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Restructuring and internationalization of the European automotive industry

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Abstract

This article draws on Harvey's theory of uneven development and spatio-temporal fix to conceptualize the changing geography of the European automotive industry based on the spatial profit-seeking strategies of automotive firms. It employs the spatial concept of integrated peripheries, in order to explain the growth of the automotive industry in peripheral regions and its contemporaneous restructuring in existing locations. The empirical analysis is based on 2124 restructuring events of large automotive industry firms in the European Union countries and Norway between 2005 and 2016, and on 91 interviews with foreign automotive industry subsidiaries conducted in Czechia and Slovakia between 2009 and 2015. Large differences in labor costs and other production costs across the European Union explain the growth in the East European integrated periphery and simultaneous restructuring in both traditional core regions and old integrated peripheries in Western Europe. The empirical analysis also confirmed the increasing internationalization and the decreasing role played by large domestic firms in the European automotive industry.

Keywords: Automotive industry, Europe, spatio-temporal fix, integrated periphery, job creation, job loss
JEL classifications: L62, F23
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1. Introduction

Although the automotive industry is one of the most globalized industries (Dicken, 2015) because of the presence and production of large assemblers and leading (global) suppliers in all major markets, its geographic structure is based on functionally integrated macro-regional production networks and regional or local clusters of production (Frigant and Lung, 2002; Carrillo et al., 2004; Sturgeon et al., 2008). The main advantage of macro-regional integration is the more efficient territorial division of labor through macro-regional specialization, which allows for greater scale economies (Freyssenet and Lung, 2004). Free trade and reduced transportation costs allow firms to better exploit the uneven distribution of factors of production and socially constructed endowments through the more fine-grained territorial division of labor, which leads to greater territorial specialization (Harvey, 2005).

Despite major shifts in the global geography of the automotive industry (Sturgeon and Van Biesebroeck, 2011; Dicken, 2015), Europe continues to be one of the world's main production regions by accounting for 23% of total vehicle production and 28% of total car output in 2016 (OICA, 2018). In 2016, the narrowly defined automotive industry (NACE 29) employed 2.5 million workers in the European Union (EU) (Eurostat, 2018), while the broadly defined automotive industry employed 3.3 million (ACEA, 2017). This makes the automotive sector one of the crucial manufacturing industries in the EU, especially when also considering its positive trade balance (€89.7 billion in 2016) and large spending on research and development (€50.1 billion in 2015) (ACEA, 2017). Since the 1990s, the geographic distribution of the European automotive industry has been affected by changes in its organization and production strategies (Frigant and Lung, 2002; Sturgeon et al., 2008), the economic and political liberalization in Eastern Europe (Lung, 2004), and its economic integration into the EU (Frigant and Miollan, 2014). These changes have had significant effects on employment and regional development across Europe and in adjacent automotive industry regions, such as in Turkey and Morocco (Layan and Lung, 2007; Jürgens and Krzywdzinski, 2009; Benabdejlil et al., 2016; Pavlínek, 2017).

This article seeks to contribute to the analyses of the European automotive industry by examining job creation and job losses by large automotive firms in the EU and Norway (henceforth EU + 1) between 2005 and 2016 and by investigating the investment and location decisions of foreign automotive companies in East-Central Europe (henceforth Eastern Europe). It aims to improve our understanding of the territorial development of the automotive industry through its expansion into peripheral regions adjacent to core areas and their integration into macro-regional production networks. I address five research questions: first, how can we conceptualize the changing geography of the European automotive industry? Second, what was the geography of job creation and job losses in the EU + 1 automotive industry between 2005 and 2016? Third, what were the underlying reasons behind the geography of job creation and job losses? Fourth, what kind of firms were driving the job creation and job losses in terms of their ownership (domestic or foreign) and nationality? Fifth, what were the most important types of restructuring events resulting in job creation and job losses? I analyze firm-level data on job creation and job loss in the EU + 1 countries, which also allows me to evaluate the degree of internationalization of the European automotive industry by examining the role of foreign and domestic firms in these processes. I also draw on 91 interviews with foreign automotive industry subsidiaries in Czechia and Slovakia in order to identify the most important reasons behind the investment and location decisions of foreign automotive firms to expand production into Eastern Europe.

In order to conceptualize the geographic expansion and restructuring of the European automotive industry, I draw on Harvey's theory of uneven development and spatio-temporal fix (Harvey, 1982, 2001, 2005, 2010, 2014), which allows me to further develop the spatial concept of integrated peripheries as a particular form of spatio-temporal fix in the contemporary automotive industry (Pavlínek, 2018). The dynamic and relational view of the uneven development of the European automotive industry helps me understand uneven geographic trends in job creation and job losses. I argue that large national differences in labor costs and corporate taxes along with other cost-cutting reasons played an important role in the geographic restructuring of the European automotive industry between 2005 and 2016. Lower production costs in

integrated peripheries created excess profit opportunities for automotive firms who responded by locating new production to these regions and, in the process, by restructuring their operations in existing automotive industry locations in Western Europe.

I begin with a conceptual discussion of the uneven development of the European automotive industry through the formation of spatio-temporal fixes. I show how this process of territorial expansion integrates peripheral areas into macro-regional production networks while, at the same time, triggering restructuring in existing locations. I also briefly review the development of integrated peripheries in the European automotive industry. Second, I explain the data and methodology employed in the empirical analysis. Third, I analyze the 2005–2016 job creation and job loss in the EU + 1 automotive industry and, based on company interviews in Czechia and Slovakia, I investigate the reasons for the investment and location behavior of foreign firms in the Eastern European integrated periphery. Fourth, I examine job creation and job losses in the EU + 1 automotive industry by the nationality of the firms, ownership and restructuring events. Finally, I summarize and evaluate the results in the conclusion.

2. Spatio-temporal fixes in the automotive industry

Although the reasons for the location decisions of automotive firms and the changing geography of the automotive industry are complex and cannot be reduced to one or two factors (Layan, 2006; Pries and Dehnen, 2009), they are ultimately tied to profit-seeking behavior. Despite the pursuit of different profit strategies by automotive firms (Boyer and Freyssenet, 2002), all firms need to keep production costs under control in order to be profitable. Production costs include the costs of factors of production, costs of various material and non-materials inputs in production, R&D costs, administrative costs and transportation and logistics costs. It is easier for firms to squeeze labor costs than the costs of other factors of production. Historically, capitalist firms have controlled labor costs through technological and organizational innovations and the location of production in areas with surplus labor and low wages (Harvey, 1982). One hundred years ago, transportation costs were considered the most important location factor for industries (Weber, 1929). However, as the cost of transport declined by 90% during the 20th century (Glaeser and Kohlhase, 2004) and the mobility of capital increased through deregulation (Freyssenet et al., 2003), the relative importance of labor costs for the location behavior of firms increased. Large geographic differences in labor costs, labor availability and other labor characteristics, such as labor skills, productivity, motivation, militancy, the degree of unionization and national labor legislation, affect the location behavior of firms. The average personnel costs per employee in the automotive industry were more than five times higher in Germany than in neighboring Poland and four times higher than in Czechia between 2005 and 2016. Although the average apparent labor productivity was three-times higher in Germany than in Poland and two-and-half times higher than in Czechia, the average wage-adjusted labor productivity was 41% higher in Poland and 64% higher in Czechia than in Germany (Eurostat, 2018). During the same period, the average corporate tax rate was 67% higher in Germany than in Poland and 54% higher than in Czechia (KPMG, 2017). In the absence of trade barriers and with relatively low transportation costs, such

differences in labor costs, corporate taxes and other costs, such as land and infrastructure, affect the spatial distribution of production in the long run. In the words of Harvey (2010, 164):

> Competition forces individual capitalists and corporations to seek out better places to produce, just as they are forced to seek out superior technologies. As new locations with lower costs become available, so capitalists under the gun of competition have to respond by moving, *if they can*. (emphasis added)

Similarly, Smith (2008 [1984], 197) argues: 'Capital moves to where the rate of profit is highest (or at least high).' In other words, capitalist firms are constantly searching for 'spatio-temporal fixes' for their declining profitability that will yield higher profits by locating production to areas with labor surplus and lower wages (Harvey, 2014). Production costs in particular regions can also be lowered by other factors, such as weakly organized labor (Bohle and Greskovits, 2006; Drahokoupil and Myant, 2017), while growth and profit opportunities can be enhanced by the existence of various regional assets, such as particular labor skills, infrastructure, markets, technology, agglomeration economies, natural resources and the institutional environment (Coe et al., 2004; MacKinnon, 2012).

The key point is that excess profit opportunities do not last as competing firms want to benefit from the same locational advantages by locating their production in the same or similar high-profit areas (Harvey, 1982; Domański and Lung, 2009). The growth, which is based on the influx of profit-seeking capital, depletes labor surplus, which pushes wages up as competition over workers intensifies (Smith, 2008 [1984]), despite strong efforts of firms to minimize wage increases and keep them as low as possible (Freyssenet and Lung, 2000). Ultimately, labor shortages and rising wages decrease the rate of profit and compel some firms to look for new locations with surplus labor and lower wages that can be integrated into macro-regional production networks for future growth and excess profit opportunities. Spatio-temporal fix is, therefore, only a temporary solution to the problem of profitability and firms are compelled to continue their relentless search for new spatio-temporal fixes in order to increase or at least maintain their rate of profit. This spatial profit-seeking strategy is illustrated in the empirical section and supported by other evidence, such as the behavior of the largest Tier-one automotive suppliers in Europe who addressed their persistent profitability problems by moving production to lower-cost countries in the late 1990s and in the 2000s (Jürgens and Krzywdzinski, 2008; Frigant, 2009; Frigant and Layan, 2009). Labor-intensive activities are especially susceptible to variations in labor costs and labor availability and are more likely to seek low-cost locations (Pavlínek, 2015, 2018). The latest new peripheral areas with excess profit opportunities that saw a significant increase in the influx of surplus capital in the automotive industry have included Serbia (average gross salary €368 a month in 2015), Bulgaria (€451), Macedonia (€521), Moldova (€220) and Morocco (less than €400) (MIEPO, 2017).

