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How labor manages productivity advances and crisis response: A comparative study of automotive manufacturing in Germany and the US

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How labor manages productivity advances and crisis response

A comparative study of automotive manufacturing in Germany and the US

John Cody

GLOBAL LABOUR UNIVERSITY

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HOW LABOR MANAGES PRODUCTIVITY ADVANCES AND CRISIS RESPONSE

A Comparative Study of Automotive Manufacturing in Germany and the US

John Cody

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ABSTRACT

This research study will examine how labor manages productivity advances and crisis response in both the United States and Germany's automobile manufacturing sector, particularly in the context of technological application, workplace organization, and the political economies of both countries. In the US, labor is increasingly challenged through reductions in the workforce and lower wages while in Germany, labor has remained resilient even during the global economic crisis of 2008. This paper utilizes in-depth interviews with key actors in the automotive industry, field research at automotive plants, and an examination of relevant literature and data. Among the areas examined are automation, workforce training regimes, institutional factors, and outsourcing.

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1. INTRODUCTION AND THEORETICAL FOUNDATION

1.1. Introduction

The automobile industry, in the countries where it flourished, has traditionally been an important source of both employment and labor power. This labor power derived from an ability to effectively challenge capital, be it through strike power, a strong bargaining position, or both. In the US and Germany, labor agreements in the automobile sector have historically been important enough to set bargaining standards across industries, leading to real wage increases, quality health care, and other benefits that have been the hallmark of an industry seen as a traditional stronghold of labor. However, labor's power in the automobile sector has slowly been challenged in the last three decades. Against the backdrop of rising productivity has been the story of a decline in real wages and a weakened bargaining position. Even though this general trend persists, there have been differences between countries in important areas. Employment trajectories between the automobile industries of Germany and the US have been remarkably inconsistent. Employment in the US auto industry is falling, breaking below one million in 2007 and accelerating lower following the 2008 crisis. This outcome has mirrored the general decline of manufacturing employment in the US despite rapid growth in output. German autoworkers have avoided this fate, at least to the degree that manifests itself in the US. In Germany, automobile employment levels remain stable. Coinciding with falling automobile industry employment is the issue of productivity advances and technology's effect on the production process. How labor deals with technological change will continue to influence its future, and with recent developments in computerization and robotics, this issue takes on renewed importance for labor in manufacturing.

Germany and the US present a useful case study as they both feature extensive application of IT, widespread utilization of industrial robots in automobile production, and both have undergone similar crisis headwinds. At the same time, notably different outcomes in terms of wages and employment security have developed in both countries.

Ensuring job security, real wage increases and bargaining power are important goals for labor. However, methods for attaining these goals are often influenced by other institutional actors besides labor. As a result, evaluating institutional frameworks within a comparative model may elucidate how labor realizes or fails to realize its goals. Comparative examination of the institutional structure of Germany and the US requires analyzing stakeholder identity and agendas, government policy, firm strategies and the level of socialization within the state. These institutions and policies are effected in turn by labor's interests and vice-versa. While much literature has focused on the role of globalization and institutional arrangements between and within countries, this study seeks to

more deeply explore the role of technology and institutional arrangements between countries, which this paper will argue are areas of growing importance for labor.

The following serves as a summary of the paper's structure. Section one is the introduction and theoretical foundations for the paper. The first part examines how technology and innovation have historically influenced the workforce while the second looks at the Varieties of Capitalism (VoC) model, which may help explain the different outcomes for labor seen in the US and Germany. Section two provides the general contours of the automobile market and the development of technology and automation within the industry. The third section explores collective bargaining in Germany and the US, primarily focusing on the 1980s to the present, including an analysis of events following the 2008 crisis. Subsumed within this analysis is an examination of the industrial relations configurations of both countries, which focuses on explaining the role of unions in the US and the role of the dual system of works councils and unions in Germany. Section four further explores labor perspectives on legacy costs, co-determination and offshoring. Finally, section five contrasts vocational systems in Germany and the US and trends in skill polarization.

1.2. Technology's Impact on Labor

Extensive research has documented the growth in wage and skill polarization since the 1980s, with the primary factor fueling this trend attributed to the growing use of IT and computerization within the US economy (Autor et al., 1998; Bresnahan et al., 2002; Beaudry et al., 2013). This trend has also held on a European-wide level (Goos et al., 2009). Autor and Dorn (2012) write that particularly susceptible to this technological shock has been middle-skill jobs, many of them in manufacturing, involving tasks that are routine, repetitive and codifiable that are especially susceptible to automation. They write (2012: 4) further, "there has been a transition in the manufacturing sector from labor intensive production to capital intensive flexible specialization in the industrialized world" and that labor released from the manufacturing sector may be absorbed in other parts of the economy but that seems increasingly unlikely. Others claim structural unemployment will be a worldwide phenomenon due to advances in computerization, software, and robotics (Rifkin, 1995).

A number of organizations have also increasingly documented technological implications on the overall workforce. The OECD study *Growing Unequal* indicated that "technological progress tends to widen the wage distribution by making the demand for skilled labour higher than for unskilled labour" (OECD, 2011: 115). Writing for the New York Federal Reserve, Deitz and Orr (2006) indicate that productivity advances and international competition for labor-intensive production has led to a growth in demand for high-skilled jobs in manufacturing at expense of overall employment numbers in manufacturing, particularly for low-skilled workers.

