to the report of the Office of the Government of the Czech Republic (2013), around 80-100 thousand persons were living in such areas in 2006 (roughly 1% of the country's population), the number of such areas increased roughly ¼ by 2012 according to official estimates.

65.   Roma people are disproportionally vulnerable in the labour market, a situation that is related to their poor education outcomes and the fact that they tend comprise the predominant group in socially excluded areas. A report by the Office of the Government of the Czech Republic (2013) finds that 70% of Roma living in socially excluded areas have at most completed elementary schooling (up to ISCED 2), the remainder 30% having completed upper secondary education (ISCED 3). No Roma answering the survey had attained tertiary education. This outcome is in sharp contrast with the non-Roma population living in these areas.

66.   A recent study by Rákoczyová, Šimíková and Trbola (2013) examined the situation in a socially excluded area in Frýdek-Místek (Moravia-Silesia region) found that around 77% of the self-reported Roma inhabitants were unemployed, while only 14% of non-Roma population living in this socially excluded area were unemployed. This is not an isolated case: another study by ICL Management (2013), conducted in socially excluded area in Dubí (Ústecký region) estimated that about two thirds of the surveyed inhabitants were Roma. 82% of persons in this locality attained just basic education, 63% of persons were (registered) unemployed and 13% employed. Moreover, most of surveyed Roma became discouraged from seeking regular work and those employed scratch a living on public works and temporary informal jobs. According to the direct interviews conducted by Rákoczyová *et al.* (2013), there are significant unemployment traps, as several social benefits are scrapped as soon as a person becomes employed.

Low employment of women at productive age

67.   There is a quite substantial potential for improving women labour outcomes. While increases in the statutory retirement age over the last decade boosted labour market participation of women over 55 years of age, the employment rate for the 60-64 age cohort still stood well below the OECD average in 2013 (Figure 28). This difference is likely to diminish with further yearly increases in the statutory retirement ages.[17] The lower employment rate of young women aged 15-24 relative to the OECD average

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17.   Statutory retirement ages are increasing from 1996 (at that time they were 60 years old for men and 55 years old for women with two children), with the aim of unifying retirement age for all persons at 67 years

relates to the particularly high participation in education and training (67% of this cohort in 2013 according to the Labour Force Survey). However, a worrisome trend is emerging for women 30-35 years old, whose employment rate decreased when compared to 2003 and is also lower than those aged 25-29.

Figure 27.   Improving employment rates of women aged 55 and more were offset

Employment rates of women, in percentage of the population
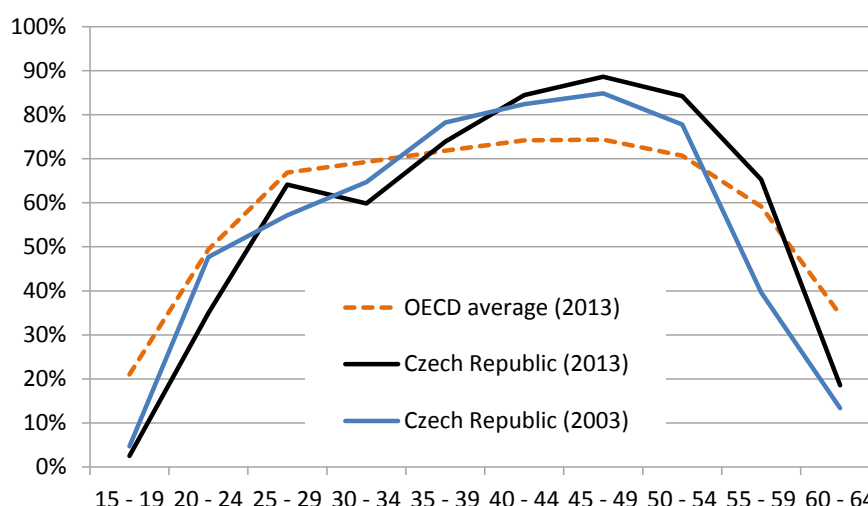
Source: OECD, Labour Force Statistics Database.

68.   Women's low employment rate in this age group is closely linked to increasing difficulties in reconciling work and care for children (the mean age for having the first child was 29.9 years in 2013). Indeed, the impact of motherhood on employment is very severe in the Czech Republic: women in the age group 20-49 with children up to 6 years old have an employment rate 40 percentage points lower than those without young children, one of the highest differentials among EU OECD countries (Figure 29). This is largely a consequence of the setup of childcare in the Czech Republic, which is based on longer parental leaves. Long parental leaves coincide with the second lowest enrolment rate in formal childcare under 3 years out of OECD countries (4% in 2010, as opposed to the OECD average of 32.6%). This situation affects mothers mostly as less than 3% of Czech fathers take parental leave (Moss, 2011).