The spatial flexibility of capital described by the theory of spatio-temporal fix coexists with the spatial fixity of capital in existing locations that can be, to a large extent, explained by various types of sunk costs (Clark and Wrigley, 1995). High accumulated and exit sunk costs in existing locations and high set-up sunk costs in new locations are important reasons for the continuing commitment of firms to existing locations, despite the fact that there might be potentially superior locations elsewhere.

Firms that cannot relocate because of high sunk costs therefore employ various in-situ restructuring strategies in order to remain competitive and profitable, such as downsizing, technological change, automation, outsourcing, upgrading, rationalization and corporate reorganization, which may or may not involve labor shedding (Clark and Wrigley, 1997). Overall, when measured by job creation and job loss, *in situ* restructuring plays a much more important role than locational shifts in the restructuring of the European automotive industry, as shown in the empirical section of this article.

2.1. Geographic restructuring through spatio-temporal fixes in integrated peripheries

As firms continue to search for new spatio-temporal fixes, the areas of production expand over time and growth tends to bounce from region to region, which leads to uneven geographical development (Harvey, 1982). The new peripheral automotive production regions that were integrated into core-based macro-regional production networks through 'peripheral integration' (Lung, 2000; Pavlínek, 2002) were originally labeled as 'growth-peripheries' (Storper and Walker, 1989; Lagendijk, 1995), 'peripheries of large existing market areas' (Sturgeon and Florida, 2000) and 'integrated peripheral markets' (Humphrey et al., 2000), and later conceptualized as 'integrated peripheries' (Pavlínek, 2018). As a particular form of the spatio-temporal fix, integrated peripheries are dynamic regions of growth and development within macro-regional production networks that are typified by the following features: significantly lower wages than in traditional core regions of the automotive industry; a sizeable labor surplus at the initial stages of growth; geographic proximity to large and lucrative markets that lowers transport costs and is further enhanced by the development of modern transport infrastructure; membership in regional trade agreements or preferential trading arrangements that assure tariff-free access to large and lucrative markets; a high degree of foreign ownership and control through foreign direct investment (FDI); strongly export-oriented production of standardized cars, niche-market vehicles and generic automotive components; limited development of high value-added and strategic functions, such as R&D; FDI-friendly state policies that are actively attracting automotive FDI through low corporate taxes and generous investment incentives; weak labor unions, more liberal labor codes and more flexible labor practices compared to the automotive industry core countries; underdeveloped domestic automotive industry; and the integration into macro-regional production networks as assembly platforms through predominantly dependent supplier linkages (Pavlínek, 2018).

However, as Harvey (1982, 2014) reminds us, growth and excess profits in new areas are at least partially gained at the expense of devaluation in less profitable places, that are affected by lower growth, which might lead to disinvestment and eventually factory closures or relocations. Growth in new locations has several potential effects on existing locations. First, despite lower levels of investment and higher wages, existing locations may maintain their production and employment for a number of reasons, especially due to high sunk costs (Clark and Wrigley, 1995, 1997) and geographic proximity to suppliers and markets (Frigant and Lung, 2002; South and Kim, 2018). New production capacity in new, more profitable locations that is developed in order to expand production and meet the growing demand for cars in existing and new markets, contributes to the growth and higher profits of the corporation as a whole. For

example, new assembly factories that were built in integrated peripheries to satisfy the growing demand for new cars in Europe (Lagendijk, 1995; Layan and Lung, 2004) contributed to the growth and profitability of Western European automakers.

Second, investment in new locations may affect existing locations through the more fine-grained division of labor and greater territorial specialization within a particular corporate production network because of the relocation of the generic, labor-intensive and less profitable production that does not require proximity to other activities to new lower-cost locations, while the more profitable, less labor-intensive production requiring greater skills and the one requiring proximity to other firms is maintained in existing locations (Frigant and Layan, 2009). The more efficient territorial division of labor through such complementary specialization (Kurz and Wittke, 1998) will likely increase the overall corporate profits. It may also increase wage levels in existing locations because of their increased specialization in higher value-added activities but often at the expense of job losses as the labor-intensive production is relocated to new locations. However, these job losses may be at least partially compensated by new jobs created through upgrading in existing locations (Jürgens and Krzywdzinski, 2008, 2009). The increased production of luxury cars and a simultaneous decrease in the assembly of small cars in Germany, because of its partial relocation to integrated peripheries after 1990, is an example of this strategy (Krzywdzinski, 2014). By 2010, the share of small and compact cars produced abroad reached 67% for German and 72% for French automakers, while the assembly of 93% of the upper-medium and 96% of luxury cars took place in Germany (Danyluk, 2018).

Third, existing locations may be negatively affected by factory closures as the entire production is relocated to new lower-cost locations, although this is the least likely scenario (Dicken, 2015). Lower-tier suppliers engaged in the most labor-intensive production of generic components, which does not require specific labor skills and is the most sensitive to labor costs, such as the assembly of cable harnesses, are most likely to relocate their entire production when wages increase in existing locations (Pavlínek, 2015). For example, between 2001 and 2006, Valeo, a large French component supplier, closed 59 factories and sold 26, while opening 29 new factories and acquiring an additional 13 in its effort to regain profitability (Frigant and Layan, 2009).

The closure and relocation of large assembly factories is much less likely because of very large sunk costs. Still, a number of older assembly factories, that have lower sunk costs because they are more depreciated and are more expensive to run than new factories, have been closed in Western Europe since the early 1990s, while new ones were opened in Eastern Europe (Lung, 2004; Jacobs, 2017; Pavlínek, 2017). Because of domestic political pressures, potential strikes and adverse publicity in their home markets, lead firms are more likely to close assembly factories in foreign locations than in their home countries (Revill, 2008), which makes the foreign-owned factories in older integrated peripheries more vulnerable to plant closure than domestic assembly plants in core regions of Western Europe.

The integration of new peripheries into macro-regional production networks therefore also involves the spatial reorganization of the automotive industry in core areas and older integrated peripheries, such as Belgium and Spain (Bilbao-Ubillos and Camino-Beldarrain, 2008; Lampon et al., 2015), and it leads to increased territorial specialization based on the finer macro-regional division of labor (Frigant and Layan, 2009; Jürgens and Krzywdzinski, 2009; Pries and Dehnen, 2009). Automotive firms have also used relocation or the threat of relocation to lower-cost regions, along with

inter-place competition between factories in core and peripheral regions, to keep wage increases and rising production costs under control in the existing locations (Phelps and Fuller, 2000; Freyssenet and Lung, 2000; Lung, 2004; Layan, 2006).

2.2. Technological, organizational and institutional fixes in integrated peripheries

The basic features of integrated peripheries suggest that their development and integration into existing automotive production networks depend on various technological, organizational and institutional preconditions or fixes (Harvey, 2010; Jessop, 2013) (Table 1). The search for excess profits through location to superior locations is not independent of the search for excess profits through technological change and superior organizational forms (Harvey, 1982, 2005) as vehicle assembly firms and component suppliers build state-of-the-art factories and experiment with new production and organization strategies in integrated peripheries (Frigant and Lung, 2002; Pavlínek, 2002; Layan, 2006; Frigant and Layan, 2009). A technological fix also allows for the integration of new peripheries into macro-regional production networks through new transportation technologies and logistical systems (Kaneko and Nojiri, 2008; Coe, 2014; Danyluk, 2018), which is made possible by the development of modern transportation infrastructure, such as highways, high speed rail and sea ports. Modern transportation technologies and logistical systems increase the spatial range over which materials, components and finished vehicles move efficiently by taking less time and at lower cost.

These technological changes have been one of the preconditions for organizational fixes in the form of the reorganization from nationally based automotive industries into trans-national production networks that depend on efficient global sourcing (Freyssenet and Lung, 2000; Kleinert, 2003), follow sourcing (Frigant, 2007), just-in-time and in-sequence delivery of pre-assembled modules (Frigant and Layan, 2009), imports of components for assembly in integrated peripheries and exports of finished vehicles and components from integrated peripheries to markets (Contreras et al., 2012; Pavlínek and Žížalová, 2016; Pavlínek, 2018). Organizational fixes have also involved the redefinition of relationships between assembly firms and their component suppliers (Lagendijk, 1997) with a closely related reduction in the number of suppliers (Freyssenet, 2009) and tiering of the supplier base (Humphrey and Memedovic, 2003; Frigant and Layan, 2009). These organizational fixes significantly increased the internationalization of the automotive industry (Sturgeon and Lester, 2004) and its geographic expansion into new production regions, including integrated peripheries (Humphrey et al., 2000).

An institutional fix creates the necessary preconditions for the free international movement of commodities and capital, including the flow of surplus capital to integrated peripheries in the form of FDI (Pavlínek, 2017), and the flow of profits and dividends back to the home economies of foreign investors (Pavlínek and Ženka, 2016). It operates at multiple geographic scales: at the global scale in the form of the IMF and WTO policies supporting FDI and international trade liberalization; at the macro-regional scale in the form of free trade agreements, local content requirements and regulations limiting the extent of state support for FDI projects within macro-regional trade blocs such as the EU (Sadler, 1995; Nicolini et al., 2017) at the national scale in the form of state FDI policies and the willingness of states to compete over FDI with

Table 1. The basic elements of the spatio-temporal fix and conjoining organizational, technological and institutional fixes in the automotive industry of integrated peripheries

Spatio-temporal fix	Low labor costs
	Sizeable labor surplus
	Weakly organized labor
	Geographic proximity to large markets
	Membership in regional trade agreements or preferential trading arrangements
Organizational fix	Redefined carmaker/supplier relationships
	Internationalization through global and follow sourcing
	Modularization
	Tiering of the supplier base
	Foreign ownership and control
Technological fix	New transportation and communication technologies
	New logistical systems
	Modern transportation infrastructure
Institutional fix	Local content requirements
	Low corporate taxes
	Liberal FDI policies
	Strong investment incentives
	Intense state competition over FDI
	Weak labor legislation
	Local and regional FDI coalitions

Source: Author.

other states (Pavlínek, 2016); and at the regional and local scales in the form of local and regional growth coalitions organized in order to attract and support particular FDI projects (Harvey, 2005; Phelps and Wood, 2006; Drahokoupil, 2009).