Commentators have identified our current transitional phase as the Third Industrial Revolution, marked by rapid advances in IT, robotics and digital technologies (McAfee and Brynjolfsson, 2011). Technology may have reached a tipping point where, due to rapid growth in processing power, computers are increasingly encroaching on tasks where human intelligence is losing its comparative advantage to machine intelligence (ibid.). Following the 2008 crisis there has been a surprising growth in corporate profit levels without a subsequent increase in hiring. Developments within the US manufacturing sector, and to a lesser extent, the German one, seem to demonstrate a secular trend towards a sectoral-wide reduction in employment. The OECD found that between 2000 and 2009, Germany lost approximately 700,000 manufacturing jobs representing an 8.3 percent decline while the US lost a total of 5.7 million jobs, representing a 30.2 percent decline.[1] The US thus suffered four times as many manufacturing job losses as Germany in that time period. This decline in jobs came despite a very large increase in output. According to a congressional report, the US increased its output by 60 percent between 1997 and 2005 (Platzer and Harrison, 2009: 8). The report partly attributed this to the "application of new technologies such as robotics and computer software on the factory floor" that increased productivity and cut prices, but led to employment reductions (idib).

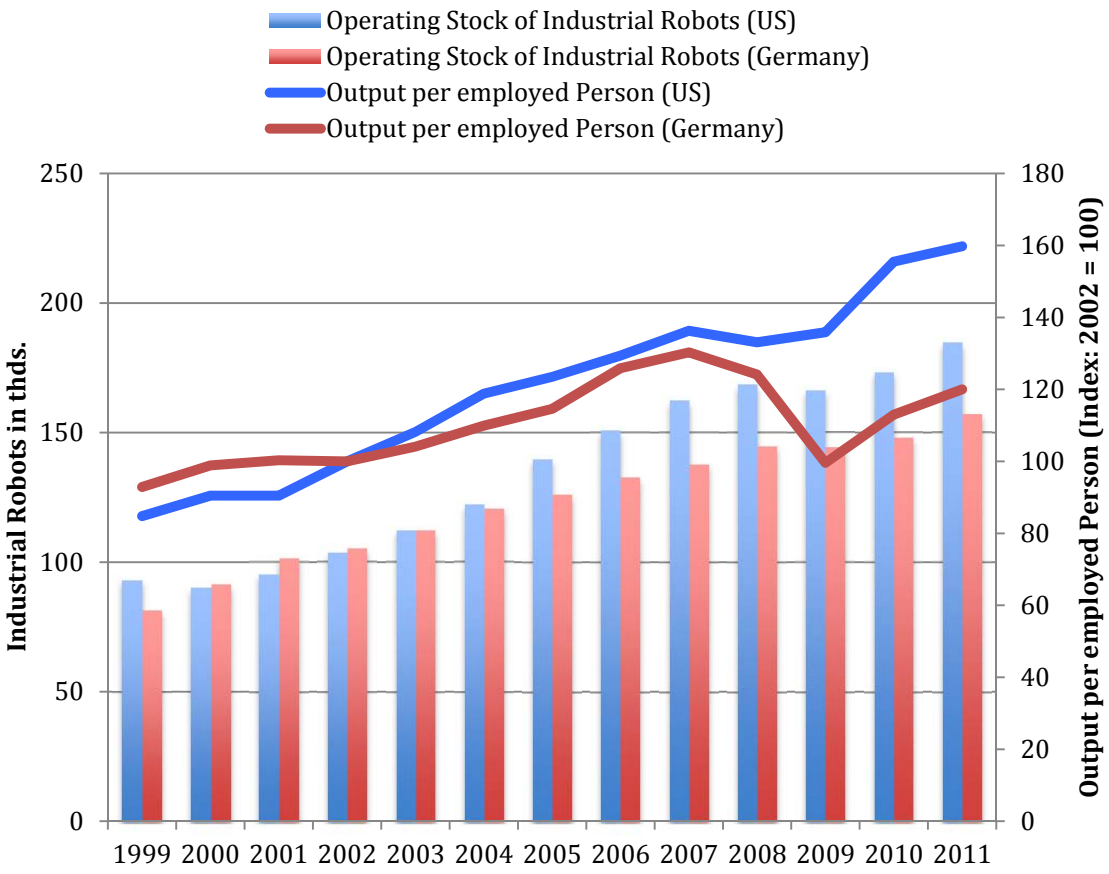
Automation within the manufacturing sector is associated with increasing usage of computerization and robotics. Kromann et al. (2012) write "that at the most aggregate level, the whole economy, automation is likely to reduce employment in the manufacturing industry since overall less labor input is used to produce the same amount of products." The operational stock of industrial robots has been growing in the US and Germany, which may have an influence in the rapid growth in output per employee (Figure 1). There are arguments that manufacturing no longer matters to the US economy as it increasingly transitions towards a service economy. However, such claims belie the fact that the US's share of manufacturing within the world economy was 25 percent in 1982 and remained at 25 percent in 2005 despite the enormous growth of Asian producers (Herrigel, 2010). This illustrates that one of the growing, if overlooked trends in manufacturing, is the growth in productivity at the expense of employment. As such figures illustrate, outsourcing also does not provide an adequate explanation for the US's loss of manufacturing workers and massive growth in output. A significant "reshoring" of US industry could certainly lead to a marked employment boost in the short- to medium-term but may not amount to long-term growth in employment. As companies have demonstrated, when they are unable to offshore labor-intense areas of production, they often find ways through computerization, robotics and IT to drastically reduce labor input, such as Amazon's push to automate its warehouses through the use of robotics.[2]

[1] OECD Statistics, total employment in manufacturing ISIC 15-37

[2] Kopytoff, Verne "In Warehouses, Kiva Robots do the Heavy Lifting" *MIT Technology Review*, 2012 July 20.

