
The 2008–2009 automotive industry crisis and regional unemployment in Central Europe

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This paper evaluates the influence of the broadly defined automotive industry on regional increases in unemployment in the Czech Republic (Czechia) during the 2008–2009 economic crisis. Drawing on a unique database of 490 firms with 20 or more employees each and a survey of 274 firms, we employ eight indicators to explain changes in the microregional unemployment rate between August 2008 and August 2009. We also introduce and calculate the value creation potential, employment stability potential and regional labour market vulnerability index for each firm and investigate the relationship between a firm's position in the value chain and its propensity to dismiss workers.

Keywords: automotive industry, regional unemployment, 2008–2009 economic crisis, Czechia (the Czech Republic)

JEL Classifications: J63, R12

Introduction

The passenger car industry in Central European (CE) countries (the Czech Republic (hereafter referred to as Czechia), Hungary, Poland, Slovakia and Slovenia) has grown rapidly since the mid-1990s (for example, Pavlínek, 2008; Pavlínek et al., 2009). As a result, the share of the automotive industry in overall employment, production and value added has significantly increased and, with the exception of Slovenia, the automotive industry has become one of the key manufacturing branches for all CE economies. As measured by the share of total manufacturing employment, Czechia had the highest portion of automotive component manufacturing (NACE 34.3) in the mid-2000s

(5.2% in 2005) and the third highest share (8.7% in 2007), after Germany and Sweden, in the narrowly defined automotive industry (NACE 34), among the European Union's 27 (EU27) countries (Eurostat, 2009).¹ This increased dependence of CE countries on the export-oriented automotive industry makes their economies more vulnerable in times of economic crises, during which consumer demand for passenger cars may dramatically decrease. Such vulnerability is compounded by the fact that the CE automotive industry is dominated by foreign transnational corporations (TNCs) and that its position in the European automotive value chain remains predominantly peripheral (for example, Pavlínek, 2002; Pavlínek et al., 2009). Foreign-owned

subsidiaries, at the lowest levels of the value chain, are most susceptible to the risk of closure during economic crises (for example, Bruinsma et al., 1998). This increases the potential risk of factory closures and relocations of production abroad in the CE automotive industry. The latest economic crisis has thus threatened a number of regions across CE with potentially large-scale layoffs because of their increased dependence on the predominantly foreign-owned automotive industry, which, in turn, is undermining their regional resilience (for example, Simmie and Martin, 2010).

Although the global production of passenger cars declined by 1.1% in 2008 and by 10.4% in 2009 (OICA, 2010), the Czech passenger car output increased by 0.9% in 2008, and by 3.2% in 2009, mainly because of a new Hyundai assembly plant launched in November 2008. Among Czech-based assemblers, Škoda Auto was the worst affected by the economic crisis in 2008 and 2009, with a production decline of 16.5% (by 102,901 units). The Toyota–Peugeot–Citroen Automotive’s (TPCA) output increased by 7.8% (by 24,011 units) and the Hyundai assembly plant produced 118,000 passenger cars in 2009, although the factory planned to produce 200,000 units in 2009, compared to 12,050 in 2008 and zero in 2007 (AIA, 2010). Another indicator of the extent of the automotive industry crisis in Czechia is the fact that during 2009 these three Czech-based producers assembled 383,000 passenger cars less than they had originally planned because the production targets were not met by Škoda Auto and Hyundai (HN, 2008).

The situation in various segments of the motor vehicle industry differed. For example, the production of heavy trucks increased globally by 10% and by 1% in the EU27 in 2008 before declining by 24% globally and by 63% in the EU27 in 2009 (OICA, 2010). In Czechia, it declined by 14% in 2008 and by 60% in 2009 (AIA, 2010). It suggests that the effects of the 2008–2009 economic crisis were not necessarily universal among Czech-based component suppliers. While truck suppliers, suppliers exporting their components to Western Europe and Škoda suppliers were likely to be most affected,

TPCA suppliers were not affected at all. The locations of these different groups of suppliers will therefore likely influence the regional effects of the crisis in the passenger car industry. Overall, the production of Czech-based automotive suppliers was expected to decline by 15% in 2009. As of September 2009, the Czech automotive industry as a whole had shed 19,000 jobs since summer 2008 and the 2009–2010 decline was projected to reach 26,000 jobs, including 10,000 temporary workers (HN, 2010).

This paper examines the regional effects of the 2008–2009 economic crisis in the Czech automotive industry, based on an analysis of the relationship between regional unemployment and the regional distribution of the automotive industry. We investigate whether regional concentrations of Czech-based automotive firms influenced regional changes in the unemployment rate between August 2008 and August 2009. Our analysis employs several concepts developed by the global production networks (GPN) perspective on regional development, such as value creation and value capture (Coe et al., 2004). Additionally, our approach is informed by the global value chains (GVC) analysis (Gereffi et al., 2005; Kaplinski, 2004; Sturgeon, 2001) and we consider the positions of firms in the automotive value chain to be an important factor in their propensity to dismiss or retain workers during economic crises.

We start with the discussion of extraregional factors in regional development. Second, we consider the factors of unemployment increase at the plant level. Third, we consider the role of institutional factors in regional unemployment during the 2008–2009 economic crisis. Fourth, we explain the data and methodology employed in our analysis of regional unemployment in the Czech automotive industry. Fifth, we classify Czech-based automotive firms and Czech microregions based on the plant-level empirical analysis of what we call regional labour market vulnerability. In the sixth section, we analyse the factors of regional unemployment increase between August 2008 and August 2009. Finally, we summarize basic findings in the conclusion.