2.3. Integrated peripheries in the European automotive industry

Integrated peripheries represent examples of spatio-temporal fixes that developed through the geographic expansion of production into lower-cost areas adjacent to higher cost regions. The European automotive industry has gradually expanded from its original core areas in Western Europe by integrating peripheral regions into the core-based macro-regional production networks since the 1960s: Belgium, the peripheral regions of western France, the Seine Valley and southern Italy were integrated in the 1960s (Lung, 2004), Spain and Portugal in the 1980s (Lagendijk, 1995; Pike and Vale, 1996; Layan, 2000; Veloso et al., 2000; Charnock et al., 2016), former East Germany and Central Europe (Czechia, Hungary, Poland and Slovakia) since the early 1990s (Pavlínek, 2002; Jacobs, 2017), Turkey, Morocco and Tunisia since the mid-1990s (Layan and Lung, 2007; Benabdejlil et al., 2016), and Southeastern Europe since the 2000s (Pavlínek, 2017).

The development of integrated peripheries has been closely tied to European integration (Layan and Lung, 2004) (an institutional fix) with each EU enlargement and each EU free-trade association agreement providing opportunities for the integration of new peripheries through tariff-free imports of capital, components and materials and exports of finished vehicles and components back to core areas of the automotive industry and markets in Western Europe. The absence of such institutional fixes was one of the reasons behind the failed attempts of Western European automakers to

develop the low-cost export-oriented production in Eastern Europe before 1989 (Gatejel, 2017). Almost immediately after the collapse of state socialism, foreign automakers were looking for new markets in Eastern Europe that, however, never lived up to expectations mainly because the region was flooded by millions of used cars from Western Europe (Hudson and Schamp, 1995). More importantly, foreign firms were also looking for low-cost production sites (Nestorović, 1991; Sadler et al., 1993; Havas, 1997). The influx of automotive FDI in excess of €35 billion between 1990 and 2015 led to growth in output in Eastern Europe from 797 thousand cars in 1990 to 4.1 million in 2017 (OICA, 2018) and the output of the supplier industry grew even faster with at least 1212 supplier factories built by foreign investors between 1997 and 2016 (EY, 2010; ERM, 2017).

At the same time, the output of the automotive industry core regions in Western Europe kept rising until the early 2000s as they continued to attract investment because of skilled labor, well-developed supplier networks, proximity to the large market and corporate headquarters, R&D competencies, and also the strong socioeconomic embeddedness of automakers in home economies and their preferential treatment by home country governments (Lagendijk, 1997; Lung, 2004). The continuing growth of core regions can be further explained by technological and organizational changes in the automotive industry, that tended to promote its increased spatial concentration (Frigant and Lung, 2002; Lung and Volpato, 2002; Larsson, 2002), scale economies, and also by the general tendency of the spatial concentration and centralization of capital (Smith, 2008 [1984]).

The process of geographic expansion of the automotive industry through the development of new integrated peripheries is illustrated by regional production trends in Europe between 1991 and 2017 (Figure 1). The total production of cars, including the integrated periphery in Turkey and Morocco, increased by 26% from 14.2 to 18.7 million. While output almost tripled in integrated peripheries (from 2.8 to 8.0 million cars) and grew less rapidly in Germany (from 4.7 to 5.6 million cars), it declined in the rest of Western Europe (from 6.7 to 5.1 million), which, in addition to Germany, also excludes the older integrated periphery of Spain and Portugal in Figure 1.

Although it has been argued that the integration of new peripheries has benefited the European automotive industry as a whole, including its traditional core countries because it increased the competitiveness of their cars (Pries and Dehnen, 2009), empirical evidence suggests the uneven impact of this integration on core countries. With the exception of Germany, and to a lesser extent an increasingly semi-peripheral Britain, the traditional European automotive industry core countries suffered steep declines in domestic car production between 1991 and 2017, especially France (−49%), Italy (−56%) and Sweden (−24%), with the deepest declines during the 2008–2009 economic crisis (Figure 1). Additionally, several older integrated peripheries suffered declines between 2000 and 2017, such as Belgium (−63%), Portugal (−29%) and the Netherlands (−28%) (OICA, 2018). The declines in France and Italy compared to the continuing growth in Germany can be at least partially attributed to the more extensive offshoring of car assembly by French and Italian automakers which, in turn, is related to a greater share of small cars in their product portfolio compared to the German automakers. At the same time, the German automakers offshored a greater proportion of the production of components, especially to Eastern Europe, in order to benefit from its lower labor costs (Chiappini, 2012), which resulted in a more efficient intra-corporate division of labor (Walker, 1989). Additionally, the high level of production in

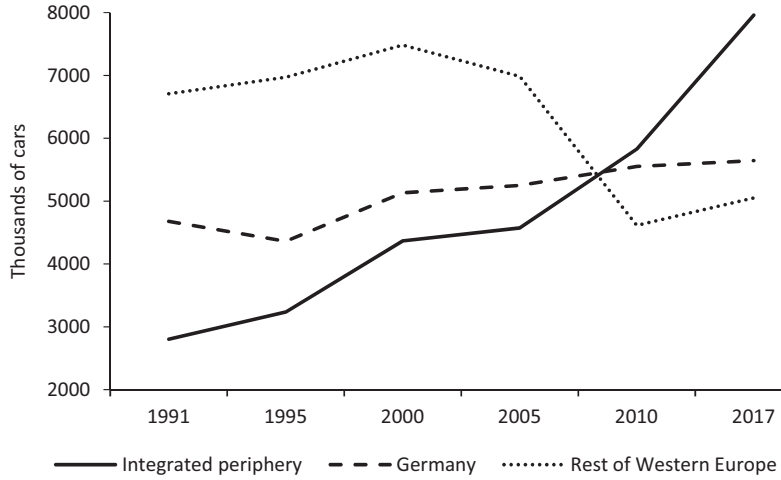

Figure 1. Car production trends in Europe, including Turkey and Morocco, 1991–2017.
Note: Integrated periphery includes Eastern Europe, Spain, Portugal, Turkey and Morocco.
Source: Author based on data in OICA (2018) (1997–2017 data), USDT (2017) (1991–1995 data) and national statistical offices of individual countries (1991–1995 data).

Germany has been sustained by large exports of mostly premium cars to China, which has not been the case in other West European core countries (Maiza and Bustillo, 2018).

It is in this context that I will examine the restructuring of the European automotive industry in the rest of this article by analyzing job creation and job loss across the EU + 1 between 2005 and 2016 and by analyzing investment decisions of foreign automotive firms in the integrated periphery in Czechia and Slovakia since the early 1990s.

3. Data and methodology

The automotive industry restructuring database has been constructed and analyzed for the EU + 1 countries for the 2005–2016 period. It involved the manual extraction of individual restructuring events in the automotive industry from the European Restructuring Monitor (ERM) (ERM, 2017), resulting in the creation or loss of at least 100 jobs or 10% or more of the labor force in firms or factories employing at least 250 workers. The ERM database is based on the screening of national media sources in daily newspapers, business press and online. Its basic advantage is that it provides firm level data about job creation and job loss and reasons behind these dynamics that are not otherwise available. The nationality of firms creating or cutting jobs can be determined, which allows for the analysis of the role of foreign and domestic firms in the restructuring of the automotive industry.

The ERM database has five important limitations. First, it is not strictly representative since it relies only on selected media titles. Second, it does not include small and also many medium-sized enterprises (SMEs) that continue to play an important role in the supplier industry (Frigant, 2013), despite the increased domination of the automotive industry by large firms (Humphrey and Memedovic,

2003; Sturgeon and Lester, 2004). Third, the level of media coverage of restructuring events differs from country to country, which may lead to the overrepresentation of restructuring events in some countries and underrepresentation in others. Fourth, the ERM database covers job losses more accurately than job creations because companies are less likely to report job creations and its media coverage tends to be lower. Fifth, it does not cover non-EU countries in Europe, such as Serbia, Macedonia, Bosnia and Herzegovina, and Moldova, that saw significant FDI-driven job creation in the automotive industry during the study period. We have to keep these limitations in mind when interpreting the data. Since our goal is to understand the overall trends in restructuring and geographic shifts in the European automotive industry and the analysis of restructuring events of large firms should reveal basic trends in job creation and job loss at the national level, the advantages of the ERM database outweigh its disadvantages.

The extracted dataset was carefully checked for mistakes, such as double entries in the original ERM database or the announced restructuring events that never materialized. The average values have been used in the cases of ranges of announced job creations or job losses. Restructuring events were classified by their announcement year even though some were planned over the course of several years. The parent company of the firm owner was determined and the descriptive information of each restructuring event was used to classify the reasons for the job creation or job loss. Overall, a total of 2124 restructuring events were extracted from the ERM database in the EU + 1 automotive industry for the 2005–2016 period (Table 2).

The second unique dataset is based on 91 interviews with managers of foreign automotive subsidiaries in Czechia and Slovakia conducted by the author and members of his research team (Schoenberger, 1991) that collected information about the reasons for investment, location choice, perceived national competitive advantages in the automotive industry, strategic needs of parent companies in foreign locations, relocations and reasons for the continuing production in these countries. Sixty-four interviews were conducted in Czechia between 2009 and 2013 and 27 in Slovakia between 2011 and 2015.