Manufacturing continues to be an important area for employment, partly due to its multiplier effect on the economy. Charles et al. (2013) estimated that due to manufacturing's large indirect effect on employment the overall 45 percent of the increase in non-employment from 2000 to 2011 could be accounted for by the decline in manufacturing, thus indicating the outsize effect manufacturing losses can have in the wider economy. Massive losses in manufacturing were likely masked by a credit fueled housing boom in the US from 2000 to 2007 (ibid.). However, following the crisis the hollowing out of the manufacturing sector has accelerated.

Figure 1: Operational Stock of Robots and Output Per Employed Person (US and Germany)



Source: IFR and Federal Reserve of St. Louis.

Does this wider trend find itself developing in the automobile sector as well? If so, how is labor reacting to this development and what methods can it use to offset this trend? Are differences between the US and German automobile employment outcomes dictated in part by their institutional arrangements?

1.3. Varieties of Capitalism

There is a contention that due to market liberalization countries are converging in areas such as technological implementation and 'best practices' while national institutions have increasingly little influence over these market forces (Baccaro and Howell, 2011). However, the Varieties of Capitalism (VoC) model challenges this view, positing that there are indeed institutional differences between countries that have profound effects on areas such as real wages, employment opportunities and levels of social protection (Hall and Soskice, 2001). The VoC theory does offer compelling arguments that support its case, often using the US and Germany as examples to illustrate these differences. Furthermore, there is evidence that the basic institutional settings and the role of stakeholders have a profound effect on capitalist development within countries. Countries like Germany are typical examples of Coordinated-Market Economies (CMEs) which are often viewed as a "more egalitarian form of capitalism" (Thelen, 2010: 646). They feature coordinated and centralized collective bargaining, codetermination models, and highly regulated systems for training and skill development (ibid.). The CME model also tends to contain advanced welfare states which reduce distributional conflicts amongst stakeholders. These elements of the CME model are designed to enhance CMEs countries, "export position in areas of wage negotiations, research and development and product standards" (Whitley, 2010: 649). Liberal-Market Economies (LMEs) such as the US are characterized by plant-level collective bargaining models, weak labor regulations and utilization of low-wage labor (ibid.). Whitley contends that LMEs "derive profits by squeezing rather than by cooperating with organized labor" (ibid.).

VoC contends that institutional arrangements help predict which economic areas a nation will excel at, with LMEs specializing in fast-paced industries typified by *radical innovation* (such as biotechnology, telecommunications and software development) while CMEs excel at *incremental innovation* through continuous improvement of already existing products, such as machine tools, durable goods, and factory equipment (Soskice and Hall, 2001: 39). However, both models are successful from an economic standpoint. As Hall and Soskice (2001) write, "The institutional structure of a particular political economy provides firms with advantages for engaging in specific types of activities there. Firms…produce some kinds of goods more efficiently than others because of the institutional support they receive for those activities in the political economy." LMEs achieve comparative advantage in certain industries through loose labor laws that allow for ease in hiring and firing, higher labor mobility and developed capital markets including extensive use of venture capital, all of which facilitate higher risk taking in LMEs. CMEs are expected excel in incremental innovation, as the "workforce (extending all the way down to the shop floor) is skilled enough to come up with such innovations, secure enough to risk suggesting changes to products or process that might alter their job situation, and endowed with enough work autonomy to see these kinds of improvement as a dimension of their job." The literature of the VoC model points to the automobile industry and manufacturing in general as beneficiaries within CME nation-states.

However, do these differences really exist between the US and Germany as the VoC model contends? If they do, is the German system truly more "egalitarian" or able to provide a viable framework for ensuring employment? Furthermore, can differences between the LME model and CME model account for moderating effects on wage polarization and technological change on the workforce? There are a number of elements within the CME and LME models that may shed light on employment outcomes. For example, employer organizations in CME economies are highly organized in comparison to LME economies. Wilkins writes (2010: 648) "Historical analysis shows that labor strength and employer strength do not stand in a zero-sum relation to one another, but in fact go hand in hand. It is no coincidence that the countries we associate with more egalitarian outcomes feature a high degree of coordination on both sides of the class divide…Coordination on the employer side does appear to be very useful and perhaps even necessary for sustaining high levels of social solidarity." Soskice and Hall (2001) further underline the importance of organized employer systems, noting that as market liberalization continues, the measure of firm-level cooperation amongst employers plays a measurable role in in social and economic outcomes.