Extraregional factors and regional development

Recently, there has been a gradual shift in thinking about regional development in economic geography. In the 1990s and early 2000s, the role of indigenous factors as driving forces of successful regional development was emphasized in the 'new regionalism' literature (Amin and Thrift, 1994; Florida, 1995; Morgan, 1997). Its overemphasis of indigenous factors and local institutions has been criticized for ignoring the importance of extraregional and translocal forces and their important role in understanding regional development dynamics (Lee, 2009; Yeung, 2009). The GPN perspective, as an alternative framework for thinking about regional development, emphasizes the role of extraregional forces in addition to indigenous factors (Coe et al., 2004; Henderson et al., 2002; Yeung, 2009). In particular, these extraregional forces are represented by TNCs and their production strategies, which increasingly shape the contemporary global economy 'for example' (Dicken, 2007). In the GPN perspective, the development of indigenous capabilities and assets is considered to be vital, but not sufficient, for a region to succeed in increasing international competition. Working through firms located in their territory, regions need to be incorporated into competitive GPNs organized by large lead firms. In order to be included in GPNs, regions must possess assets and capabilities that correspond with strategic needs of TNCs. The role of indigenous factors and regional/national institutional arrangements in developing such strategic assets is considered to be crucial. Successful regional development is thus the outcome of different forms of 'strategic coupling' between the regional assets and strategic needs of GPNs (Coe et al., 2004; Yeung, 2009).

The type of regional coupling and thus the position of firms in GPNs and value chains affect their abilities to produce, enhance and capture value from production, which is considered to be crucial for the prospects of economic development (Coe et al., 2004; Henderson et al., 2002). While this argument has been accepted and, to a certain extent,

developed theoretically and conceptually, GPN researchers, in our opinion, have struggled to empirically measure these processes in specific regions. A typical approach to investigate the processes and strategies of value production, enhancement and capture has been through firm-level interviews with key informants, which has yielded valuable case studies of successful regions and firms (Coe et al., 2004; Lee, 2009; Yeung, 2009). However, a limited sample of investigated firms and regions and, thus, a limited ability to generalize research results represent an obvious weakness of this approach. Therefore, in addition to qualitative approaches, at least simple quantitative methods should be developed to measure and evaluate the processes of value creation, enhancement and capture at the firm level, which, in combination with qualitative approaches, would better allow GPN researchers to evaluate these processes at the regional level, in specific regions and countries.

In this paper, we are specifically interested in changes in employment and unemployment in the Czech automotive industry during the 2008–2009 economic crisis. Over the past two decades, the Czech automotive industry has become dominated by global automotive lead firms that now own all Czech-based passenger car assembly plants and the majority of the most important component suppliers. Overall, more than a half of the component suppliers (55%) in the broadly defined automotive industry were foreign owned in 2006, 76% of capital stock was foreign-owned as of 2008 and foreign companies accounted for 71% of employment in firms with more than 20 employees (AIA, 2010; CSO, 2009). Based on the GPN and GVC perspectives, we assume that the position of automotive firms in GPNs and GVCs affects their economic vulnerability, which is, among other things, reflected in their propensity to layoff or retain workers during periodic economic crises. Similarly, we assume that firm ownership influences firm behaviour during economic crises. In other words, in addition to external markets and indigenous factors, other extraregional and transnational factors influence firm behaviour during economic crises.

Factors affecting unemployment increase at the plant level

Several adjustments have been common in the automotive industry in response to declining demand. First, temporary workers are laid off. Temporary workers have been used by Czech-based firms to increase their flexibility, in order to cope with surges in demand and with local labour shortages (for example, Pavlínek, 2008). Second, the working hours or working days of permanent employees are often reduced to prevent their being laid off.² Although the dismissal of permanent workers is considered to be a last resort strategy, the downsizing of production may result in large-scale layoffs of permanent workers. The most numerous job losses are associated with plant closures and relocations either within the same country or abroad (Coucke et al., 2005; Dicken, 2007), which, however, need to be understood as the outcomes of long path-dependent processes rather than discrete events (Clark and Wrigley, 1997; Pike, 2005).

Foreign or domestic ownership may influence the propensity of firms to lay off workers. In particular, foreign-owned firms tend to be more flexible than domestic firms (for example, Pennings and Sleuwaegen, 2000) and are more likely to engage in disinvestment than domestic companies (Henderson et al., 2002; Dicken, 1976). Thus, they are generally quicker to lay off redundant workers, when demand for their products declines. During an economic recession, TNCs tend to protect employment in their home country and attempt first to reduce labour costs in their foreign subsidiaries (Bruinsma et al., 1998). This is also because in comparison with core plants usually located in TNCs' home countries, offshore subsidiaries often combine a lower position in GPNs and GVCs with weak local supplier and customer linkages (Meijboom and Voordijk, 2003).

The position of firms in GPNs and GVCs and their role in the corporate hierarchy thus affects their propensity to resort to large-scale layoffs (for example, Brouwer, 2004). Since low-skilled and temporary workers are more likely to be laid off, during economic downturns, than highly skilled

and permanent workers (Pierrard and Sneessens, 2003), firms positioned at lower levels of value chains tend to be more vulnerable than those positioned at higher levels which possess strategic or knowledge-intensive non-production competencies and functions. Factories engaged in high value-added, highly skilled and high technology intensive production tend to be more resilient than those engaged in manual, low value-added assembly. Their specifically trained, experienced and highly skilled labour force cannot be easily or quickly replaced after being dismissed. High exit sunk costs (Clark and Wrigley, 1997) thus lower the likelihood of large-scale layoffs in or the relocations of such firms compared to those lacking non-production functions (Pennings and Sleuwaegen, 2000). Sunk costs are particularly high in the case of recent investments because they are less depreciated (Coucke et al., 2005). Combined with a firm's intangible investment, these recent investments lower the likelihood of factory closure or relocation (Caves and Porter, 1976). At the same time, however, a high amount of capital 'sunk' in fixed assets makes large recently built factories more vulnerable to closure during economic recessions because it lowers a firm's flexibility, limiting its ability to invest into new technologies and product innovations (Clark and Wrigley, 1997).

In our approach, we assume that a firm's propensity to resort to large-scale layoffs, during an economic recession, is strongly influenced by two basic factors examined in this paper. The first is what we call 'value creation potential' which refers to a firm's long-term competitiveness and its innovation capability. The second is what we call 'employment stability potential' which includes sunk costs, ownership type and employee skills. The assembly type of manufacturing and/or the low profitability of a particular firm contribute to its low value creation potential and potentially increase the risk of plant closure. We assume that unproductive and uncompetitive firms with low value creation potential are under greater pressure to dismiss workers during an economic crisis, which increases the risk of plant closures and relocations in regions, where such firms are located. High employment

stability potential reflects a low probability of downsizing and large-scale layoffs among competitive firms. The unemployment rate in regions with low employment stability potential is likely to be strongly influenced by decisions made by foreign owners outside a particular region. Such regions, characterized by a combination of low employment stability potential and medium/high value creation potential, are mostly threatened by factory downsizing and not necessarily by plant closures.