69.   Indeed, formal day care for children less than 3 year old is almost inexistent: as documented by Paloncyová *et al.* (2013), there were 46 facilities for children up to 3 years old for the whole country in 2011 (with 1 425 places), as opposed to 1 043 facilities in 1990 (and 39 829 places). Furthermore, such facilities are typically limited to major cities and are virtually non-existent in smaller municipalities. Importantly, low supply coincides with low demand: Höhne *et al.* (2010) conducted a survey in 2006, which revealed that just 5.1% of families with young children preferred crèches as a childcare arrangement for those aged 2-3, and around half a percent of families with children younger than 2 years. Kuchařová *et al.* (2009) argue that low demand derives from a combination of long parental leaves and normative values in the society which lead to a mistrust of crèches and a stigmatisation of women who place their young children into institutionalised care.

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in 2044. This implies a relatively faster increase of statutory retirement ages for women (depending on the number of children).

Figure 28.   The impact of motherhood on employment is large

Difference between employment rates of women (20-49) with children up to 6 years old and without children, percentage points
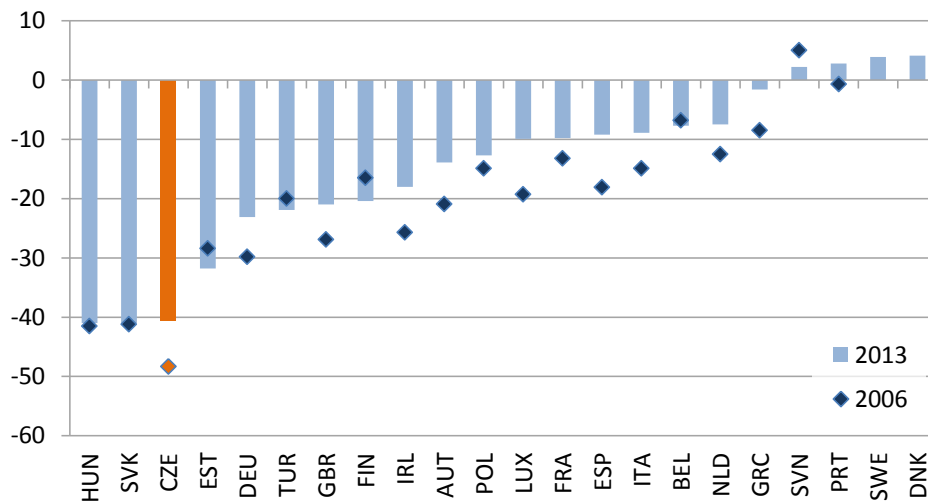
Source: Eurostat, own calculations. 2006 data for Sweden and Denmark were not available when the study was launched.

70.   Both supply and demand for kindergartens caring for children between 3 to 5 years old is significantly higher: with an enrolment rate of 78.9% (2010) close to the OECD average (80.9%). From the demand side, kindergartens enjoy a better reputation relative to crèches and in the study of Höhne *et al.* (2010) 66.3% of women consider kindergartens as the ideal arrangement for children of more than 4 years of age. Also, kindergartens fees tend to be very low or even non-existent, which further stimulates demand. Nevertheless, the rising number of children aged 3-6 in recent years was not accompanied by an adequate increase of places in kindergartens, which led to an increase in rejections for admissions in kindergartens from 4.6% in 2008 to 16.6% in 2014, further delaying mothers return to work (Figure 30). Capacity constraints tend to occur in larger cities, whereas some kindergartens in smaller municipalities are on the other hand faced with free capacities and related financial and operational difficulties (Paloncyová *et al.*, 2013). Solving capacity constraints can have a dramatic effect on employment of mothers of young children. Assuming that each woman needs to be inactive when looking after a child rejected by a kindergarten, ensuring full enrolment of these children would have reduced the employment impact of motherhood (or equally, increase employment rates of women with children up to 6 years) by 10 percentage points in 2013.

Figure 29. High rejection rates in kindergartens reflect capacity constraints
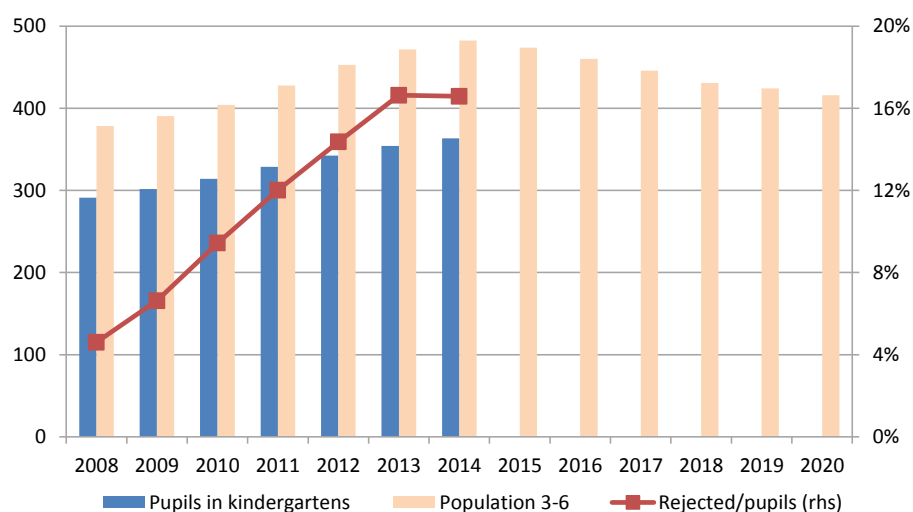
Source: Ministry of Education, Youth and Sports, demographic projection of the Czech Statistical Office (middle variant).