4. 2005–2016 Job creation and job loss in the European automotive industry

I will start the empirical analysis with mapping and testing the relationship between job creation/loss on one side and wages and corporate taxes on the other side. The EU + 1 automotive industry was dynamic during 2005–2016 with 462,398 jobs created and 478,780 jobs lost for a net loss of 16,382 jobs (Table 2). However, if we also consider job creation in countries not included in the ERM database, the total balance for Europe (excluding Russia, Belarus and Ukraine) was slightly positive. Foreign firms created more than 18,000 jobs in Serbia alone (SIEPA, 2014) and several thousand jobs were also created in Macedonia, Bosnia and Herzegovina, and Moldova (MIEPO, 2017; Bolduc, 2017). Western Europe recorded a net loss of 254,317 jobs, while Eastern Europe recorded a net gain of 237,935 jobs (Figure 2). The data thus suggest a partial spatial shift in production from Western to Eastern Europe, which started in the early 1990s (Sadler et al., 1993). However, the bulk of change was concentrated into one-third of the analyzed countries. Poland, Germany, Czechia, France, Britain, Romania, Slovakia, Sweden and Hungary recorded more than 100 restructuring events each (78%

Table 2. Job creation and job loss in the EU + 1 automotive industry by country, 2005–2016

	No. of cases	Jobs created	Jobs lost	Net gain/loss
Poland	309	74,771	21,889	52,882
Germany	238	50,926	145,536	−94,610
Czechia	228	72,598	28,751	43,847
France	212	21,908	83,140	−61,232
Britain	161	19,796	42,028	−22,232
Romania	141	77,844	10,657	67,187
Slovakia	141	51,673	6368	45,305
Sweden	119	8803	31,773	−22,970
Hungary	118	29,048	12,594	16,454
Italy	75	5390	18,658	−13,268
Spain	73	8386	22,193	−13,807
Slovenia	71	6675	9257	−2582
Belgium	51	3197	17,912	−14,715
Austria	50	7105	6659	446
Bulgaria	33	15,440	0	15,440
Portugal	32	3786	9606	−5820
Finland	18	1250	2560	−1310
Netherlands	17	1850	3820	−1970
Lithuania	10	940	855	85
Ireland	7	140	1212	−1072
Norway	6	170	878	−708
Estonia	5	112	1215	−1103
Denmark	4	0	940	−940
Latvia	2	420	0	420
Greece	1	0	200	−200
Luxembourg	1	0	79	−79
Malta	1	170	0	170
Total	2124	462,398	478,780	−16,382

Note: No automotive industry restructuring events were recorded for Croatia during its 2012–2016 coverage in the ERM database.
Source: Calculated by author from data in ERM (2017).

of the total) and accounted for 88% of all created jobs (407,367) and 80% of jobs lost (382,736). Overall, job creation was more concentrated in Eastern Europe with 71% of all jobs created, while job loss was more concentrated in Western Europe with 81% of jobs lost. Romania, Poland, Czechia and Slovakia recorded the largest job creation (276,886 jobs), while Germany, France, Britain and Sweden together lost 302,477 jobs (Table 2, Figure 3).

The Pearson correlation coefficient revealed highly significant negative statistical correlation at the 95% confidence interval between the national level ERM data on 2005–2016 job creation and average personnel costs in the automotive industry (Eurostat 2018) (Figure 4).[1] The negative correlation is also highly significant between

1 P (two-tailed) = 0.0007, r = −0.6323, N = 25. Luxembourg, Cyprus, Malta and Croatia had to be removed from the analysis for the lack of data but none is a major automotive producer. I have controlled for the size of the automotive industry in different countries.

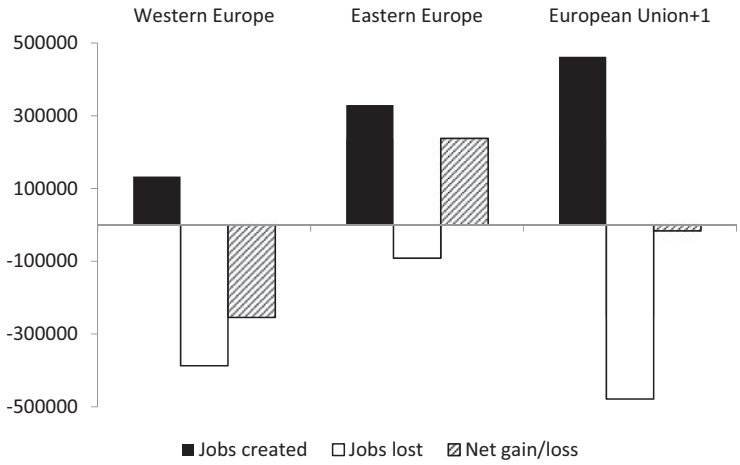

Figure 2. The job creation and job loss in the European automotive industry, 2005–2016.
Note: European Union+1 refers to the European Union countries plus Norway.
Source: Calculated by author from data in ERM (2017).

the average corporate tax rate for the 2005–2016 period (KPMG, 2017) and job creation.[2] Similarly, the net job creation/loss negatively correlates (highly significant) with both personnel costs[3] and corporate taxes.[4] The correlation between job losses and average personnel costs is statistically significant only after the removal of one outlier (Slovenia) (Figure 5).[5] The correlation between job losses and average corporate tax rates is significant only after the removal of two outliers (Slovenia and Ireland).[6] Although the Pearson correlation coefficient revealed that national differences in labor costs and corporate taxes were related to job creation and job losses in the EU + 1 automotive industry between 2005 and 2016, it also suggested that labor costs and corporate taxes were more important for job creation in new locations than for job losses in existing locations. This highlights the importance of other factors in corporate decisions to cut or keep jobs in existing locations.

4.1 The formation of spatio-temporal fixes in integrated peripheries: insights from company interviews

The interviews support the results of the correlation analysis by identifying low labor costs as one of the most important reasons for investment by automotive TNCs in

2 P (two-tailed) = 0.0007, r = −0.6327, N = 25.
3 P (two-tailed) = 0.0008, r = −0.6273, N = 25.
4 P (two-tailed) = 0.0024, r = −0.5797, N = 25.
5 P (two-tailed) = 0.0168, r = −0.4831, N = 24. Slovenia has relatively low average personnel costs compared to Western Europe but suffered by far the highest job losses relative to the size of its automotive industry in the EU+1 mainly due to the bankruptcy of Prevent Global (−3,907 jobs) and large employment fluctuations in Renault Slovenia.
6 P (two-tailed) = 0.0228, r = −0.4726, N = 23. Slovenia is again an outlier because of its highest relative job losses combined with relatively low average corporate taxes. Ireland is an outlier because of its extremely low average corporate tax rate at 12.5% combined with the fourth highest job losses relative to its size of the automotive industry in the EU+1. Ireland accounted only for 0.12% of the EU automotive industry employment and Slovenia for 0.52% in 2015.

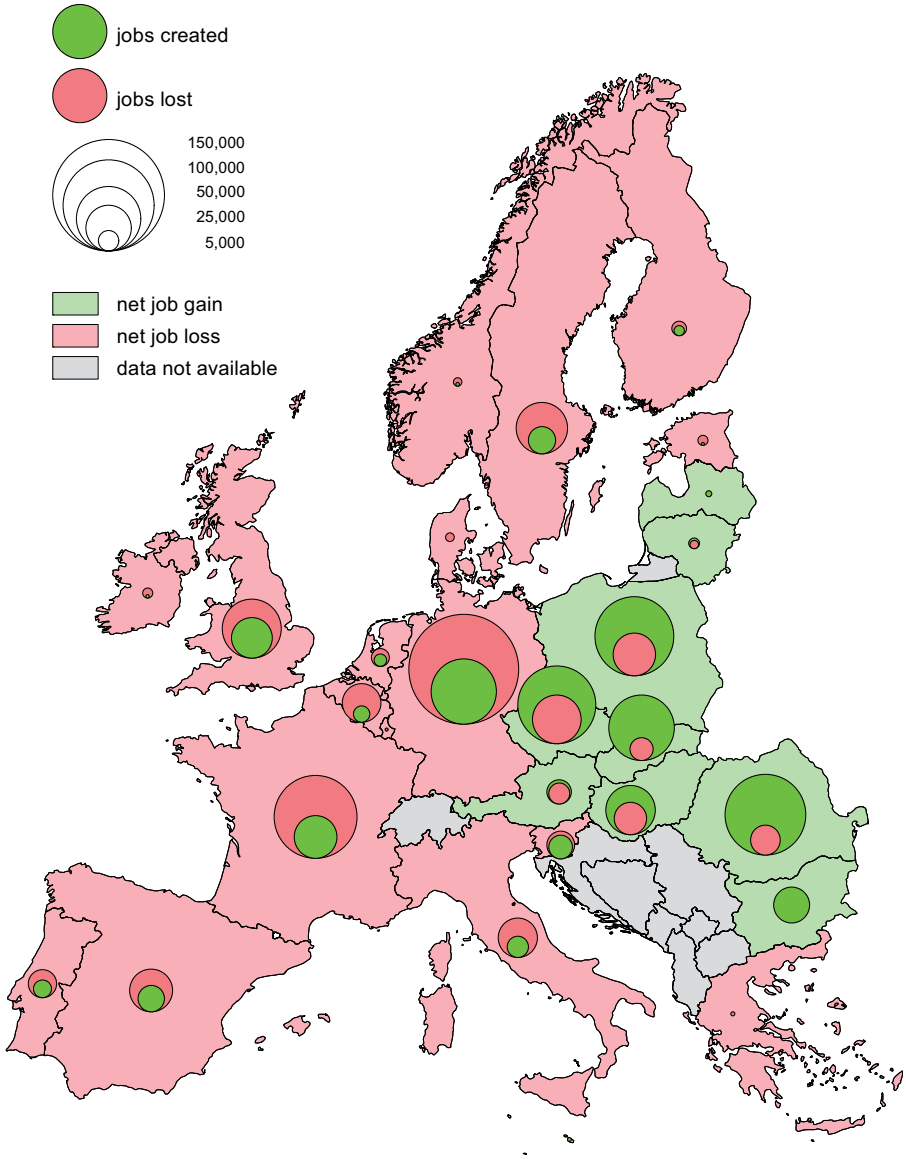

Figure 3. Spatial distribution of automotive jobs created and lost by large firms in the EU + 1 between 2005 and 2016.
Source: The author based on data in ERM (2017).