Institutional factors affecting regional unemployment during the 2008–2009 economic crisis

Any national or regional analysis of unemployment needs to be situated in the broader context of national and regional employment and labour market policies. The role of national governments has always been extremely important in the development of the automotive industry (Dicken, 2007). The 2008–2009 economic crisis further increased the importance of government intervention in the sector (for example, Sturgeon and Van Biesebroeck, 2009). In Europe, many governments offered help to the automotive industry, ranging from favourable loans, loan guarantees, wage subsidies and direct subsidies to various scrappage schemes. Most of these instruments were designed to prevent plant closures and massive layoffs. The Czech government, however, did not implement any such program. Nevertheless, Czech-based assemblers strongly benefited from scrappage schemes introduced in countries such as Germany, Slovakia, the United Kingdom, France and Italy in 2009.

In Czechia, as in other EU countries, we can recognize three most important institutional factors affecting firm behaviour, in terms of propensity to lay off workers: employment protection legislation (EPL), labour unions and an active labour policy. While the main goal of EPL and labour unions is to protect existing jobs by making it more difficult for firms to lay off workers, the goal of an active labour policy is to stimulate firms to create new jobs. However, in addition to job protection, EPL may foster dynamic efficiency gains by firms, by encour-

aging them to make their operations more productive, rather than relying on cost minimization. The nature of these three institutional factors significantly affects labour market flexibility and, therefore, the competitiveness of individual countries (for example, WEF, 2009).

The degree of Czech labour market regulation and its flexibility is average in the European context. Along with Hungary, Czech labour market regulation is lowest in Central and Eastern Europe (CEE) (Romih and Festic, 2008) but it is higher than in several west European countries, such as Denmark, the Netherlands, Ireland and the UK. In comparison with major European passenger car producing countries, such as Germany, France, Spain and Italy, the Czech labour market is more flexible (WEF, 2009). Permanent workers enjoy a relatively high level of job protection, especially compared with temporary workers. The costs of firing permanent workers are average compared with other European countries (2 months notice and 3 months of severance pay) (WEF, 2009). The acute shortage of skilled manufacturing workers in Czechia, which peaked in 2006 and 2007, forced companies to look for other ways to cut costs, such as the reduction of working hours or working days, rather than firing its skilled workers during the 2008–2009 crisis (2009 and 2010 company interviews). However, because the high social security and health insurance payments by firms for their employees might contribute to layoffs, especially in firms experiencing economic difficulties, the government introduced an option to make delayed social security and health insurance payments in 2009.

Union membership is significantly lower in Czechia compared with most western European countries and, especially, with the core countries of the European automotive industry, such as Germany and France (OECD, 2005). As in other CEE countries, the legitimacy of Czech labour unions was strongly undermined by their complete subordination to the Communist Party and their degradation to its ‘transmission belt’ at the workplace during the state socialist period before 1989. CEE trade unions were also weakened by other processes related to

the economic transformation of the past 20 years, such as the decline of heavy industry, the privatization and fragmentation of industry and a general increase in traditionally less unionized, service sector employment (Anspal and Vork, 2007). Czech labour unions became excessively fragmented in the 1990s, making it almost impossible for them to coordinate their activities. Despite these negative developments, Czech labour unions continue to be relatively strong in traditional industrial regions. However, peripheral regions, such as the area along the Czech—German border, are usually typified by weak or totally absent labour unions at workplaces, especially in greenfield, foreign-owned manufacturing facilities (2009 and 2010 company interviews). This situation makes it easier for automotive firms to resort to large-scale layoffs in peripheral regions than in traditional industrial regions of Czechia, making peripheral regions potentially more vulnerable during economic crises.

As in other CEE countries, the active labour policy of the Czech government has been plagued by insufficient financial resources, especially when compared with the EU-15 countries (Anspal and Vork, 2007). Nevertheless, the active labour policy has been a significant factor affecting job creation and job protection in Czechia. Its three most important components have included investment incentives for investors to create new jobs in the manufacturing industry, job training and retraining for unemployed workers and continuing worker training, financed from EU structural funds. The investment incentives and job training for unemployed workers have been focussed on regions, with above-average unemployment rates, in the form of subsidies for each newly created job and for each newly trained worker. These measures have been relatively successful in job creation and in lowering the regional unemployment rate in Czechia during the economic transformation. During the 2008–2009 economic crisis, the Czech government launched several active labour policy programs supporting job training and worker education. Overall, the active labour policy of the Czech government has concentrated on job creation rather than the prevention of job losses. In this re-

spect, it differed from some EU countries with a strong automotive industry, such as Germany, which made a greater effort to protect existing jobs during the 2008–2009 economic crisis.

Measuring value creation and employment stability potentials at the regional level

Our analysis draws on two databases of Czech-based automotive firms. The first database includes 490 plants, employing more than 20 workers each, in the broadly defined automotive industry. The collected data include the number of workers, financial indicators, such as value-added and wages, and R&D indicators for the years 2005, 2006 and 2007. This database is based on annual surveys of Czech-based firms by the Czech Statistical Office (CSO). The second database is based on a 2009 survey of 800 Czech-based automotive firms, with 20 or more employees each, conducted by the authors. This survey yielded a response rate of 34.6% (274 firms) and it provided firm-level data about ownership type, skills, the number of temporary workers and changes in employment in 2009.

To measure the value creation potential at the firm level, we employ three indicators: factor productivity, gross operating surplus in value added and R&D intensity. Factor productivity and R&D intensity reflect the long-term, knowledge-based competitiveness of a firm. Gross operating surplus in value added reflects a firm's short-term economic performance, thereby indicating the degree of a firm's vulnerability at times of economic crisis. To measure the employment stability potential, which reflects the probability of downsizing and large-scale layoffs at individual firms, we employ five quantitative indicators (ownership, capital intensity, wages and salaries, skills and temporary workers) (Table 1). We combine the value creation potential and the employment stability potential into what we call the 'regional labour market vulnerability index', which is an average of the value creation potential and the employment stability potential and which reflects the risk of large-scale

Table 1. Indicators of the increase in unemployment at the plant level.