71. Labour participation of women is also hindered by the lack of proper flexibility of working arrangements. The Czech Republic has one of the most rigid informal arrangements for women aged 25-49 in terms of varying work time due to family reasons (Figure 32). Moreover, as discussed in the first section, the Czech Republic had the third lowest share of part-time jobs out of the OECD countries. Quite surprisingly, demand for such arrangements seems to be rather limited, as only 6.6% of women with young children would appreciate a part-time job (Höhne *et al*., 2010). Rather, they reported that the predominant means for achieving a better work-life balance would be a more extensive cooperation of their partners (47%), flexible working hours (13%) and a better understanding from employers (10%).

Figure 30. Women face challenges on the labour market also later in life

Gender unemployment rate differentials by age cohorts
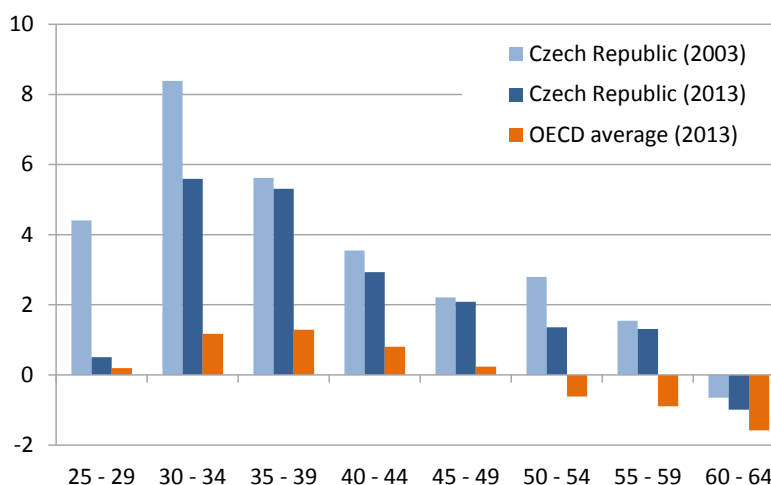
Note: Differences in gender unemployment rates are calculated as the difference between male and female unemployment rates in the relevant age groups.

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Figure 31.   Women aged 25-49 face rather stringent working time arrangements (2010)

Left panel: possibility to vary start and/or stop of the working day for family reasons

■ Generally possible   ■ Rarely or not possible
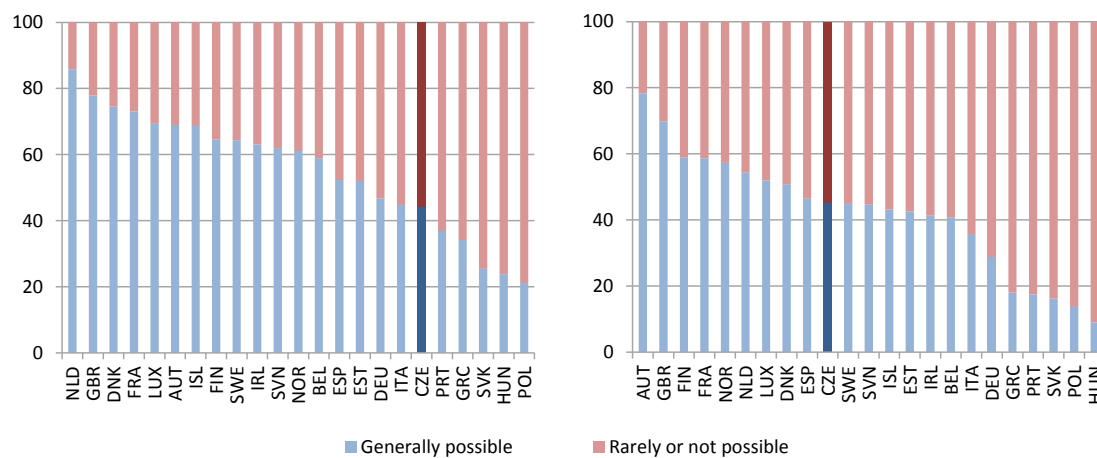
Source: Eurostat, ad hoc module *Reconciliation between work and family life*, own calculations.