There has been a greater emphasis on production and efficiency issues in response to globalization, causing "labor politics in the advanced capitalist countries to move away from labor's traditional national distributional agendas towards employers' firm-level concerns with productivity and efficiency" (Thelen, 2001: 71). While this trend has been the same in LMEs and CMEs, more conflict has arisen in LMEs between labor and employers due to the lack of complementary structures including "long-term financing and collective provisions of skills" that are seen in CMEs (Thelen, 2001: 72). Since unions are the only real institution coordinating labor's role in LMEs, labor's position has weakened as the fortune of unions have declined. Thelen (2001) finds that in countries such as Germany, employers would rather reform their current coordinated arrangements with labor than overthrow the system. Large export-oriented employers there have demonstrated a wish to maintain peace at the plant-level to protect Germany's high-quality product production model.

There are other elements within the VoC model regarding how stakeholders cooperate and what structures govern such cooperation, which inform social and economic outcomes. The role of *socializing agencies* as institutions imbues values and norms amongst social stakeholders within a political economy, which in turn may provide actors in LMEs and CMEs with social perspectives that direct their actions. In terms of power relations, the arrangement of institutional hierarchies provides social actors with necessary resources and determines the level of coordination within an economy. In relation to this hierarchical structure, a political economy's formal and informal sanctions and incentives can help predict how stakeholders will respond to new challenges (Hall and Soskice, 2001: 5). These incentives and sanctions can take the form of government access to programs to help pay workers' wages during downturns or business community

pressure for non-conforming members to adhere to bargaining agreements within an employer association.

The general theories and framework of the VoC model may inform an analysis of the German and US automobile industries, especially in regards to how labor, particularly organized labor, navigates in each country. Although there has been criticism of the VoC model for being too rigid to deal with the fast-paced changes engendered by globalization,[3] the model provides a solid vantage point for analysis. By examining the rapid development of technology within Germany and the US through the VoC framework's perspective on vocational training, capital structures, and government coordination, it should reveal crucial differences that can aid labor in it's struggle to overcome the challenges facing it.

1.4. Hypothesis

A significant factor in recent employment declines in the US relative to Germany is related to productivity advances stemming from technological application and insufficient crisis management in the context of the US's market-oriented institutional arrangement. Germany's coordinated economic model has shielded labor to a large degree from productivity enhancements and crisis through the market moderating influence of the CME model.

2. THE AUTO MARKET AND TECHNOLOGICAL APPLICATION

2.1. The Auto Market for Germany and the US

Automobile producers in Germany and the US are both facing significant challenges in the form of intense competition and cyclical market variations. Of particular concern is market saturation in both countries, with vehicle sales in Germany and the US predicted to decline over the long-term (Haugh et al., 2010). The US market has remained healthier, with 14.4 million vehicles sold in 2012[4] while only three million were sold Germany.[5] The size and demand in the US market has allowed the Big Three producers (Chrysler, Ford and General Motors) to focus on domestic production and sales while German producers have traditionally been more export-oriented.

There are some notable differences and similarities between domestic automobile producers from Germany and the US in terms of both their market performance and the domestic environments they operate in. The German auto market is made up of seven large manufacturers, two of which operate under the

[3] For example, Herrigel (2010) and Streeck (2011) contend that while institutional arrangements remain significant factors in the economic outcomes of countries, globalization and technological change have forced actors to reevaluate rules and find creative solutions that challenge institutional path dependency.
[4] Federal Reserve Bank of St. Louis: Light Weight Vehicle Sales: Autos & Light Trucks.
[5] VDA.

Volkswagen umbrella: Porsche and Audi. The others are BMW, Daimler and two companies with management control ultimately stemming from the US: Ford and GM Opel. Auto sales in the German domestic market have slowed in recent years, presenting a challenge to auto producers. However, the German auto market has compensated for this with increased exports. Approximately 47 percent of domestic production Germany were exported in 1991, 60 percent in 1997 and 77 percent in 2011. In 2011, that amounted to 4.5 million vehicles, a record amount of exports (VDA, 2012: 28). German automakers such as VW have been successful at producing vehicles that create demand in emerging markets, such as the BRIC countries. This development bodes for German producers as domestic markets become saturated.

Within auto-manufacturing there has been a general trend towards consolidation, with the OECD noting (Haugh et al., 2010: 5), "the minimum efficient scale of production has increased over time, spurring mergers and acquisitions in order to gain economies of scale." Within an industry as large as the automobile industry, and one that serves as an important source of employment, numerous agreements are often preserved within mergers that guarantee no job losses, or very little (Sturgeon, 1999). For example, as a part of Daimler's merger with Chrysler in 1998[6], Daimler had to guarantee that there would be no job losses at Chrysler plants (Sturgeon, 1999: 83). VW in Germany has also gone on an acquisition spree but has preserved the boards and the general operations of the companies it absorbs.[7]

One notable difference between the US and Germany is that foreign transplants from Asia never made significant inroads in the European markets. Factors that account for this include the similar models of vehicles offered by European producers which tended to also be as fuel efficient as the Japanese models and protectionist measures in the form of import quotas. McKinsey also notes that Japanese producers did not offer direct-injection diesel engines and enough safety features to satisfy European consumer tastes (McKinsey, 2002: 21). The Japanese failure to substantially penetrate the European market appears to have benefited organized labor, as the US context will demonstrate.