Eastern Europe since the early 1990s. More importantly, the interviews capture other factors behind the investment decisions of foreign firms (Laulajainen and Stafford, 1995) that are not revealed by the ERM data but are equally important for the understanding of the formation and nature of the spatio-temporal fix in Eastern Europe. The interviews show that the decisions to invest are generally in line with the logic conceptualized by the theory of spatio-temporal fix and take place through several

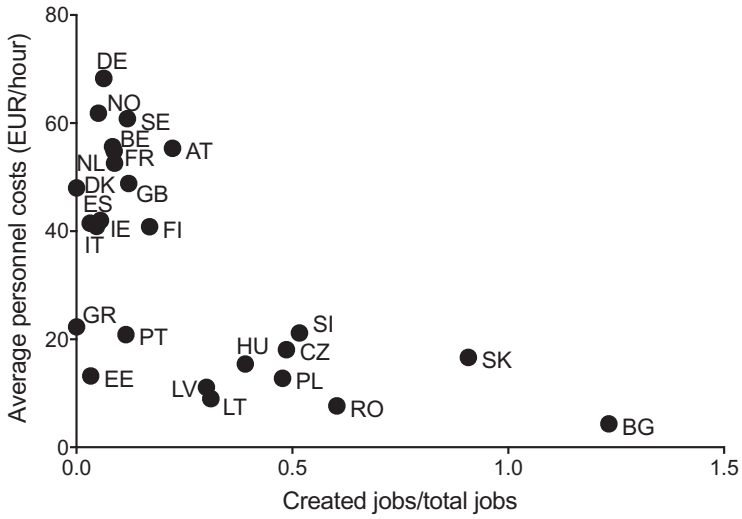

Figure 4. The relationship between 2005–2015 average personnel costs in the automotive industry and 2005–2016 jobs created in the automotive industry.
Note: Country codes in this figure and in Figure 5 are based on the ISO 3166-1 standard.
Source: Author based on data from ERM (2017) and Eurostat (2018).

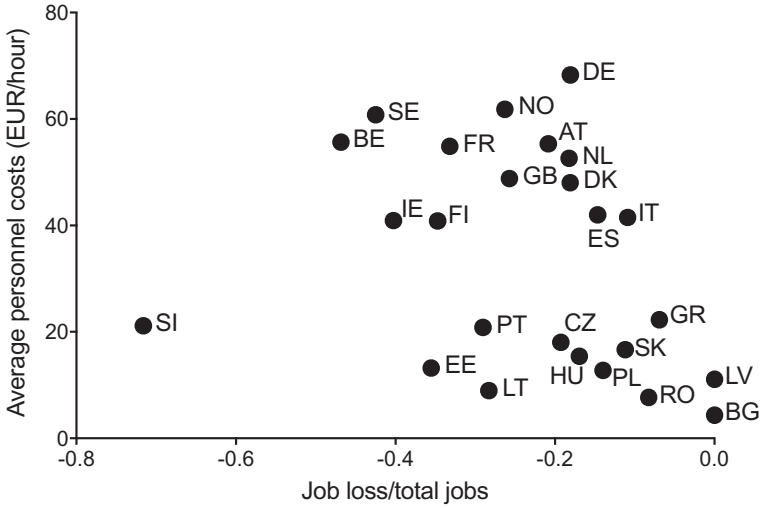

Figure 5. The relationship between 2005–2015 average personnel costs in the automotive industry and 2005–2016 jobs lost in the automotive industry.
Source: Author based on data from ERM (2017) and Eurostat (2018).

interconnected steps at different geographic scales with the changing of relative importance of different location factors at each step. First, a corporate decision is made to invest in Eastern Europe, typically with a goal of establishing a low-cost production site within the EU. This has been the case for large assembly factories (Pavlínek, 2017; 2002), smaller scale investments, such as export-oriented cross-border and market-

capture investments (Pavlínek, 1998), but not for follow sourcing (Frigant, 2007), in which suppliers follow an assembly firm or other suppliers into a specific country. After the decision to invest in Eastern Europe is made, a specific country is selected and, finally, a specific location is chosen in the selected country.

The interviewed firms usually listed more than one reason for investing in Czechia and Slovakia, suggesting a number of factors being considered. Overall, however, cost-cutting reasons, namely low labor costs, follow sourcing and investment incentives, were cited more frequently than other reasons, highlighting their greater importance in investment decisions (Table 3). The cost-cutting nature of follow sourcing was revealed during an interview with a car assembly firm in Czechia:

> Our company has strongly exploited and supported follow sourcing because we were looking for lower production costs. We have invested in Central Europe where labor costs are lower and we have strongly encouraged our key suppliers to build their factories here too for two fundamental reasons: first, to lower transportation and logistical costs and, second, by starting production here, they produce with lower labor costs too. And this has been the main reason why many firms have moved production from Germany to Central Europe with the goal of lowering production costs. (An interview with an assembly firm, 8 August 2011).

Additionally, follow sourcing decreases set-up sunk costs for assembly firms because it lowers their entry costs into new regions as these are shared with their most important suppliers (Lung, 2004). At the same time, the importance of follow sourcing highlights the role of organizational fixes in the formation of spatio-temporal fixes in the automotive industry in integrated peripheries. The reduction in the number of suppliers and their organizational restructuring into distinct supplier tiers has led to the spatial restructuring of the supplier base with assembly firms requiring their most important module and Tier-one suppliers to be located close to assembly plants in order to minimize logistical and transportation costs (Frigant and Lung, 2002; Pavlínek and Janák, 2007). Table 3 also underlines the importance of investment incentives in the location decisions of foreign firms. As a form of institutional fix, investment incentives lower set-up sunk costs for investing firms and are therefore another cost-cutting measure. As one supplier argued:

> There were several reasons for our investment here. But if I speak openly, I think that investment incentives were really the most important one and the final impulse that made it possible for this factory to be built here. Simply put, it was a financial reason. (Interview, November 16, 2010).

Other factors, such as labor skills, industrial tradition and the proximity and transportation accessibility of Western European markets have also played an important role in the selection of a particular country for investment, although they have been cited less frequently than cost-cutting reasons. The importance of cost-cutting reasons in investment decisions, especially low labor costs, was reiterated by the evaluation of the competitive advantages of Czechia and Slovakia by the interviewed automotive firms, with low labor costs topping the list (listed by 84% of the interviewed firms in Czechia and 85% in Slovakia), followed by proximity to the West European market (66% of the interviewed firms in Czechia and 30% in Slovakia) and proximity to assembly plants and other customers (23% in Czechia and 48% in Slovakia). However, it also highlighted the importance of labor skills (59% of the interviewed

Table 3. Reasons for investment by foreign-owned automotive firms in Czechia and Slovakia

Reasons for investment	Czechia		Slovakia		Total	
	No.	% of firms	No.	% of firms	No.	% of firms
Low labor costs	43	67	12	41	55	60
Follow sourcing	21	33	13	45	34	37
Acquisition of existing firm	17	27	3	10	20	22
Investment incentives	10	16	8	28	18	20
Skilled labor	10	16	2	7	12	13
Proximity of Germany	10	16	0	0	10	11
Proximity and transportation accessibility of Western European markets	7	11	2	7	9	10
Industrial tradition	7	11	1	3	8	9
Market capture	4	6	2	7	6	7
Access to local know-how and technology	4	6	0	0	4	4

Notes: The number of interviewed firms: Czechia 64, Slovakia 27. % of firms refers to the percentage of interviewed firms. Each firm could list more than one reason for investing.
Source: Author's interviews.

firms in Czechia and 44% in Slovakia) and industrial tradition (38% in Czechia and 19% in Slovakia) for investing firms. Similarly, low labor costs (listed by 91% of the interviewed firms in Czechia and 93% in Slovakia), skilled labor and industrial tradition (56% in Czechia and 33% in Slovakia), and market proximity (33% both in Czechia and Slovakia) were listed as the most important strategic needs of parent TNCs for production in foreign locations.

The interview data further suggest that a specific location choice in a selected country is influenced by technological fixes that help investing firms minimize transportation and logistical costs. Foreign subsidiaries attempt to cut these costs by locating close to their customers and through an easy access to high-quality infrastructure, especially highways (Table 4), which is supported by previous research (Klier and McMillen, 2015). The theory of spatio-temporal fix highlights the existence of labor surplus as one of the preconditions for the formation of spatio-temporal fixes and the interviews showed that labor surplus plays an important role in site selection. The availability of cheap land and buildings combined with investment incentives are also significant in location choice as additional ways to lower set-up sunk costs by investing firms. As in the case of country selection, labor skills and industrial tradition were cited less frequently than cost-cutting reasons among the important factors in the selection of a particular locality. This may indicate two things. First, given the relatively high level of education and labor skills in Czechia and Slovakia, automotive firms are confident that they can train local labor to meet their needs. Second, they are also confident they can find skilled labor in local labor markets even if it would mean poaching existing workers from local companies, which has become commonplace (Pavlínek and Žížalová, 2016; Pavlínek, 2018). At the same time, the interviewed managers, both in Czechia and Slovakia, almost universally complained about the disappearance of labor surplus and growing labor shortages due to the rapid growth of the automotive industry, which prompted some of them to relocate parts of production to lower-cost countries with surplus labor, such as Bosnia and Herzegovina.

Table 4. Reasons for the location choice of foreign-owned automotive firms in Czechia and Slovakia

Reasons for location choice	Czechia		Slovakia		Total	
	No.	% of firms	No.	% of firms	No.	% of firms
Proximity of customers (other firms)	22	34	8	30	30	33
Transportation accessibility and infrastructure	19	30	9	33	28	31
Existing location (acquisition or JV)	22	34	5	19	27	30
Availability of labor	18	28	7	26	25	27
Proximity of Germany or Austria	18	28	1	4	19	21
Availability of (inexpensive) land or building(s)	10	16	8	30	18	20
Investment incentives	8	13	4	15	12	13
Industrial tradition	8	13	3	11	11	12
Low labor costs	5	8	5	19	10	11
Qualified labor	7	11	2	7	9	10
Help from local politicians	4	6	2	7	6	7
Proximity of the capital city	4	6	1	4	5	5
Low transportation costs	2	3	0	0	2	2

Notes: The number interviewed firms: Czechia 64, Slovakia 27. % of firms refers to the percentage of interviewed firms. Each firm could list more than one reason for the location choice.
Source: Author's interviews.