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ANNEX

Table A1. Structure of employment of Czech regions by occupations

Share of total employment

	Czech Republic			Prague			Central Bohemia		
	1993	2003	2013	1993	2003	2013	1993	2003	2013
Managers	3.9%	5.2%	5.5%	**5.2%**	**7.0%**	**8.0%**	3.8%	**5.5%**	**6.7%**
Proffesionals, technicians	25.3%	28.2%	32.3%	**39.0%**	**44.4%**	**49.7%**	21.9%	23.8%	**32.4%**
Clerical support	7.9%	8.8%	9.6%	**11.8%**	**11.6%**	**12.1%**	7.3%	**9.3%**	**10.6%**
Service and sales	13.4%	15.5%	15.1%	**14.7%**	15.4%	12.9%	**14.0%**	**16.3%**	14.6%
Craftsmen, skilled workers	25.1%	21.4%	18.5%	14.8%	11.6%	9.7%	**26.7%**	20.9%	18.3%
Machine operators	14.8%	14.1%	13.0%	8.2%	5.8%	4.7%	**15.5%**	**15.3%**	12.4%
Elementary occupations	8.0%	6.2%	5.6%	5.6%	4.0%	3.0%	**9.2%**	**7.3%**	4.7%
Armed forces	1.5%	0.8%	0.3%	0.6%	0.2%	0.0%	**1.6%**	**1.5%**	0.3%
	Southwest			Northwest			Northeast		
	1993	2003	2013	1993	2003	2013	1993	2003	2013
Managers	3.9%	4.9%	5.1%	3.8%	4.2%	4.4%	**4.3%**	**5.4%**	5.5%
Proffesionals, technicians	24.1%	26.3%	29.8%	22.0%	22.4%	26.4%	23.2%	25.4%	29.4%
Clerical support	**8.0%**	8.2%	8.1%	**8.3%**	8.8%	8.3%	7.2%	8.2%	9.4%
Service and sales	13.3%	15.3%	14.1%	**14.2%**	**18.8%**	**17.9%**	13.3%	14.7%	14.8%
Craftsmen, skilled workers	**25.2%**	**22.8%**	**21.2%**	**26.3%**	20.8%	**20.4%**	27.6%	23.9%	19.5%
Machine operators	**15.0%**	**15.1%**	**16.0%**	15.2%	16.1%	15.4%	15.1%	14.8%	14.7%
Elementary occupations	8.0%	**6.6%**	5.0%	**9.0%**	**8.0%**	**7.0%**	8.0%	**6.8%**	6.5%
Armed forces	**2.5%**	0.7%	**0.7%**	1.2%	**0.9%**	0.3%	1.2%	0.7%	0.3%
	Southeast			Central Moravia			Moravia-Silesia		
	1993	2003	2013	1993	2003	2013	1993	2003	2013
Managers	3.8%	4.5%	5.2%	3.5%	5.2%	4.1%	3.0%	4.5%	4.6%
Proffesionals, technicians	**25.5%**	28.1%	**32.5%**	23.9%	25.5%	26.6%	22.4%	27.8%	28.8%
Clerical support	7.5%	8.5%	9.0%	7.0%	7.3%	9.5%	6.2%	8.0%	**9.8%**
Service and sales	12.5%	14.4%	15.0%	12.2%	14.6%	**16.0%**	13.4%	**15.6%**	**16.5%**
Craftsmen, skilled workers	**27.0%**	**23.5%**	19.7%	26.3%	24.0%	21.7%	26.6%	22.9%	18.8%
Machine operators	14.6%	**14.7%**	12.7%	**17.2%**	16.5%	14.2%	17.8%	14.9%	15.1%
Elementary occupations	7.6%	5.5%	5.6%	**8.3%**	6.1%	**7.1%**	8.8%	5.7%	**6.1%**
Armed forces	1.5%	0.8%	0.2%	1.5%	**0.9%**	**0.8%**	**1.7%**	0.5%	0.2%

Source: Czech Statistical Office, own calculations.

Figure A1. Own account workers and employees in the two selected sectors

Year-on-year changes, thousands of persons
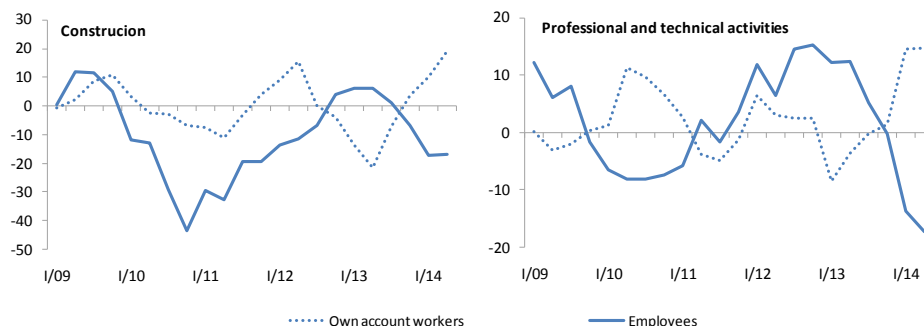
Source: Eurostat, own calculations.