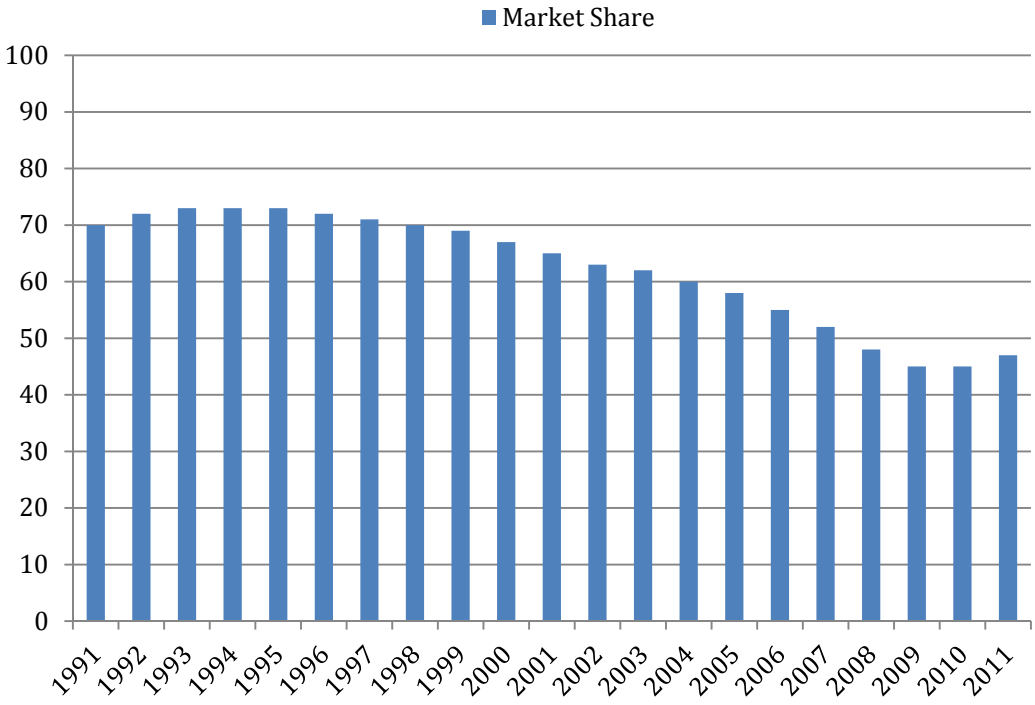
When the Japanese transplants first arrived in the US, there was a general recognition they had far higher levels of productivity than the Big Three. Interviews with UAW officials indicated concern with transplants has been long running. Japanese auto companies utilized a different method for producing vehicles known as lean production. Lean production is characterized as reliance on just-in-time inventory, the usage of statistical controls in the production process and flexible multi-skilled teamwork (Womack et al., 1990). By eschewing the inventory building of the mass production system, lean production can diminish excess waste and reduce costs. Through the '*kaizen*' process workers

[6] Fiat and the UAW currently own Chrysler.
[7] VW's workforce went from approximately 329,000 workers in 2007 to 555,000 in 2012, almost doubling through acquiring producers such as Audi, SEAT, Scania, MAN and Porsche.

were expected to improve efficiency through problem solving and constant quality control (ibid.). However, some writers have asserted that lean production has not truly led to worker empowerment or skill upgrading but only to work intensification and an increase in management control of the workforce.[8]

As transplants[9] entered the US market, the Big Three lost significant market share (Figure 2). It has been alleged that rigid work rules and confrontational labor relations were initially responsible for this decline (Katz, 1987: 685). However, other factors came together that were certainly outside the control of the unions. In particular, concerns about fuel prices made the smaller fuel-efficient Asian cars more desirable to US consumers. Since the Big Three have been heavily reliant on domestic sales of light trucks (SUVs, minivans, pickup trucks) to generate profits, rising oil prices in the late 2000s further shifted consumer preference towards

Figure 2: Market Share of the "Big Three" in the US



Source: Ward's Auto

[8] Rifkin (1995: 183) and Huxley et al. (1991) both take this view. Huxley et al. write that lean production should be seen merely as an extension of Fordist mass production and that claims of "skill upgrading" are overblown. Lean production can be characterized as more of an intensification of work and a subordination of workers' interests to that of the company. Management in lean production has successfully framed a constant demand that workers incorporate quality control as a "collaborative effort" and not simply an effort to extract further value from workers. Furthermore, they argue Taylorist work principles continue to be a fundamental element of lean production as workers are still expected to perform tightly regulated and narrow job tasks.

[9] Transplants in the US include Nissan, Mercedes, Mitsubishi, BMW, Honda, Mazda, Kia, Toyota, Volkswagen, Subaru, Suzuki and Honda, which in total employ approximately 107,500 people as of 2009 (Platzer and Harrison 2009: 17).

smaller vehicles (Haugh et al., 2010: 5). The 2000s were also marked by additional troubles for the Big Three such as ample debt burdens, pension and health care costs, and markets saturation due to extreme use of vehicle discounts.

The steady growth of part suppliers at the expense of final assembly positions has been a growing trend in the US. While German producers tend to produce many components in-house, US producers are far more vertically disintegrated. This trend is reflected in the workforce, with German employees in parts production growing from 294,000 in 2013 from 251,000 in 1995, while final assembly jobs grew from 367,000 in 1995 to 437,000 in 2013.[10] As can be seen, parts suppliers have not grown at the expense of final assembly jobs as they have in the US (as shown in Section 4.2.).