I would expect to find similar interview results in Poland and Hungary, as these countries are comparable with Czechia and Slovakia in wage levels, distance from markets, the institutional environment, labor skills, and in the post-1990 development of the automotive industry. The findings might be more different in South-Eastern Europe because of significantly lower labor costs than in Czechia and Slovakia, larger distances from markets in Western Europe, weaker industrial tradition and lower manufacturing skills. Overall, the ERM data, correlation analysis and interviews conducted in Czechia and Slovakia point to the even greater importance of low wages for cost-driven automotive industry investments in South-Eastern Europe than in Czechia and Slovakia.

The interviews thus highlight the importance of cost-cutting reasons in the formation of the spatio-temporal fix in the East European integrated periphery as conceptualized by the theory of spatio-temporal fix and supported by the correlation analysis. At the same time, they provide evidence of the importance of organizational, technological and institutional fixes for the formation of the spatio-temporal fix, especially follow sourcing (organizational fix), modern transportation infrastructure (technological fix) and investment incentives (institutional fix). Low labor costs alone would be insufficient for the growth of integrated peripheries without the presence of these contributing factors, as argued in the conceptual section of this article.

5. 2005–2016 Job creation and job losses by the nationality of firms, firm ownership and restructuring events

5.1 Job creation and job losses by the nationality of firms

Firms from the contemporary automotive industry core countries accounted for the vast majority of jobs created in the EU + 1 between 2005 and 2016. German firms were

by far the most active in job creation by creating 37% of the EU + 1 total and, together with French firms, accounted for 51% (Supplementary Appendix). Firms from the top six countries (Germany, France, Japan, the USA, South Korea and Italy) accounted for 81%. At the same time, East European firms created only 4% of the total, with almost half created by Polish firms and an additional one-fourth by Czech firms. In Eastern Europe, East European firms accounted for only 5% of all automotive jobs created. This demonstrates the marginal role of East European firms in automotive industry development and underlines the dominant role of foreign capital behind the growth in integrated peripheries. Only Czech firms recorded any job creation abroad (in Slovakia), which shows that East European firms have not internationalized their production.

Firms from five countries (Germany, the USA, France, Britain and Japan) accounted for 80% of total job losses, which means that firms from Germany, the USA, France and Japan were responsible for both the majority of jobs created (71%) and lost (74%). German firms were also most active in job losses by accounting for 37% of the total. In Western Europe, German firms accounted for 38% of the total job losses and, together with French firms, for 57%. Both large German and French automotive firms were predominantly shedding jobs in their home economies (84% in the case of German firms and 88% in the case of French firms), while creating the majority of new jobs abroad (72% in the case of German firms and 71% in the case of French firms). Their job creation was geographically highly concentrated in the integrated periphery of Eastern Europe, which accounted for 93% of all jobs created abroad by German firms and 92% by French firms. It supports the theoretical argument about the spatio-temporal fixes being sought by core-based surplus capital in integrated peripheries, which leads to restructuring in existing locations. It also further supports the argument that production costs along with corporate taxes were the important driving forces behind the job creation and job losses between 2005 and 2016.

5.2 Job creation and job losses by domestic and foreign firms

Firm-level data make it possible to determine the geographic variation in the role of domestic and foreign-owned firms in job creation and job losses. Overall, foreign firms were more active in job creation outside their domestic economies by accounting for 79% (366,020) of all created jobs (Table 5). This indicates the high degree of internationalization of the European automotive industry. However, an important difference existed between Eastern and Western Europe. In Eastern Europe, 95% of the jobs were created by foreign firms and only 5% by domestic firms. The dependence on job creation by foreign firms among major producing countries of Eastern Europe was the highest in Romania and Slovakia and lowest in Slovenia and Poland (Table 5). National differences in job creation by foreign and domestic firms closely correspond with the degree of foreign control in the automotive industry, which is extremely high in Eastern Europe (Table 6). This high dependence on foreign capital is one of the underlying structural features of integrated peripheries. At the same time, the 5% share of domestic firms on the job creation in Eastern Europe shows their marginal role in the FDI-driven growth of the automotive industry.

The situation in Western Europe was different with 60% of the new jobs created by domestic firms and 40% by foreign firms. However, compared to the universally high dependence on foreign firms for job creation in Eastern Europe, there are significant

Table 5. Job creation by foreign and domestic firms in the EU + 1 automotive industry by country, 2005–2016

Country	Total jobs	Domestic firms	Foreign firms	Share of foreign firms (%)	Share of domestic firms (%)
Austria	7105	1120	5985	84.2	15.8
Belgium	3197	0	3197	100.0	0.0
Britain	19,796	1921	17,875	90.3	9.7
Bulgaria	15,440	480	14,960	96.9	3.1
Czechia	72,598	3725	68,873	94.9	5.1
Estonia	112	0	112	100.0	0.0
Finland	1250	1250	0	0.0	100.0
France	21,908	18,928	2980	13.6	86.4
Germany	50,926	47,591	3335	6.5	93.5
Hungary	29,048	955	28,093	96.7	3.3
Ireland	140	0	140	100.0	0.0
Italy	5390	5240	150	2.8	97.2
Latvia	420	0	420	100.0	0.0
Lithuania	940	170	770	81.9	18.1
Malta	170	0	170	100.0	0.0
Netherlands	1850	1400	450	24.3	75.7
Norway	170	0	170	100.0	0.0
Poland	74,771	8200	66,571	89.0	11.0
Portugal	3786	0	3786	100.0	0.0
Romania	77,844	500	77,344	99.4	0.6
Slovakia	51,673	665	51,008	98.7	1.3
Slovenia	6675	1942	4733	70.9	29.1
Spain	8386	150	8236	98.2	1.8
Sweden	8803	2141	6662	75.7	24.3
Total	462,398	96,378	366,020	79.2	20.8

Note: No automotive jobs were created in Denmark, Greece and Luxembourg.
Source: Calculated by author from data in ERM (2017).

differences among Western European countries. On one hand, the dependence on job creation by foreign firms was extremely high in the older integrated peripheries of Portugal, Belgium and Spain, and also in Britain (Table 5), which corresponds with the fact that these four countries have the highest degree of their automotive industries under the control of foreign capital in Western Europe (Table 6). On the other hand, the lowest shares of automotive jobs created by foreign firms were in Italy, Germany and France, which also have the lowest degrees of control of their automotive industries by foreign firms that clearly sets these countries apart from the rest (Tables 5 and 6). These three countries constitute the traditional core area of the European automotive production system with a long history of strong domestic automotive industry.

The vast majority of jobs (86%) created by foreign firms were created in Eastern Europe with Romania, Czechia, Poland, Slovakia and Hungary accounting for 80% of the EU + 1 total, which supports the theoretical argument of the spatio-temporal fix being sought by surplus capital in the integrated periphery. Between 2005 and 2016, these five countries had new foreign assembly plants either built (Czechia, Hungary, Slovakia) or expanded (Poland, Romania) and also saw a major expansion in the supplier industry because of follow sourcing and export-oriented production by foreign

Table 6. The index of foreign control in the European automotive industry in 2015

Country	Index of foreign control
Slovakia	97.1
Hungary	94.9
Czechia	91.4
Romania	90.7
Spain	86.5
Bulgaria	86.5
Poland	86.3
Latvia	86.3
Britain	84.3
Austria	80.0
Portugal	79.7
Lithuania	78.0
Belgium	76.2
Estonia	67.8
Sweden	67.5
Netherlands	65.2
Ireland	64.6
Croatia	61.4
Slovenia	59.3
Denmark	37.0
Norway	34.9
Finland	27.6
France	22.5
Italy	20.9
Germany	14.6

Notes: The index is the average value of the share of foreign controlled enterprises of five indicators in the manufacture of motor vehicles, trailers and semi-trailers (NACE_R2) in 2015: production value, value added at factor cost, gross investment in tangible goods, number of persons employed and turnover or gross premiums written. Data are not available for Luxembourg, Malta, Cyprus and Greece.
Source: Calculated by author from data in Eurostat (2018).

firms (Pavlínek, 2017). The concentration of growth into these five countries shows the uneven development in the integrated periphery as some countries were able to attract much larger volumes of surplus capital than others based on the particular combinations of institutional, technological and organizational fixes.

German automotive firms were the most active in creating jobs abroad by creating 123,273 jobs in the EU + 1 outside of Germany, which was 34% of all jobs created by foreign firms. German, Japanese (48,113), French (46,195) American (46,011) and South Korean (26,669) firms accounted for 79% of all automotive industry jobs created by foreign firms outside their home economy in the EU + 1 between 2005 and 2016. This indicates that TNCs from these five automotive industry core countries were the main driving force behind the restructuring of the European automotive industry during this period.

Compared to jobs created by foreign firms being concentrated in Eastern Europe, 83% of the jobs created by domestic firms were created in Western Europe and only 17% in Eastern Europe. The majority of jobs created by domestic firms in Western Europe were created in Germany (60% of the West European total and 49% of the

EU + 1 total) and France (24% and 20%). Domestic firms played a much less important role in job creation in the rest of Western Europe. In the old integrated peripheries of Western Europe, no job creation was recorded by large domestic firms in Belgium and Portugal, and only 150 jobs were created in Spain, which was only 2% of Spain's total. In Eastern Europe, large domestic firms failed to create more than 5000 jobs in all countries with the exception of Poland (8200 jobs), which accounted for 49% of all jobs created by domestic firms in Eastern Europe (Table 5). This situation underscores the weak position of domestic firms in the automotive industry in both older and newer integrated peripheries.