Table A2. Wage structure in selected sectors (NACE)*

		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Agriculture, forestry	% of employees	4.2	3.8	3.5	3.5	3.1	3.1	2.9	2.8	2.6	2.6	2.6
	% of average wage	73.9	75.2	74	76.4	79	78.1	75.6	76.8	77.4	81.5	83.1
	CV of earnings	0.50	0.46	0.45	0.46	0.45	0.47	0.46	0.46	0.46	0.46	0.41
Manufacturing	% of employees	34.7	34.6	33.7	32.9	34.1	34.0	31.0	30.8	28.6	28.2	28.2
	% of average wage	94.5	94.2	93.7	93.9	93.5	94.3	92.4	93.9	96.9	98.4	99.7
	CV of earnings	0.73	0.71	0.70	0.77	0.72	0.79	0.93	0.82	0.76	0.76	0.73
Construction	% of employees	6.4	6.3	5.9	6.1	5.9	5.8	6.2	6.1	6.2	6.0	5.7
	% of average wage	100.3	101.4	101.1	100.8	99.9	101.5	102.4	100.9	92.2	91.7	90.6
	CV of earnings	0.76	0.78	0.82	0.87	0.76	0.81	1.22	1.04	0.85	0.85	0.68
Wholesale and retail	% of employees	7.7	8.9	9.7	11.0	11.9	11.9	11.5	11.2	13.0	13.2	13.0
	% of average wage	96.7	99	101.2	103.1	106.7	102.7	97.9	98.5	91.7	91.6	92.7
	CV of earnings	1.04	1.10	0.95	1.02	1.03	1.00	1.04	1.01	0.92	0.92	0.92
Transportation and storage	% of employees	8.7	8.2	7.7	7.9	7.6	7.6	7.0	6.9	6.6	6.5	6.5
	% of average wage	111.1	106.5	109.6	104.9	102.5	104.6	98.1	98.9	93.7	92.8	92.6
	CV of earnings	0.81	0.76	0.81	0.77	0.79	0.81	0.81	0.76	0.74	0.74	0.72
Financial intermediation	% of employees	2.3	2.3	2.1	2.1	2.0	2.0	2.2	2.3	1.9	1.9	2.0
	% of average wage	187.6	187.5	185.3	187.1	181.5	175.6	180.5	177	188.9	200.3	183.2
	CV of earnings	1.09	1.08	1.10	1.12	1.12	1.08	1.13	1.04	1.05	1.05	0.95
Public admin. and defence	% of employees	4.7	7.9	8.4	8.4	7.9	7.6	8.3	8.4	7.7	7.5	7.8
	% of average wage	105.6	107.9	110.6	108.4	106.3	103.3	105.7	104.5	107.7	105.3	104.5
	CV of earnings	0.40	0.36	0.37	0.39	0.38	0.40	0.41	0.40	0.40	0.40	0.42
Education	% of employees	8.2	7.2	7.2	7.0	6.7	6.6	7.1	7.2	6.5	6.9	7.0
	% of average wage	92.4	91.3	93.1	93.8	93.4	90	94.1	92.1	104.8	97.3	98.9
	CV of earnings	0.42	0.43	0.46	0.48	0.47	0.49	0.49	0.55	0.48	0.48	0.51
Healthcare	% of employees	7.3	5.9	6.4	6.3	5.7	5.8	6.0	6.5	7.0	7.1	7.1
	% of average wage	92.6	90.9	90.9	93.1	90.7	89.5	94.9	94.4	103	101.1	97.9
	CV of earnings	0.51	0.51	0.53	0.62	0.53	0.59	0.60	0.60	0.61	0.61	0.64
Total	**CV of earnings**	**0.79**	**0.79**	**0.78**	**0.83**	**0.83**	**0.86**	**0.97**	**0.88**	**0.82**	**0.82**	**0.80**

Source: Czech Statistical Office, own calculations.