Name	Definition	Value creation potential	Employment stability potential	Regional labour market vulnerability
Factor productivity	Average of gross value added per employee and gross value added per unit of tangible assets ^a	Yes	No	Yes
Gross operating surplus in value added	Share of gross operating surplus in value added (%)	Yes	No	Yes
R&D intensity	Share of R&D expenditures in value added (%)	Yes	No	Yes
Ownership	Share of domestic capital in company's capital stock (%)	No	Yes	Yes
Capital intensity	Tangible assets per employee (thousands CZK)	No	Yes	Yes
Wages and salaries	Wages and salaries per employee and month (CZK)	No	Yes	Yes
Skills	Share of employees with secondary education and three times employees with tertiary education in total employment (%)	No	Yes	Yes
Temporary workers	Share of temporary workers in total employment (%)	No	Yes	Yes

Yes and No show for which of the three indicators (value creation potential, employment stability potential and the regional labour market vulnerability) a particular measure from the first column was used.

^aSince the size units of labour and capital productivity are not comparable, we have calculated factor productivity in the form of an index relating labour and capital productivity to the value of the Czech automotive industry as a whole (=100).

Source: The authors.

layoffs, at the firm level, and their potentially negative effects on regional labour markets.

We use labour productivity, measured as value-added per employee, to evaluate a firm's embodied technological progress, long-term competitiveness, value-added creation and also its position in the value chain (Pavlínek and Ženka, 2010; Szalavetz, 2005). At the firm level, low values of labour productivity typically reflect the assembly type of production, which is often export oriented and based on imported materials. It also reflects the low skill content of production and the absence of higher value-added activities, such as R&D, design and marketing. However, the value of labour productivity is strongly influenced by the capital (or labour) intensity of production (Ženka, 2008). We have to combine labour productivity with other indicators because it cannot sufficiently describe a firm's competitiveness, the skill content of its production and its position in the value chain alone.

In order to eliminate a strong positive correlation between labour productivity and the capital intensity of production, we have used the so called 'factor productivity', defined as the average of the value-added per employee and the value-added per unit of tangible assets (buildings, machines and equipment). Factor productivity lowers the extremely high labour productivity of capital-intensive industries, while increasing labour productivity for labour-intensive industries and high-tech industries. It reflects the skill content of production and the presence or absence of higher value-added activities, thus reflecting a firm's competitiveness, value-added creation and also its position in the value chain (Pavlínek and Ženka, 2010). However, factor productivity can be distorted by the depreciation of physical capital stock and by large-scale layoffs (Szalavetz, 2005).

Similarly, value added as an indicator of a firm's long-term competitiveness and its value creation

potential can be distorted by high wages. Therefore, we have subtracted wages from value added to arrive at the so-called gross operating surplus, which we have used along with factor productivity. A high share of gross operating surplus in value added indicates a firm's ability to invest into new technologies and innovations and to cope with declining demand. A higher share of gross operating surplus in value-added results in lower personnel costs and, at least theoretically, in a lower propensity of a firm to engage in large-scale layoffs of its employees.

R&D intensity, which measures the share of R&D expenditures in value-added, is considered to be the most important indicator of the technology intensity of production (for example, Hatzichronoglou, 1997) as well as of a firm's innovation potential and its knowledge-based competitiveness. The existence of an R&D centre, within a firm, indicates its position in the value chain. R&D workers are generally less threatened by large-scale layoffs during economic recessions because of their high training costs, the importance of their accumulated tacit knowledge and the importance of continuity of R&D activities to the overall competitiveness of a particular firm.

The capital intensity of production (the capital-labour ratio) is the most important factor of a firm's sunk costs (Pennings and Sleuwaegen, 2000). We use the share of a firm's domestic ownership to measure its value capture potential and also its ability to independently decide about large-scale layoffs in its factories. Wages and salaries, skills and temporary workers reflect a firm's flexibility in hiring and firing its employees. Since skilled workers cannot be sold to another firm during a relocation or closure (Clark and Wrigley, 1995), a firm's investment in labour training increases its sunk costs. The qualification structure of the workforce is not necessarily related to the skill content of production because highly skilled workers can be employed in low value-added assembly. Therefore, we use the average monthly wages and salaries per employee to better understand the quality of a firm's labour force. High wages and salaries reflect labour productivity, the existence of higher value-added activities and the high skill content of production.

However, high average wages are not necessarily related to increases in labour productivity since they are influenced by regional differences in labour costs and can be distorted by high managerial wages.

Based on our two databases and the eight previously described indicators, we have classified all Czech-based automotive firms according to their value creation potential, employment stability potential and regional labour market vulnerability as follows. First, the eight indicators listed in Table 1 were calculated for each firm. Second, each indicator for every firm was compared to the national average of that particular indicator for the automotive industry, as a whole, and each firm was ranked on the following scale: highly below average (1 point), below average (2 points), average (3 points), above average (4 points) and highly above average (5 points). Third, the average values of the value creation potential, the employment stability potential and the regional labour market vulnerability index were calculated for each firm from the appropriate indicators listed in Table 1. Then, each firm was ranked according to each of these three indicators on the following scale: highly below average (1.00–1.49), below average (1.5–2.49), average (2.5–3.49), above average (3.50–4.49) and highly above average (4.50–5.00). Fourth, all firms were classified according to the value of their regional labour market vulnerability index.

The Czech automotive industry and regional labour markets

The broadly defined automotive industry is the most important Czech industry. It includes not only firms classified in NACE 34 but also firms classified in other industrial sectors and involved in the automotive value chain, such as companies from the machinery, iron and steel industry, rubber and plastic industries and the manufacturing of electrical equipment.³ Its share in total Czech manufacturing employment and output has been rapidly increasing and its total employment increased from 142,833 in 1998 to 232,819 in 2007. The manufacturing

industry, as a whole, lost 123,218 jobs (9.6% of the total) during the same period (see Pavlínek and Ženka, 2010, for details).