In contrast to job creation, domestic firms accounted for higher job losses (55%—261,302) than foreign firms (45%—217,478). Job losses by domestic firms were concentrated in Germany (47% of the total) and France (25%). Overall, foreign firms created net 148,542 jobs abroad (outside their home economy) in the EU + 1, while domestic firms had a net loss of 164,924 jobs in their home economies. This is clear evidence of the increased internationalization of the European automotive industry. At the same time, it suggests the weakening role of domestic firms in the fiercely competitive supplier industry, which is increasingly dominated by large TNCs and follow sourcing. In order to survive, large West European suppliers have been forced to internationalize production by setting up factories in the integrated periphery. From these factories, they supply newly built foreign assembly plants in Eastern Europe through follow sourcing or export standardized components that do not have to be supplied just-in-time to Western Europe. This partial shift in production to Eastern Europe has often involved cuts in the automotive employment in West European countries, such as Germany and France. Domestic firms in Western Europe that were unable to internationalize found it difficult to compete with rapidly growing imports of cheaper components from newly built foreign factories in the integrated periphery in Eastern Europe, Turkey and North Africa, and were often forced to cut employment or declare bankruptcy, as we will see in the next section.

Despite the overall net gain of 237,935 jobs in Eastern Europe, domestic firms recorded a net loss of 6276 jobs between 2005 and 2016. This suggests that large domestic firms in Eastern Europe failed to benefit from the massive job creation by foreign firms and the strong growth of the automotive industry. Existing firms were often unable to meet quality, quantity and delivery demands of foreign firms and were excluded from newly formed production networks that were set up and are controlled by foreign firms (Pavlínek and Janák, 2007). At the same time, new domestic firms found it difficult to get established, because of high entry barriers, and to succeed, because of the fierce competition in the automotive industry. This means that between 2005 and 2016, the benefits of large FDI in the automotive industry did not significantly spread from foreign to domestic firms in the form of spillovers in integrated peripheries (Pavlínek and Žížalová, 2016; Pavlínek, 2018), confounding the basic premise of expected positive effects of FDI on host country economies stressed by the economic theory (Blomström and Kokko, 2001; Dunning and Lundan, 2008). Overall, large domestic firms were losing ground both in Western and Eastern Europe at the expense of foreign firms, which has also been a long-term trend in other automotive industry regions, such as the USA (Klier and Rubenstein, 2010), Canada (Rutherford and Holmes, 2008), South Africa (Barnes and Kaplinsky, 2000), Brazil and India (Humphrey, 2000), and one of the signs of the increasing corporate concentration and internationalization of the automotive industry.

5.3 Job creation and job losses classified by restructuring events

The information provided in the ERM database for each restructuring event allows for their classification and comparison among different countries and macro-regions. In terms of job creation, I have differentiated between new investments in new and existing locations in the form of new factories and the expansion of production in existing locations. Between 2005 and 2016, *in situ* expansions were responsible for 59% of all newly created jobs, followed by 39% of new jobs created in 460 newly built factories. The remaining 2% of jobs were created in service units, such as R&D, technical and logistics centers. In terms of job losses, I have classified restructuring events into *in situ* rationalizations, plant closures and plant relocations. The frequency of these events and their job impacts followed the expected distribution identified in literature with *in situ* restructurings being the most frequent and plant relocations being the least frequent (Dicken, 2015). *In situ* restructurings accounted for 71% of total job losses, plant closures for 21%, plant relocations for 5% and partial relocations for 2% (Table 7). *In situ* job creations and job losses tend to follow business cycles as firms tend to expand production and create jobs during periods of economic prosperity and rationalize production and cut jobs at the same locations during periods of economic stagnation or decline (Figure 6).

The main difference between Western and Eastern Europe was in the construction of new factories. Out of 460 new factories built in the EU + 1 between 2005 and 2016, 438 (95%) were built in Eastern Europe as surplus foreign capital was exploiting the spatio-temporal fix there. Foreign firms also rapidly expanded production in factories they built in Eastern Europe between 1990 and 2004 (Jacobs, 2017; Pavlínek, 2017). In Western Europe, the vast majority of new jobs were added in existing factories through the expansion of production rather than building new factories and the vast majority of job losses took place through restructuring in existing locations (Table 7). At the same time, out of 222 factory closures, 181 (86%) took place in Western Europe, which was also more affected by relocations, partial relocations and job cuts in existing locations than Eastern Europe. Britain, France, Germany, Spain and Italy accounted for 63% of all closures and relocations and 62% of jobs lost through closures and relocations (Figure 7). This is evidence of restructuring in existing locations as production partially shifted from Western to Eastern Europe, which supports the theoretical argument about the close relationship between new spatio-temporal fixes and restructurings and devaluations in existing locations (Harvey, 1982). It also shows the strong location inertia and commitment of firms to existing locations. The large number of *in situ* restructurings, resulting in large numbers of job losses and job creations, compared to relocations, suggest that relocations tend to take place only after an unsuccessful *in situ* restructuring and might be the last option for a company to regain profitability before declaring bankruptcy.

The increased production in Eastern Europe also required increased technical, R&D, logistics and administrative support (Table 7). However, the increase in the number of these jobs was disproportionally low compared to jobs in production as the majority of higher value-added jobs remained in Western Europe or in parent economies of non-European firms (Pavlínek and Ženka, 2011, 2016; Pavlínek, 2012). The vast majority of new factories (410) were built in just five East European countries that have assembly plants (Poland, Czechia, Slovakia, Romania and Hungary) (Figure 8), underlying, once again, the importance of follow sourcing and the export-oriented low-cost

Table 7. The summary of main restructuring events in the EU + 1 automotive industry, 2005–2016

	Western Europe		Eastern Europe		Total	
	No.	Jobs	No.	Jobs	No.	Jobs
New factory	22	9569	438	169,238	460	178,807
Expansion of production	240	121,163	364	152,868	604	274,031
Rationalization, job cutting	529	−276,652	170	−65,050	699	−341,702
Plant closure	181	−86,395	41	−15,920	222	−102,315
Plant relocation	50	−14,667	18	−8516	68	−23,183
Partial relocation	35	−9480	4	−2100	39	−11,580
New R&D or technical center	2	355	9	4425	11	4780
Expansion of R&D center	7	1790	7	1760	14	3550
New logistics center	0	0	5	550	5	550
New shared services center	0	0	1	180	1	180
New administration unit	0	0	1	500	1	500
Total	1066	−254,317	1058	237,935	2124	−16,382

Source: Calculated by author from data in ERM (2017).

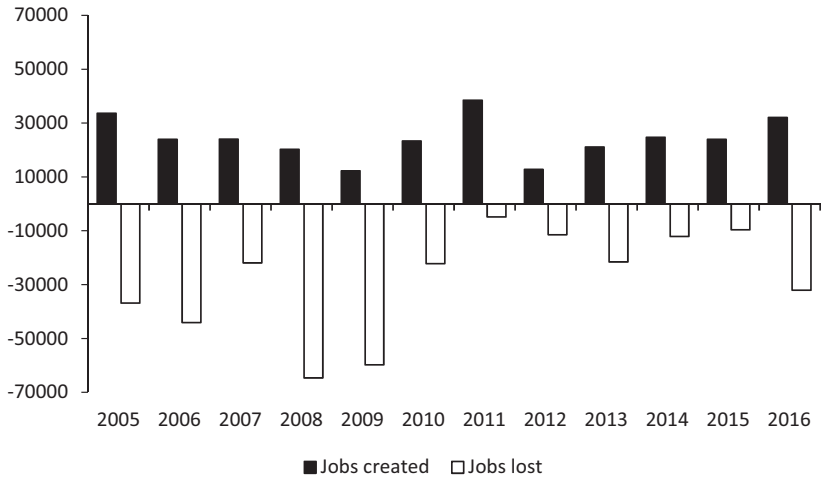

Figure 6. Job creation and job losses through *in situ* restructuring in the EU + 1 by year, 2005–2016.
Source: Calculated by author from data in ERM (2017).

manufacturing of components in the contemporary automotive industry and also uneven development of the automotive industry in integrated peripheries.

However, the number of plant closures and relocations was also relatively high in Czechia (20), Hungary (14) and Poland (12), which is evidence of the temporary nature of the spatio-temporal fix and of the constant search of automotive firms for cheaper and more profitable locations in lower-cost countries, such as Romania that experienced only one factory closure (in 2009) and no relocations. The average 2005–2016 personnel costs in the automotive industry in Romania were 53% lower than in Czechia, 49% lower than in Hungary and 38% lower than in Poland (Eurostat, 2018),

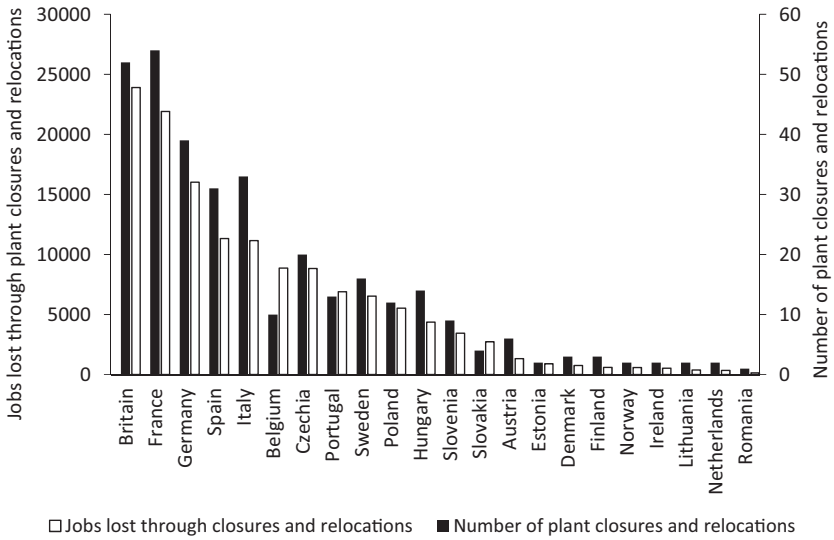

Figure 7. The number of plant closures and relocations (including partial relocations) and resulting job losses in the EU + 1 by country, 2005–2016.
Source: Calculated by author from data in ERM (2017).