Table A3. Wage structure by occupations*

		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Armed forces	% of employees	--	0.1	0.5	0.8	0.7	0.7	0.8	0.8	0.6	0.6	0.6
	% of average wage	--	--	--	--	100.7	99.8	99.3	99.0	102.2	96.8	95.2
	CV of earnings	--	--	--	--	0.40	0.38	0.39	0.38	0.40	0.40	0.39
Managers	% of employees	7.0	6.8	6.9	6.9	7.0	6.9	7.2	7.1	5.4	5.2	5.1
	% of average wage	205.3	204.5	201.1	204.5	201.5	208.2	211.9	206.7	215.1	223.3	216.2
	CV of earnings	1.00	1.05	1.00	1.11	1.10	1.14	1.31	1.19	1.10	1.10	1.03
Professionals	% of employees	12.5	13.2	12.8	12.8	12.8	13.1	13.9	14.2	14.3	14.6	14.5
	% of average wage	134.1	132.4	133.7	133.1	135.0	134.3	136.2	134.6	141.8	140.0	142.5
	CV of earnings	0.64	0.62	0.63	0.66	0.67	0.63	0.69	0.62	0.62	0.62	0.64
Technicians	% of employees	22.8	22.9	23.1	22.8	22.2	22.5	22.7	22.6	20.8	20.7	20.9
	% of average wage	106.5	107.8	109.1	109.7	109.4	108.5	107.7	108.4	110.6	110.1	110.2
	CV of earnings	0.53	0.48	0.50	0.51	0.54	0.52	0.51	0.50	0.52	0.52	0.52
Clerical support	% of employees	6.2	6.3	6.5	6.7	6.9	7.0	7.3	7.4	8.3	8.4	8.4
	% of average wage	80.5	80.0	80.7	80.6	80.5	80.1	79.0	79.4	86.3	86.4	85.8
	CV of earnings	0.43	0.41	0.44	0.45	0.45	0.41	0.41	0.41	0.46	0.46	0.44
Service and sales	% of employees	6.0	6.0	6.5	7.2	7.3	7.3	8.0	8.1	12.4	12.7	12.7
	% of average wage	65.2	63.1	63.3	63.5	63.0	61.7	61.2	60.6	62.9	62.9	63.2
	CV of earnings	0.43	0.43	0.50	0.42	0.42	0.42	0.43	0.43	0.47	0.47	0.45
Agriculture, forestry	% of employees	1.6	1.3	1.3	1.2	1.0	1.0	1.0	1.0	0.9	0.9	0.9
	% of average wage	61.8	63.7	62.5	66.2	68.6	67.4	65.9	66.1	67.0	72.0	72.7
	CV of earnings	0.27	0.29	0.28	0.30	0.31	0.32	0.31	0.30	0.30	0.30	0.27
Craftsmen	% of employees	19.7	19.6	18.7	18.2	18.0	17.6	16.3	15.9	15.6	15.5	15.0
	% of average wage	83.3	82.6	82.2	82.7	82.9	83.1	79.8	82.0	82.0	83.2	83.9
	CV of earnings	0.34	0.34	0.34	0.34	0.35	0.34	0.34	0.35	0.38	0.38	0.36
Machine operators	% of employees	17.1	17.0	16.9	16.8	17.6	17.4	16.4	16.4	15.8	15.6	16.0
	% of average wage	82.6	82.5	81.3	80.7	81.4	80.5	78.0	79.1	80.5	80.8	80.8
	CV of earnings	0.32	0.32	0.32	0.33	0.33	0.33	0.33	0.31	0.35	0.35	0.34
Elementary occupations	% of employees	7.0	6.7	6.8	6.6	6.6	6.6	6.5	6.6	5.8	5.8	5.8
	% of average wage	58.2	57.6	56.6	56.3	56.1	54.8	54.1	54.0	56.9	56.0	56.4
	CV of earnings	0.34	0.35	0.35	0.35	0.36	0.37	0.36	0.35	0.36	0.36	0.36
Total	**CV of earnings**	**0.79**	**0.79**	**0.78**	**0.83**	**0.83**	**0.86**	**0.97**	**0.88**	**0.82**	**0.82**	**0.80**

Source: Czech Statistical Office, own calculations.

Table A4. Unemployment to vacancies by occupations*

Differences between occupation-specific unemployment/vacancy ratios and the overall unemployment/vacancy ratio (bottom line), as of end June in the respective year

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Managers	4.2	4.2	6.0	4.2	2.4	1.9	2.0	7.6	7.6	6.4	3.4	4.6	7.1
Professionals	4.7	5.9	7.0	5.6	3.1	2.4	1.9	6.1	7.1	4.6	3.6	6.2	6.8
Technicians	7.1	8.8	8.7	7.2	3.9	2.5	2.0	6.5	6.7	6.7	4.1	5.1	6.6
Clerical support	20.7	27.7	25.6	19.7	9.1	6.2	5.3	26.9	31.8	24.8	21.1	24.3	28.4
Service and sales	10.8	15.5	17.5	15.8	9.2	4.8	3.5	14.8	22.4	20.7	14.5	16.7	12.1
Agriculture, forestry	7.7	7.4	7.8	7.0	6.6	4.2	3.0	11.3	23.0	25.3	18.1	28.3	16.7
Craftsmen	4.0	5.3	5.1	4.3	2.6	1.2	0.7	7.7	12.2	7.1	5.5	10.0	7.3
Machine operators	4.6	6.4	5.5	4.5	2.2	1.1	0.8	11.4	11.2	6.9	6.2	13.0	5.7
Elementary occupations	27.5	28.2	25.0	11.5	9.3	5.4	3.1	9.8	22.8	26.2	11.9	12.5	17.2
Armed forces	3.8	56.0	2.0	1.7	2.9	14.8	6.8	13.4	3.1	64.5	11.7	59.3	107.0
Total	**8.2**	**10.5**	**10.3**	**7.9**	**4.8**	**2.7**	**1.8**	**9.8**	**14.2**	**11.7**	**8.5**	**11.7**	**10.5**

Source: Ministry of Labour and Social Affairs, own calculations.