The regional distribution of automotive firms is very uneven in Czechia. Out of 206 microregions, 40.2% of total employment in the broadly defined automotive industry is concentrated in just 10 of them.⁴ We consider microregions that have more than double the national average or at least 10% of their workforce employed in the broadly defined

automotive industry to be overdependent on the automotive industry and thus economically vulnerable during cyclical automotive industry crises and general economic crises. Nearly one-quarter (51) of Czech microregions are, according to our definition, overdependent on the automotive industry. The highest degree of dependence was found in two types of locations. First are the traditional industrial centres that house large assembly plants and/or the headquarters of major automotive

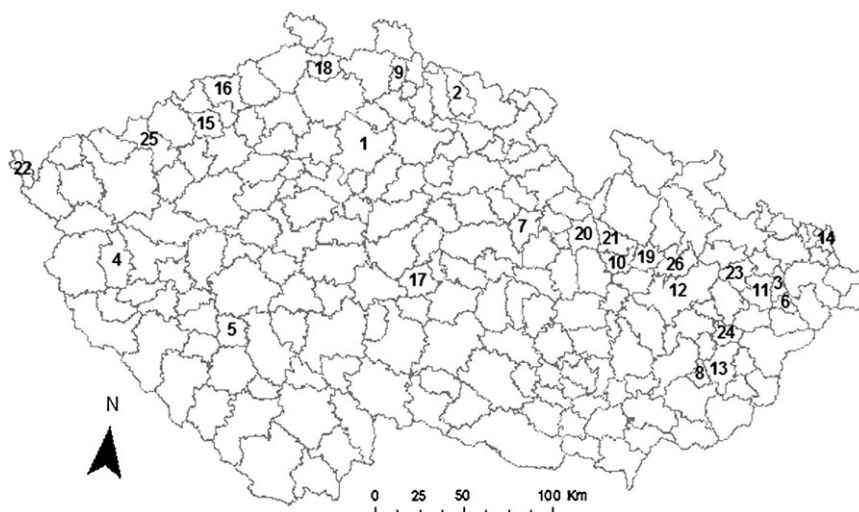


Figure 1. The location of microregions mentioned in the text.

Notes: 1 = Mladá Boleslav, 2 = Vrchlabí, 3 = Koprivnice, 4 = Stříbro, 5 = Blatná, 6 = Frenštát pod Radhoštěm, 7 = Vysoké Mýto, 8 = Otrokovice, 9 = Jablonec nad Nisou, 10 = Mohelnice, 11 = Nový Jičín, 12 = Olomouc, 13 = Zlín, 14 = Karviná, 15 = Most, 16 = Teplice, 17 = Světlá nad Sázavou, 18 = Nový Bor, 19 = Uničov, 20 = Lanškroun, 21 = Zábřeh, 22 = Aš, 23 = Odry, 24 = Bystrice pod Hostýnem, 25 = Kadaň and 26 = Šternberk.

Table 2. The distribution of Czech-based automotive firms by value creation potential class between 2005 and 2007 (the Czech automotive industry = 100).

Value creation potential	Number of firms			Employment	Turnover	Value added	Gross operating surplus	R&D expenditures	Wages and salaries ^a
	Domestic	Foreign	All						
Highly above average	6.5	6.6	6.5	22.0	42.8	39.4	55.3	72.6	26,705
Above average	18.7	31.6	24.7	30.9	28.0	33.9	41.6	20.1	22,121
Average	41.6	34.2	38.2	32.4	23.5	20.4	5.0	6.3	18,428
Below average	23.7	20.6	22.2	10.9	4.2	5.0	-1.0	1.0	17,625
Highly below average	9.5	7.0	8.4	3.8	1.5	1.3	-0.8	0.0	14,963
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	21,169

^aWages and salaries are the average values in CZK per month.

Source: Calculated by the authors from data in CSO (2009).

companies, such as Mladá Boleslav (Škoda Auto), Vrchlabí (Škoda Auto) and Kopřivnice (Tatra trucks) (see Figure 1 for the locations of specific microregions). Second are smaller cities, usually located in peripheral microregions that house large automotive component plants, such as Stříbro (AEE Czech Platinum Equity),⁵ Blatná (Dura Automotive) and Frenštát pod Radhoštěm (Siemens). These large component plants are typically the largest employers in their respective microregions, making them especially economically vulnerable at times of economic crisis, should these factories close or relocate.

Here, we present the classification of Czech-based automotive firms and Czech microregions, based on the plant-level empirical analysis of regional labour market vulnerability: value creation potential, employment stability potential and unemployment increase. The value creation potential among Czech-based automotive firms, between 2005 and 2007, was very unevenly distributed (Table 2); 153 firms with highly above-average and above-average value creation potential accounted for only 31.2% of the 490 firms. However, they accounted for 96.9% of the total gross operating surplus, 92.7%

of the total R&D expenditures and 52.9% of total automotive employment. It is interesting to note that Czech-owned firms accounted for one-half (16 of 32) of the total number of firms with highly above-average value creation potential. However, their share in overall employment was only 15.6% and in value-added only 12.2%, indicating a much smaller average size of domestic firms compared to foreign-owned firms.⁶ Firms classified in below-average and highly below-average value creation potential were typically medium-sized companies and more than half of them (59%) were domestic firms. These results show that both foreign and domestic firms are distributed in all classes of value creation potential. In other words, contrary to what one might expect, based on uncritical arguments about the CEE automotive industry, high value-added classes are not totally dominated by foreign firms and low value-added classes are not occupied only by domestic firms.

The distribution of employment stability potential among Czech-based automotive firms is also very uneven. The automotive industry is dominated by a small group of large foreign and domestic assembly and supply firms, with above-average

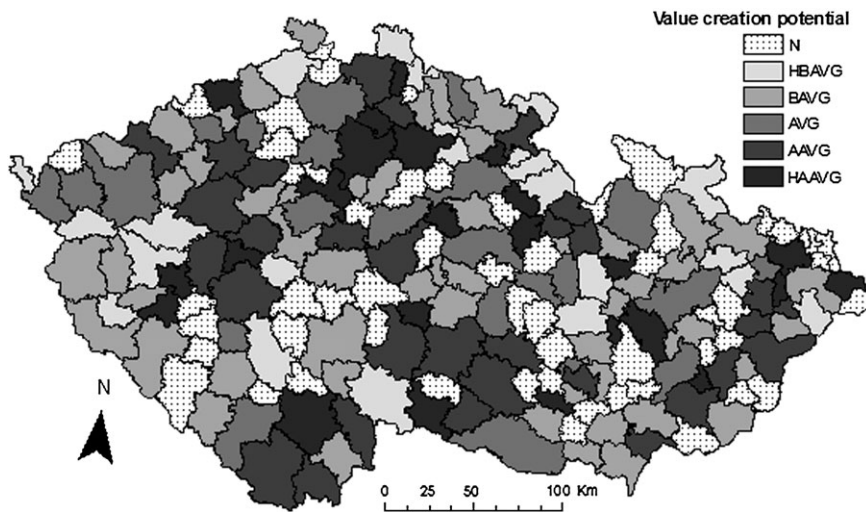


Figure 2. The regional distribution of value creation potential of the automotive firms by Czech microregion between 2005 and 2007. Notes: N, microregions with less than 100 employees in the automotive industry; HBAVG, highly below average; BAVG, below average; AVG, average; AAVG, above average; HAAVG, highly above average.