While US and German automobile producers face a number of similar challenges in terms of reducing costs, increasing innovation, and dealing with exogenous shocks in the form of oil prices or economic downturns, both country's domestic producers feature unique market strategies and product niches. In addition, domestic pressures have been particularly acute for the Big Three auto producers in the US where organized labor is concentrated. Before we turn to union collective bargaining history and labor strategies in the auto industry, first we will examine the effect of automation and technological change in the auto industry to better understand how labor has confronted productivity increases in both the US and Germany.

2.2. Technology and Productivity in the Automotive Sector

The auto industry is capital-intensive with a high capital-to-labor ratio (Nunnenkamp, 2010: 5). Technology, most often applied in the form of industrial robots and IT systems, has a profound effect on labor in manufacturing.[11] The automobile industry has historically made extensive use of automation. In 2004, Germany had 1,150 industrial robots per 10,000 workers while the US had 800 industrial robots per 10,000 workers.[12] The automobile industry features a low ratio of workers to industrial robots (IFR, 2013) compared to other industries. Industrial robot versatility has improved tremendously over fixed forms of previous automation, with the introduction of computer circuitry that has fostered 'flexible automation'. Streeck (1988: 23) writes that computerized equipment "can be designed as to be far less dedicated to given products than equipment automated on the basis of conventional electronics…since machinery equipped with microelectronic controls is easily retooled, it can be used for highly diversified production of individualized products." In the auto sector industrial robots excel in areas such as body shop welding or painting—areas where robots can perform the same operation as many times as necessary with better precision than human labor. In tasks that require more manual dexterity, such as final

[10] IG Metall Brochure, Vorstand 01 - "Daten Acht Monate 2013 und Ausblick".
[11] While the subject of technology in the automotive sector is a broad one, for the purpose of this section, the focus of technological implementation primarily relates to the production process itself, such as the application of industrial robots or IT.
[12] International Federation of Robotics

assembly, robots are not tactile and dexterous enough yet (at least robots that are cheap enough to be introduced en masse into the production process).

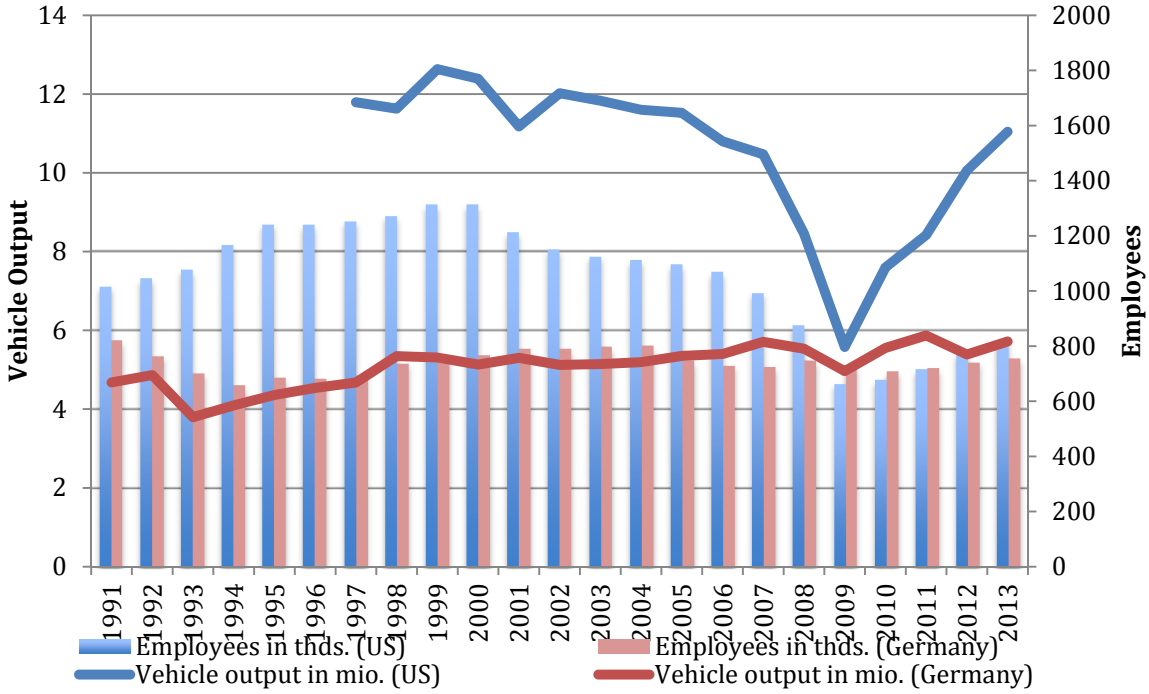
Other factors have accounted for productivity increases besides industrial robots, with IT adding another technological tool for automakers. IT allows firms to monitor equipment, integrate various elements within production, monitor labor, increase product testing and design, streamline procurement[13], and increase efficiency in clerical and logistical areas. Industrial robots have grown much more flexible than previous generations by combining modern computing elements and IT into their design. While the adoption of lean production has also certainly helped to account for increases in productivity, many authors have noted that US auto manufacturers have been slow to introduce lean production, and instead have focused on retooling mass production through the use of automation and a reduction in product variation (Katz et al., 2013). Perhaps one of the most overlooked elements of lean production is its extensive use of flexible automation. A study conducted by MacDuffie and Pils (1997) indicated that Japanese auto plants, both within Japan and the US, are far more automated than US and European plants. They further note (1997: 242) that within manufacturing plants "automation has been on the rise since 1989" in all departments and that there is a significant shift in firms from fixed automation to robotics. Between 1989 and 1993/94 that average number of robots used per vehicle/hour rose 60 percent, from 2.3 robots in 1989 to 3.7 in 1993/1994 (ibid: 247). Their study demonstrates that Japanese lean production methods are not entirely about work organization methods, but also rely heavily on technology and robotics for productivity increases.