Table A5. Self-reported matching of skills to work placement

		2005			2010			difference (pps.)		
		Need further training to cope well with duties	Skills correspond well with duties	Skills to cope with more demanding duties	Need further training to cope well with duties	Skills correspond well with duties	Skills to cope with more demanding duties	Need further training to cope well with duties	Skills correspond well with duties	Skills to cope with more demanding duties
EU OECD average	under 30	15.9%	48,0%	36.1%	15.1%	50.1%	30.2%	-0.8	2.1	-5.9
	30 to 49	13.3%	53.8%	32.9%	12.3%	53.9%	29.3%	-1.1	0.0	-3.5
	50+	10.3%	58.2%	31.5%	9.5%	57.5%	28.4%	-0.8	-0.7	-3.0
	Total	**13.2%**	**53.5%**	**33.3%**	**12.1%**	**54,0%**	**29.3%**	**-1.1**	**0.5**	**-4.0**
Czech Republic	under 30	15.3%	61,0%	23.8%	27.6%	51.4%	21,0%	12.3	-9.6	-2.8
	30 to 49	11.4%	68.3%	20.4%	14.9%	61.1%	24,0%	3.5	-7.2	3.6
	50+	11.3%	65,0%	23.7%	12.9%	68,0%	19.1%	1.6	3.0	-4.6
	Total	**12.2%**	**65.8%**	**22,0%**	**16.4%**	**61.4%**	**22.2%**	**4.2**	**-4.4**	**0.2**

		2005			2010			difference (pps.)		
		Need further training to cope well with duties	Skills correspond well with duties	Skills to cope with more demanding duties	Need further training to cope well with duties	Skills correspond well with duties	Skills to cope with more demanding duties	Need further training to cope well with duties	Skills correspond well with duties	Skills to cope with more demanding duties
EU OECD average	High-skilled clerical	18.1%	51,0%	30.9%	16.8%	49.8%	29.3%	-1.3	-1.2	-1.6
	Low-skilled clerical	14.7%	51.4%	33.9%	14.1%	53,0%	28.8%	-0.6	1.6	-5.1
	High-skilled manual	11.8%	55.7%	32.5%	11.2%	56.7%	28.1%	-0.6	1.0	-4.4
	Low-skilled manual	7.7%	55.7%	36.6%	6.4%	59.7%	30,0%	-1.3	4.0	-6.6
	Total	**13.5%**	**53.2%**	**33.3%**	**12.7%**	**54.2%**	**29.1%**	**-0.8**	**1.0**	**-4.2**
Czech Republic	High-skilled clerical	19.4%	64.4%	16.3%	19.3%	59.7%	21,0%	-0.1	-4.7	4.7
	Low-skilled clerical	13.2%	61.5%	25.3%	21.9%	56.1%	22,0%	8.7	-5.4	-3.3
	High-skilled manual	7.3%	70.7%	22.1%	12.5%	59.4%	28,0%	5.2	-11.3	5.9
	Low-skilled manual	9.3%	69.1%	21.6%	6.3%	75.8%	17.9%	-3.0	6.7	-3.7
	Total	**12.1%**	**65.7%**	**22.2%**	**16.5%**	**61.4%**	**22.1%**	**4.4**	**-4.3**	**-0.1**

Source: European Working Conditions Survey (2010), own calculations.

Table A6. Unemployment ratios of graduates by type of education and branch of study

Unemployed graduates (left columns) and graduate unemployment ratios (right columns, the share of unemployed graduates to graduates in the last school year), April 2013

	VET with a certificate		VET with certificate and maturita		Post-maturita education		VET with maturita		Higher technical education	
Ecology							99	**21.8%**	5	**18.5%**
IT							303	10.2%		
Metallurgy	10	**37.0%**	7	**33.3%**			5	**18.5%**		
Machinery	1230	20.4%	145	12.1%	56	15.6%	333	13.2%	6	6.2%
Electronics, telecom.	453	20.0%	176	16.0%	48	20.6%	373	**17.3%**	38	**16.8%**
Technical chemistry	30	**51.7%**	9	**26.5%**			57	**15.3%**	4	**36.4%**
Food chemistry	423	**31.4%**					44	**24.3%**	2	**16.7%**
Textiles	50	**59.5%**	3	**33.3%**			45	**25.0%**		
Footware, plastics	10	**71.4%**					5	**20.0%**		
Wood processing	458	**29.2%**	18	**23.1%**	31	27.4%	31	**22.1%**	6	**23.1%**
Polygraphy	34	20.7%	56	17.7%			38	**18.1%**		
Construction	990	**33.4%**			28	28.3%	312	13.4%	7	**14.0%**
Transport	12	26.7%			26	25.7%	144	**16.7%**	8	**14.0%**
Special technical branches	27	27.0%	180	**22.7%**	21	**51.2%**	19	**16.5%**	17	**18.3%**
Agriculture, forestry	577	24.3%	1	7.7%	13	18.1%	319	**22.2%**	10	11.4%
Veterinary medicine							51	**17.3%**		
Healthcare	26	17.3%					244	11.0%	62	4.6%
Philosophy									3	**15.8%**
Economics, administration							1491	**16.8%**	114	**14.4%**
Entrepreneurship					733	**32.0%**			38	**17.3%**
Catering, tourism	1775	**30.5%**	67	**21.5%**	82	28.9%	541	**15.4%**	39	**12.4%**
Sales	522	**35.3%**	177	**26.5%**	44	**95.7%**	7	14.6%	3	11.5%
Law							318	**18.2%**	74	**20.5%**
Personal services	592	26.1%	192	**23.9%**	12	16.7%	4	10.3%		
Journalism, librarianship							28	**17.9%**	10	10.1%
Education	108	**36.7%**					290	**15.6%**	81	9.7%
General training							503	9.1%		
Art	46	18.2%	36	19.3%	4	28.6%	212	13.7%	56	**25.2%**
Total	**7483**	**27.4%**	**1068**	**19.3%**	**1105**	**29.6%**	**5895**	**14.8%**	**584**	**11.9%**