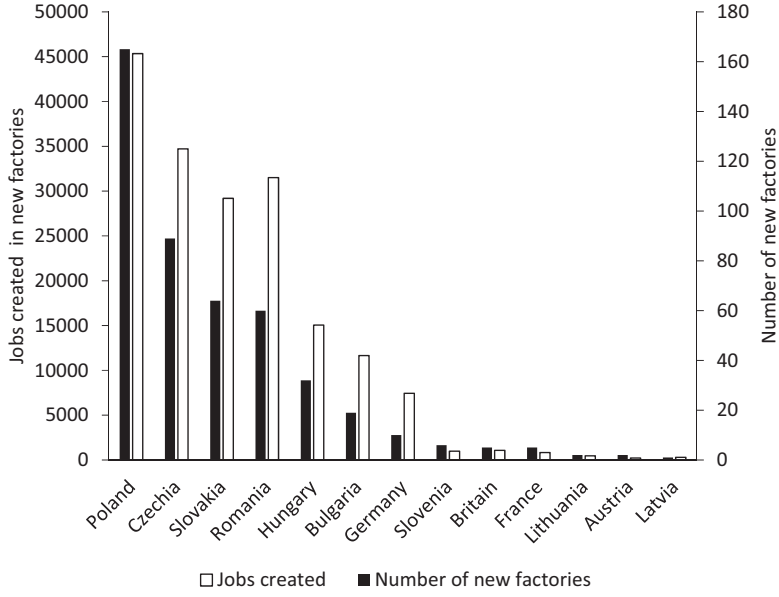

Figure 8. The number of new automotive factories and jobs created in new factories in the EU + 1 by country, 2005–2016.
Source: Calculated by author from data in ERM (2017).

which made Romania the most important target country for labor-cost driven relocations in Eastern Europe, as revealed by the ERM data (Table 2) and the interviews. At the time of the interview, 24% of the interviewed foreign subsidiaries in Czechia and 26% in Slovakia already relocated parts of their production abroad, while

16% in Czechia and 21% in Slovakia were considering future relocations. These figures tend to underestimate the extent of relocations since foreign subsidiaries that already relocated their entire production were not interviewed. Foreign subsidiaries engaged in labor-intensive and low value-added production were the most likely to experience and consider relocations to lower-cost countries, such as Romania, Bulgaria, Ukraine and China, which is in line with previous studies on manufacturing relocation (Pennings and Sleuwaegen, 2000; South and Kim, 2018), including the automotive industry (Lampon et al., 2015; Pavlínek, 2015). These subsidiaries tended to compare their labor costs with those in lower-cost countries, rather than with Western Europe, and frequently argued that labor costs were no longer low in Czechia and Slovakia. Although the gap in manufacturing labor costs between Eastern Europe and Western Europe narrowed between 1996 and 2016 because of FDI-driven growth in Eastern Europe that pushed wages up, it continues to be large. In 1996, the hourly costs in manufacturing in Czechia were 90% and in Slovakia 92% lower than in Germany. In 2016, the hourly manufacturing costs were still 75% lower in Czechia and 73% lower in Slovakia than in Germany (CB, 2018), while the average personnel costs in the automotive industry were 74% lower in both Czechia and Slovakia than in Germany (Eurostat, 2018). The importance of this continuing wage gap was acknowledged as one of the reasons for not considering relocation by 48% of the interviewed firms that were not planning relocation or partial relocation at the time of the interview both in Czechia and Slovakia.[7] Sunk costs (61% of the interviewed firms in Czechia and 38% in Slovakia), supplier relations (35% in Czechia and 48% in Slovakia) and skilled labor (39% in Czechia and 10% in Slovakia) were also frequently cited reasons behind the continuing production in Czechia and Slovakia and no plans to relocate production abroad. These results show that labor costs are only one of the factors firms consider when deciding whether or not to relocate and that other factors, such as sunk costs, supplier relations, labor skills and proximity to the market, are equally or even more important. The interviews also emphasized that the role of labor costs in relocation decisions depends on the nature of production and is especially important for the labor-intensive and simple assembly type of manufacturing operations.

6. Conclusion

This article has demonstrated the dynamic nature of the automotive industry, which is in a constant state of flux as automotive firms strive to improve or maintain their competitiveness and profitability not only through ongoing technological and organizational innovations in existing locations, but also through the location of production in superior locations from which they can derive excess profits. I have conceptualized the crucial importance of spatial strategies for the profit seeking behavior of automotive firms through Harvey's theory of spatio-temporal fix. I have explained how the formation of spatio-temporal fixes leads to the geographical expansion of the automotive industry into new areas, which I have called integrated peripheries, and, at the same time, restructuring in existing locations. I have also shown that the

7 The number of interviewed firms that were not planning relocation or partial relocation at the time of the interview was 46 in Czechia and 21 in Slovakia.

development of spatio-temporal fixes in integrated peripheries is conditioned by various organizational, technological and institutional fixes.

In the context of the European automotive industry, the empirical evidence presented here highlights the latest development of the spatio-temporal fix in the East European integrated periphery. In line with the theoretical argument, I have argued that this spatio-temporal fix has been driven by the search for low-cost locations compared to exiting locations in Western Europe, both the traditional core countries and older integrated peripheries. The theoretically explained importance of low wages and low corporate taxes for the development of this spatio-temporal fix (Harvey, 1982) was supported by the correlation analysis and by company interviews in Czechia and Slovakia, which also highlighted the importance of other cost-cutting reasons, along with organizational, institutional and technological factors (Layan, 2006; Pries and Dehnen, 2009), as important preconditions for the spatio-temporal fix to develop. Lower production costs in Eastern Europe compared to Western Europe created excess profit opportunities in Eastern Europe, which affected the geography of job creation and loss in the European automotive industry.

The firm-level analysis of large restructuring events in the EU + 1 automotive industry provided evidence of the increased internationalization of the European automotive industry through the increased role of foreign TNCs in both job creation and job losses. The geographic change in the European automotive industry was driven by the investment/disinvestment activities of automotive TNCs, mainly based in the global automotive industry core countries as TNCs from France, Germany, Italy, Japan, South Korea and the USA accounted for four-fifths of all created and lost jobs in the EU + 1 and also for four-fifths of all created and lost jobs outside their home economies between 2005 and 2016. Four-fifths of all newly created jobs in the EU + 1 were created by foreign firms, which also accounted for almost half of all job losses. The fact that large domestic firms accounted for only one-fifth of created jobs but more than half of jobs lost shows that large domestic firms, both in Western and Eastern Europe, were losing ground at the expense of foreign firms. This finding supports existing research pointing to the significantly enhanced role of large 'global' suppliers and the weakening role of domestic firms in the fiercely competitive automotive industry (Barnes and Kaplinsky, 2000; Humphrey, 2000; Pavlínek, 2018). However, as I have shown, the automotive industry in integrated peripheries and other less developed regions is under the control of foreign capital and is more significantly affected by this development than the automotive industry in core regions. In the European automotive industry, this situation is reflected in the overall weak performance of domestic firms compared to foreign firms in job creation in both old (Belgium, Portugal, Spain) and new (Eastern Europe) integrated peripheries. The empirical evidence presented in this article thus also demonstrates that large domestic firms in Eastern Europe failed to significantly benefit from the spatio-temporal fix and the massive job creation by foreign firms between 2005 and 2016. Instead, the position of domestic firms continued to weaken during the study period.

The high degree of concentration of job creation into several countries in Eastern Europe illustrates how spatio-temporal fixes operate: excess profit opportunities enjoyed by first movers attract competing firms to the same or similar locations in order to benefit from the same locational advantages that have been enhanced by institutional fixes in the form of large investment incentives, organizational fixes in the form of follow sourcing, and technological fixes in the form of modern infrastructure. At the same time, the analyzed data also underscore the vulnerability of integrated peripheries

since spatio-temporal fixes are only temporary. This is not only supported by significant job losses in older integrated peripheries of Belgium, Spain and Portugal but also in several countries of new East European integrated periphery, especially Czechia and Poland. This is another evidence of automotive firms constantly searching for more profitable locations within the EU and adjacent regions with lower wages, lower taxes and greater labor surplus that also have other preconditions for the development of the automotive industry in the form of necessary technological, organizational and institutional fixes. This spatial profit seeking behavior is especially prominent in labor-intensive manufacturing operations. The empirical analysis also demonstrated that the ongoing spatio-temporal fix in the East European integrated periphery results in geographic restructuring in existing locations in Western Europe, which is reflected in *in situ* restructurings, job losses, factory closures and relocations. The largest number of jobs created and lost was through *in situ* restructuring in Western Europe, which shows the continuing attractiveness of traditional automotive industry regions and strong commitment of automotive companies to existing locations.

The expansion of the automotive industry into new integrated peripheries and the related restructuring in existing automotive industry locations is not unique to Europe. Similar processes have taken place in North America at the continental scale through the peripheral integration of Mexico (Layan, 2000; Sturgeon et al., 2010) and southern U.S. states (Klier and Rubenstein, 2010), and the related deindustrialization and restructuring in the traditional core of the North American automotive industry centered on Detroit and southeastern Michigan (Klier and Rubenstein, 2008; Sturgeon et al., 2008). As the relentless search of automotive firms for excess profit opportunities through spatio-temporal fixes continues in Europe, we are likely to see further shifts in production from the existing locations in Western Europe into integrated peripheries and the related restructuring in Western Europe. These processes will result in the increased territorial specialization and finer division of labor within the European automotive industry. However, the traditional automotive industry regions of Western Europe will continue to function as the core area of the European automotive industry, accounting not only for the vast majority of high-value-added functions, but also for the majority of jobs and European production. Due to the persistent gap in labor costs, corporate taxes and generous investment incentives compared to core regions, the East European integrated periphery will continue to attract mostly lower-value-added and labor-intensive production of standardized cars and generic components, despite the gradual upgrading of its automotive industry (Pavlínek et al., 2009; Pavlínek and Ženka, 2011). Regional and local development effects of these changes will be significant in both the existing locations through job losses and in new locations through job creation and will thus contribute to the ongoing uneven development in Europe.

Supplementary material

Supplementary data for this article are available at *Journal of Economic Geography* online.

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