Source: Calculated by authors based on data from CSO (2009).

employment stability potential. Almost 90% of all firms have average and above-average employment stability potential, while only 6% of firms have below average and no firms have highly below-average employment stability potential. This suggests the relatively high skill level of the Czech automotive industry. It is also interesting to note that firms with below-average employment stability potential are primarily medium-sized foreign suppliers, specializing in low-skill and low-wage assembly of components.

In the next step, all Czech microregions that had more than 100 employees in the broadly defined automotive industry were classified according to value creation potential and employment stability potential. Generally, no clear-cut regional patterns can be identified because the Czech microregions are very heterogeneous. Figure 2 shows that automotive firms with highly above-average value creation potential were concentrated in only 10 out of the 206 microregions. These microregions can be divided into three types. First are those containing final assemblers and their headquarters, such as Mladá Boleslav (Škoda Auto passenger

cars), Vysoké Mýto (Iveco buses) and Kopřivnice (Tatra trucks). Second are those containing large component suppliers, such as Otrokovice (Barum Continental—tires) and Jablonec nad Nisou (TRW Lucas Varity—brakes). And third are those containing firms with R&D centres, such as Mohelnice (Hella Autotechnik—headlights) and Nový Jičín (Autopal Visteon—lighting and cooling systems). The same microregions have high employment stability potential and a low regional labour market vulnerability index because their regional distribution is strongly influenced by the distribution of value creation potential (Figure 3). The automotive firms with the lowest value creation potential are mainly small and medium-sized domestic firms, located in microregions with low employment in the automotive industry. Also, there is a noticeable concentration of below-average employment stability potential and an above-average labour market vulnerability index along the Czech–German border, especially in the Plzeň and Karlovy Vary NUTS3 regions. This concentration corresponds with the post-1990 distribution of cross-border, export-oriented foreign direct investment (FDI)

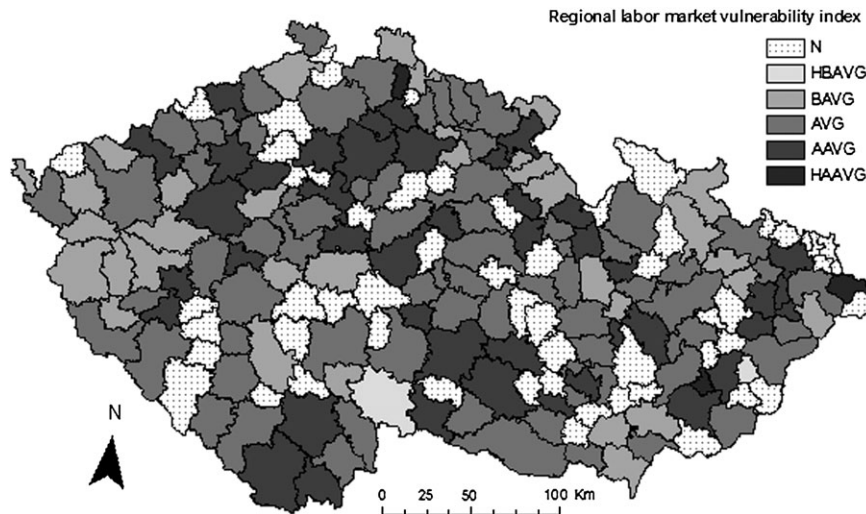


Figure 3. The regional labour market vulnerability index by Czech microregion between 2005 and 2007.

Notes: N, micro-regions with less than 100 employees in the automotive industry; HBAVG, highly below average; BAVG, below average; AVG, average; AAVG, above average; HAAVG, highly above average value creation potential; low values of the regional labour market vulnerability index indicate the biggest risk of unemployment increase.

Source: Calculated by authors based on data from CSO (2009).

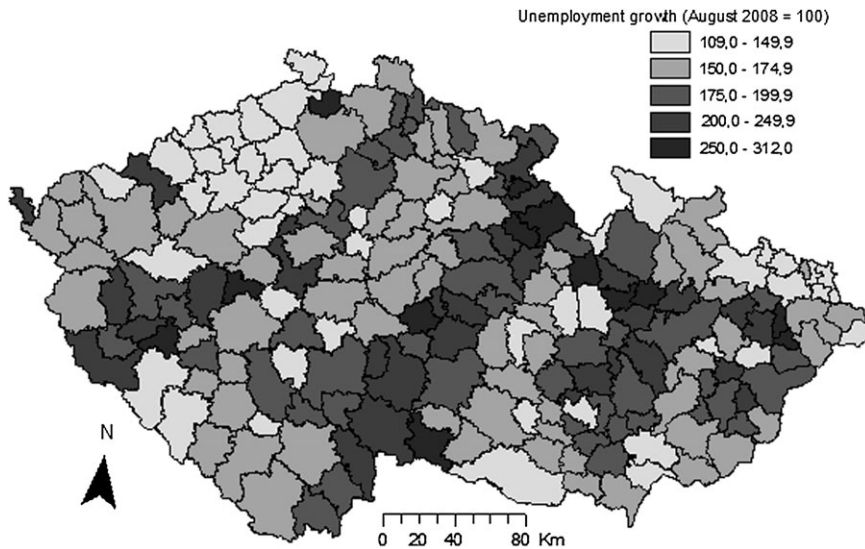


Figure 4. Regional distribution of the increase in unemployment by Czech microregion between August 2008 and August 2009. Source: Based on the data from MLSA (2009).

into simple assembly of automotive components, based on lower labour and production costs compared to Germany (see Pavlínek, 1998).