Further developments in the US point to automation increasing output without a corresponding increase in labor input. According to the BLS, labor productivity in the automobile sector rose significantly between 2000 and 2007, an average compound rate of 6.4 percent per year while the average amount of hours worked decreased 4.4 percent per year,[14] ruling out an increase in work intensity as a factor in this increase. This development can be seen within automobile parts suppliers as well. Collins et al. (2007: 19) cite that from 2000 to 2005, output per hour in the parts sector rose 28.6 percent while between 2000 and 2006, 128,200 jobs were lost (26.2 percent). This period also coincided with strong demand for automobiles. They further indicate that automation contributed greatly to job decline as demand was not great enough to overcome the impact of productivity gains on the workforce. Overall employment in all of North America and Central America has dropped from 2 million in 2000 to 1.5 million in 2013 (a 25 percent reduction) with automation and increased efficiency increasingly fingered as a major factor.[15] The UAW has also seen industrial robots become more proficient

[13] While not related directly to the production process, IT and computer technologies have the potential to increase competition amongst suppliers as well. Online marketplaces now allow for real-time bidding and access to various suppliers across geographical space that were previously unavailable (Moavenzadeh, 2006).
[14] Bureau of Labor Statistics' Spotlight on Statistic Series.
[15] Plumer, Brad "How Mexico is upending the U.S. auto industry" *The Washington Post*,

at a variety of tasks, reducing the need for workers in many areas within the last 15 years (Cooper, interview, September 25, 2013).[16] As interviewees noted, the UAW is increasingly unable to counter such trends as they lose power in areas of job control. The same trend is occurring in Germany as well. For example, the new VW Golf 5 model needs 25 percent less labor hours to produce than the previous Golf model, indicating a more efficient production process (Donath, interview, October 2, 2013). However, such efficiency increases have not necessarily coincided with a drop in employment. While German output has increased only marginally in relation to employees, the same has not been true for the US (Figure 3). This trend truly manifests itself following the 2008 crisis, when the auto bailout provided employers with the opportunity to truly exploit gains in productivity.

Figure 3: Vehicle output and employment levels in Germany and the US



Source: VDA, Ward's Auto and the U.S. Bureau of Labor Statistics.

Moreover, robots are increasingly adept at complex tasks that have traditionally required human dexterity. MacDuffie and Pils (1997: 245) write that industrial robots using sophisticated scanning equipment to check body dimensions in plant body shops were only seen in 15 percent of the automotive factories they studied at the time, but expected the figure to increase over time. The precise use

2013 October 13.

[16] Many of the tasks performed by industrial robots, while replacing workers, are seen as beneficial in terms of job safety. For example, workers in production used to remove finished dies from die casting machines by hand while robots now perform this task. The weight of the die and the heat within the work area made the job previously extremely strenuous on workers (Cooper, interview, September 25, 2013).

of lasers, cameras and sensors, along with an increase in computing power, now allow industrial robots to scan vehicles accurately for defaults and also precisely place panels and instruments into vehicles with proficiency.[17]

Despite the threat of technological incursion on employment, interviews with UAW and IG Metall officials indicate that organized labor views technological development—both through production efficiencies and production innovation—as essential to company success, while at the same time acknowledging that at times increased productivity has resulted in lost jobs, particularly for the UAW. Erik Perkins, head of the Research Department of the UAW, related that there is constant pressure to increase efficiency, with the labor hours per vehicle continuously dropping in UAW plants, from 40 to 30 hours or from 30 to 20 hours (interview, September 23, 2013). With auto producers pushing for a two percent increase in productivity per year, such reduction in labor input can be expected (ibid.). He noted further that productivity increases have not always been fully realized due to issues with demand. While auto plants became efficient enough to produce 500,000 of the Ford Taurus or Chevrolet Malibu models, demand did not support these productivity increases, leading to crisis in the industry. As a result, productivity issues got lost in overcapacity issues for the UAW (ibid.).

While German auto producers utilize more industrial robots per worker than the US, manufacturing employment in Germany remained relatively stable in comparison. This could suggest that Germany's CME model and stronger unions have been more successful at combating any potentially negative effects of technology. As will be addressed in the following sections, collective bargaining has played an essential role in managing increasing productivity, especially for the US, where external institutional factors are not nearly as strong as they are in Germany.

[17] Ford Corporate Press Release 'Robots with Laser Eyes and Suction Cup Hands Boost Quality of Louisville Assembly Plant and the All-New Ford Escape' accessed at: http://corporate.ford.com/.

3. COLLECTIVE BARGAINING AND CRISIS RESPONSE

3.1. Industrial Relations in Germany and the US

There are substantial variances in the institutional settings within the US and Germany which help account for different outcomes in labor's ability to bargain. The German industrial relations system is defined by a dual structure involving both unions and works councils. In comparison, unions in the US serve as a sort of combination of both, bargaining on issues such as wages and healthcare while also managing areas such as consultation on new technology in production, typically an area a works council would focus on in Germany. How collective bargaining has advanced in both countries in the 1980s through the present reflects labor's strategies for dealing with issues such as technology, outsourcing, and changing market conditions.