Source: Burdová and Vojtěch (2013).

Table A7. Structure of employment of Czech regions by sectors (NACE)

Share of total employment

	Czech Republic			Prague			Central Bohemia		
	1993	2003	2013	1993	2003	2013	1993	2003	2013
Agriculture	7.4%	4.3%	3.0%	0.4%	0.4%	0.3%	**8.4%**	**5.2%**	2.8%
Mining and quarrying	2.6%	1.1%	0.8%	0.1%	0.0%	0.0%	1.6%	0.2%	0.3%
Industry	31.2%	28.6%	28.2%	16.0%	11.6%	11.3%	**33.3%**	27.3%	25.5%
Construction	9.1%	9.7%	8.5%	**9.9%**	9.4%	**8.6%**	8.3%	9.6%	8.3%
Wholesale, retail	10.2%	13.0%	12.3%	**14.7%**	**16.3%**	**13.2%**	**10.5%**	12.7%	**13.4%**
IT, finance	3.3%	4.3%	5.6%	**7.4%**	**10.1%**	**13.7%**	2.9%	4.0%	**6.8%**
Other business services	18.0%	19.8%	21.8%	**30.6%**	**31.2%**	**32.0%**	16.8%	**22.8%**	**25.0%**
Public adm., education, healthcare	18.3%	19.3%	19.8%	**20.9%**	**21.0%**	**20.8%**	18.3%	18.5%	18.3%

	Southwest			Northwest			Northeast		
	1993	2003	2013	1993	2003	2013	1993	2003	2013
Agriculture	**11.6%**	**5.9%**	**4.7%**	5.5%	3.1%	2.6%	**7.8%**	**5.0%**	**3.7%**
Mining and quarrying	0.7%	0.2%	0.3%	**6.9%**	**3.6%**	**2.4%**	1.2%	0.5%	0.5%
Industry	28.9%	**31.0%**	**32.5%**	30.2%	26.4%	**28.5%**	**36.3%**	**33.6%**	**35.1%**
Construction	**10.1%**	**9.9%**	**9.4%**	**10.4%**	**10.8%**	**8.9%**	8.4%	9.7%	7.7%
Wholesale, retail	9.6%	12.2%	11.1%	10.1%	**14.3%**	12.2%	**10.3%**	12.5%	11.5%
IT, finance	2.7%	3.6%	3.4%	2.5%	3.1%	2.7%	3.1%	3.6%	4.2%
Other business services	16.3%	17.5%	19.7%	17.6%	**23.8%**	**24.9%**	15.2%	16.9%	18.1%
Public adm., education, healthcare	**20.1%**	**20.0%**	19.2%	16.8%	18.4%	**20.2%**	17.7%	18.7%	19.8%

	Southeast			Central Moravia			Moravia-Silesia		
	1993	2003	2013	1993	2003	2013	1993	2003	2013
Agriculture	**11.3%**	**6.2%**	**4.2%**	8.3%	5.1%	3.5%	4.5%	2.9%	2.1%
Mining and quarrying	1.3%	0.4%	0.4%	0.5%	0.4%	0.1%	**9.1%**	**4.5%**	**3.4%**
Industry	**32.3%**	**30.5%**	**29.8%**	38.2%	36.0%	34.1%	34.0%	31.6%	29.4%
Construction	8.3%	**9.8%**	8.4%	**9.2%**	9.6%	**9.5%**	8.2%	8.9%	7.6%
Wholesale, retail	8.5%	12.3%	11.4%	8.5%	12.0%	12.2%	9.8%	11.5%	**13.3%**
IT, finance	3.0%	3.6%	**5.8%**	2.3%	2.7%	3.0%	2.6%	3.1%	3.8%
Other business services	16.8%	18.1%	20.4%	14.7%	16.4%	17.0%	16.1%	**22.0%**	**24.4%**
Public adm., education, healthcare	**18.5%**	**19.5%**	**20.2%**	18.3%	18.1%	**20.6%**	15.8%	**19.9%**	19.3%

Source: Czech Statistical Office, own calculations.

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