Factors of regional unemployment increase between August 2008 and August 2009

In order to eliminate seasonal influences, we have analysed increases in the regional unemployment rate between August 2008 and August 2009. Despite a rapid increase in the unemployment rate during this period, its regional distribution did not change significantly. Unemployment was low in metropolitan regions, such as Prague, major industrial centres, such as Mladá Boleslav, and in the southwest (NUTS2) region of Czechia. The regions of traditional and heavy industries in the northwest, Moravia-Silesia and central Moravia, which declined after 1989, were typified by above-average unemployment rates.

However, during the economic crisis between August 2008 and August 2009, the unemployment rate increased most rapidly in the peripheral and rural areas of southwest, northeast and central

Moravia (Figure 4), which had generally low unemployment rates in 2008. Within these three NUTS2 regions, more developed metropolitan areas with a higher skilled and better educated labour force and regional universities, such as the Olomouc and Zlín regions, experienced a more rapid increase in the unemployment rate than microregions with high concentrations of declining mining and heavy industries, such as the Karviná, Most and Teplice regions (Lavický, 2009).

At the microregional level, there was only a weak correlation (0.336, significance 0.01) between the overall unemployment increase, from August 2008 to August 2009, and the share of the automotive industry in total employment. In other words, regional variations in the unemployment rate could not be sufficiently explained by the degree of regional specialization in the automotive industry. This finding suggests that the crisis, and its resultant job losses in the automotive industry, played only a minor role in the overall changes in the Czech unemployment rate because there were significant job losses in other sectors of the Czech economy, which were overall more important than job losses in the automotive industry. Not surprisingly, the

correlation between the overall increase in unemployment and the value creation potential of the automotive industry was even weaker (0.170, significance 0.05). Therefore, instead of focussing on the effects of the automotive industry on the overall increase in unemployment, we have analysed the effects of value creation potential and employment stability potential of the automotive industry on large-scale layoffs only in the automotive industry. Unfortunately, precise data about job losses in the automotive industry are not available. Therefore, based on our survey of 274 Czech-based automotive firms, conducted in Fall 2009, we have estimated the effect of job losses in the automotive industry on the overall increase in unemployment in Czechia in 2009.⁷ The surveyed firms shed 9175 permanent workers, which represented 10.6% of their total employment of 86,581 workers during the past 12 months.⁸ Provided that the broadly defined Czech automotive industry shed 10.6% or 23,843 workers⁹ and that the number of unemployed in Czechia increased by 181,623 (62%) between August 2008 and August 2009, the share of job losses in the broadly defined automotive industry in total unemployment increase in Czechia is 13.1%.

To analyse the regional distribution of the unemployment rate during the 2008–2009 economic crisis, we have first identified microregions affected by the largest increases in the unemployment rate and then we have collected available information concerning large-scale layoffs in automotive firms located in these regions. The largest increases in the unemployment rate were found in four types of Czech microregions. First were the smaller centres of traditional industries specialized in medium- and low-tech industries, such as Světlá nad Sázavou and Nový Bor, specializing in the glass industry.¹⁰ Second were the traditional centres of the automotive industry, including both the vehicle assembly, such as Kopřivnice, Mladá Boleslav and Vysoké Mýto, and the production of automotive components, such as Mohelnice and Nový Jičín. Third were the microregions specializing in various medium- and high-tech industries, such as Šternberk, specializing in the armaments industry, and Lanškroun, specializing in the production of high-tech tantal capaci-

Table 3. The share of dismissed workers from automotive firms in total automotive employment (in %) by the category of microregions between August 2008 and August 2009.

Category of microregions	Value creation potential	Employment stability potential	Regional labour market vulnerability
Highly above average	13.0	0	15.1
Above average	13.7	12.8	13.3
Average	14.6	14.3	14.4
Below average	12.6	13.8	13.8
Highly below average	15.5	0	0
Total	13.8	13.8	13.8

Notes: Because of the lack of available data the employment was calculated as an average number of employees between 2005 and 2007. The number of dismissed workers refers to the period between August 2008 and August 2009.

Source: Based on the data from MLSA (2009) and authors' 2009 survey of 274 Czech-based automotive firms with 20 and more employees.

tors. Fourth were the peripheral microregions along the border with Germany and Austria, such as Aš and Stříbro, which received large volumes of cross-border, export-oriented FDI into low-skilled, low-wage manual assembly after 1990.

Job losses were universal across the entire automotive industry during the 2008–2009 economic crisis. The position of firms in the value chain did not significantly influence the extent of these job losses (Table 3). Microregions with below-average value creation and employment stability potentials did not record a significantly higher unemployment rate than microregions with above-average value creation and employment stability potentials. Thus, our assumption about the relationship between a firm's position in the automotive value chain, reflected in its value creation and employment stability potentials, and its risk of job losses was not confirmed. As a matter of fact, the most extensive job losses were recorded among firms with above-average value creation potential and average employment stability potential. These firms included the largest foreign-owned automotive suppliers and assemblers, which accounted for 39.5% of the total number of dismissed workers between August 2008 and August 2009. We are aware that this non-significant relationship between a firm's position in

the value chain and its propensity to shed employees was probably strongly affected by the short study period and the small sample size.

Since regional labour markets are especially affected by bankruptcies, plant closures and relocations, resulting in permanent job losses, we have also analysed whether there is a relationship between the position of firms in the automotive value chain and the number of bankruptcies, plant closures and relocations, and related job losses. There were 17 bankruptcies and/or plant closures and only one relocation abroad in the Czech automotive industry in 2008 and 2009.¹¹ Bankruptcies and plant closures affected automotive firms in different positions in the value chain. Our assumption that the automotive firms with highly below-average value creation and employment stability potentials would be more vulnerable than those specializing in higher value-added activities was not confirmed. However, our analysis shows that the majority of bankruptcies took place among firms specializing in the low-wage, labour intensive and low value-added assembly of simple components, such as wire harnesses, seat covers and head restraints. Although the economic crisis was not over in the automotive industry at the end of 2009, the relatively small number of bankruptcies, closures and relocations in 2008 and 2009 suggests that Czech-based automotive firms may be less vulnerable to bankruptcies, closures and relocations abroad than generally expected.

Conclusion

Local manifestations of global economic changes may be quite dramatic. In the process of capitalist development, entire industries may become uncompetitive and obsolete as capital switches to new economic activities and locations in its search for the most productive investment returns. In such situations, which are more likely to be triggered by major economic crises, regions that host such industries may face major restructuring. The overdependence of a particular region or country on a single economic sector or industry thus increases the likelihood of such a scenario. We have shown

that the dependence of the Czech economy on the automotive industry increased significantly during the past decade. Therefore, the goal of this paper was to empirically evaluate whether the 2008–2009 economic crisis in the Czech automotive industry translated into regional economic problems in the form of significant increases in regional unemployment. Additionally, drawing on the GPN and GVC approaches, we have empirically tested our assumption that there were important differences in the extent of job losses based on a firm's position in the automotive value chain and, consequently, that microregions hosting firms, positioned at the bottom of the value chain, were more threatened by large-scale layoffs than those hosting better positioned firms during the economic crisis. In order to test this assumption, we have introduced three new indicators to evaluate each firm: value creation potential, employment stability potential and the regional labour market vulnerability index.

The statistical analysis of plant-level data and the results of our plant-level questionnaire allow us to draw several important conclusions. First, the employment effects of the 2008–2009 automotive industry crisis were significant. The broadly defined Czech automotive industry shed approximately 10% of its permanent workers (24,000) between August 2008 and August 2009, representing 13% of the total number of dismissed workers in the Czech economy as a whole. Compared with a 5.2% share of the broadly defined automotive industry in total Czech employment, the automotive industry was more seriously affected by layoffs than the rest of the Czech economy. The vast majority of automotive firms shed workers because of downsizing and not because of plant closures and relocations, suggesting relatively strong ties of automotive firms to their existing production locations in Czechia and the continuing competitiveness of Czech-based automotive firms. In other words, both domestic and foreign automotive companies are relatively strongly embedded in Czechia. This conclusion parallels the findings of Domański and Gwosdz (2009) concerning the Polish automotive industry. It also supports the argument of Pavlínek et al. (2009) who contended, before the crisis, that

the threat of large-scale relocations of automotive firms from CE to cheaper locations was relatively low because of their increased embeddedness in CE. This situation would also suggest that many job losses experienced in the automotive industry during the 2008–2009 crisis might be only temporary. It would be unrealistic to suggest any short-term measures, such as wage subsidies, to protect existing jobs in the Czech automotive industry, given the limited financial means of the Czech government and its overall distaste for such policies. However, to maintain and increase labour force skills, the government should rebuild the system of vocational training, which disintegrated after 1990.

Second, the rapid post-1990 development of the automotive industry, as a whole, and its 2008–2009 crisis did not significantly alter the long-term regional distribution of unemployment in Czechia. Although the degree of regional specialization in the automotive industry can statistically explain only 10% of regional variation in the unemployment increase between August 2008 and August 2009, the automotive industry was most responsible out of all manufacturing industries for the increase in regional unemployment. Traditional centres of the automotive industry and peripheral microregions along the German and Austrian borders were especially affected by large-scale layoffs in the automotive industry during this period.

Third, our plant-level analysis of value creation potential showed that both the domestic and foreign firms occupy all value creation classes, although there are very significant differences in basic characteristics between foreign and domestic firms, such as average size, turnover and R&D employment (see Pavlínek and Ženka, 2010 for details). This result is in line with recent findings from Poland (Domański and Gwosdz, 2009) and Czechia (Pavlínek and Janák, 2007). It challenges the views of a simple dichotomy in the CEE automotive supplier industry, in which foreign firms exclusively occupy higher tiers in the supplier hierarchy, typified by high value-added production, while domestic firms are found exclusively in the lowest tiers, typified by low value-added production (for example, Rugraff, 2010).

Finally, we did not find any significant relationship between a firm's position in the value chain and its propensity to shed employees, go bankrupt or relocate abroad. Firms with above-average and below-average value creation and employment stability potentials were similarly affected by large-scale layoffs. We have argued that the most feasible explanation for this situation is the fact that the Czech automotive industry has been affected by the economic crisis as a whole, regardless of firm position in the value chain. Another reason might be the short study period and the fact that our analysis focussed on the immediate, short-term consequences of the economic crisis since the long-term consequences are not known yet. Despite this result, we are convinced that the analytical approaches to the study of employment and unemployment, based upon the GPN and GVC perspectives, represent an important contribution to traditional sectoral analyses of employment and unemployment, especially in increasingly globalized industries, such as the automotive industry.

Endnotes

¹ To ensure data compatibility in time series, we are using the classification of industrial sectors based on the NACE 1.1 revision.

² For example, Škoda Auto reduced the number of working days to four and Hyundai to only three per week in their Czech assembly plants in early 2009. The information is also based upon 20 company interviews conducted by the authors with Czech-based component suppliers between December 2009 and March 2010.

³ However, we are aware that this figure overstates actual employment in the automotive value chain since automotive suppliers are, in many cases, devoting only part of their production to automotive components. Unfortunately, precise data reflecting their degree of involvement in the automotive industry are not available.

⁴ These are not functional regions, but the lowest level administrative regions called municipalities with expanded jurisdiction.

⁵ AEE Czech Platinum Equity lay off almost 1400 workers between August 2008 and August 2009 (ERM 2009).

⁶ Henceforth, domestic-owned firms are referred to as domestic and foreign-owned firms as foreign.

⁷ One hundred and seventy-one firms provided information about the number of dismissed workers in the past 12 months.

⁸ Additionally, 2822 temporary workers were laid off in the surveyed companies during this period (2009 authors' survey).

⁹ Based on the same reasoning, our estimate for the total number of temporary workers laid off in the Czech automotive industry between August 2008 and August 2009 is 7588.

¹⁰ Světlá nad Sázavou experienced the largest increase in the unemployment rate among all Czech microregions. Uničov, specialized in the metallurgy industry, had the highest unemployment rate in Czechia in August 2009 (20.6%).

¹¹ The only relocation involved Alcoa Fujikura, a manufacturer of wires and cables, which relocated its plant from Střebro to Romania to lower labour costs in 2009 (ERM 2009).

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