3.2. Collective Bargaining and Union Strategy in Germany

IG Metall (*Industriegewerkschaft Metall)*, the largest affiliate of the DGB (*Deutscher Gewerkschaftsbund*), has 2.25 million members as of 2013, with about 30 percent either unemployed or retired.[18] Within the auto industry, nearly 60 percent of workers are unionized while in auto parts manufacturing there is a lower density of approximately 40 percent.[19] The metalworking industries have a considerable influence on wage negotiations across sectors (Haipeter, 2013), with the automobile sector serving as a particularly strong trendsetter on bargaining patterns (Jürgens et al., 2006: 20). Collective bargaining is centralized nationally in German industry along sectoral lines. These national agreements (*Flächentarifvertrag*) apply to companies within the employers' associations, underlining the importance of having employers who are also organized in the CME system.[20]

Given that works councils play an essential role in the German industrial relations system, it is worthwhile to explore their function. The Works Constitution Act (*Betriebsverfassungsgesetz)*, a federal law first instituted in 1952, provides the basic legal framework governing works councils.[21] According to this law, works councils only have direct influence at the plant-level while unions are left to focus

[18] Approximately 90 percent of the workers are organized in the electrical and metalworking industries, which encompasses areas as varied as wood working, plumbing, and textiles.
[19] Figures provided by IG Metall staff.
[20] In general, a high degree of employers' association coordination provides an effective bargaining partner on labor agreements. Although there has been a trend of employers leaving these associations, all the major OEMs continue to be represented by an employers association, with the exception of VW which has a special contract particularly favorable to labor.
[21] The Works Council Act was further strengthened in 2001 in terms of participatory rights afforded to works councils, underlining their importance in the German industrial relations model (Hübler and Jirjahn, 2003: 471).

on collective bargaining at the sectoral level. Among the purview of works councils are helping determine when work ends and begins, issues related to restructuring, technology implementation, and areas such as job classification (Mueller, interview August, 8, 2013). While works councils do not have co-determination rights in regards to training practices, they do have an advisory role. By presenting initiatives on training the works council is able to have some influence on plant-level training programs (Berg, 1995: 85).

Both the unions and works councils work in close cooperation. Besides partaking in consultation and informational exchange with one another, works council members are comprised primarily of union members. Within the metalworking industry, about 72 percent of all works council representatives are IG Metall members, and within the OEMs, density is even higher, nearing 90 percent (Bispinck and Dribbusch, 2011: 25). Given the high rate of unionization within works councils, they are seen as valuable partners for organized labor. According to Bispinck and Dribbusch (2012: 14) in the metalworking industry, "all members of works councils who are members of IG Metall are considered by the union as ex officio trade union representatives. They are often members in the union's bargaining commissions and elected as local, regional and national delegates to union conferences."

Historically German unions did not have particularly high density, never exceeding 34 percent of the workforce, even in the 1970s (Haipeter, 2013: 5). However, unions derived their strength through effective pattern bargaining, thus providing standardized wages and work rules to workers within sectors, even when workers were not a part of the union. This bargaining strength is partly facilitated by low competition amongst unions due to the centralized organizational capacity of the DGB, which serves as an umbrella union (ibid.). Unions in Germany on the whole have attempted to keep differentials in wages to a minimum, compressing wages between skilled and unskilled workers (Streeck, 2011: 5). This strategy reduced competition between workers, strengthening both the unions and the workforce in general, and helping to account for the historically low levels of wage polarization in the German economy.

German labor has nonetheless experienced a number of crises in the form of overcapacity and falling demand. Prior to the 1990s, IG Metall was routinely successful in securing real wage increases for its workers. This was supported by German industry's focus on diversified quality production, which required a high-skilled workforce (Streeck, 1992: 19). The first crisis of the 1990s for IG Metall occurred in the German automotive sector between 1991 and 1994 when problems with overcapacity and a stark drop in demand reduced the workforce by approximately 20 percent. This period also saw Volkswagen introduce a 28.8-hour workweek at the end of 1992. As in the US, Germany also implemented early retirements in order to avoid dismissals, often with the help of the government subsidies. While the government eventually withdrew support for this program as it became too costly, such intervention underlined government's willingness to

participate in the successful restructuring of the German automobile industry at the time (Streeck, 2010: 56-57).

Following the crisis of the 1990s, collective agreements have increasingly featured a number of "opening clauses" allowing for derogations at the plant-level. Among the factors leading to these derogations was the inability for productivity increases to compensate for a lack of production demand (Jürgens et al., 2006). The 'Pforzheim Accord' in 2004 allowed an increase in plant-level bargaining that has prompted further concern that employers will "opt-out" of their agreements (Lehndroff, 2011). Despite a growth in plant-level agreements, these derogations usually contain provisions for ensuring job security at the price of lower wages or flexibilization of working time (Turner, 2009: 303). In 2006, 4 out of 5 of these agreements contained guarantees on job security (Haipter and Lehndroff, 2009: 39).

The 2004 and 2005 agreements focused even further on job protection as demonstrated by employment guarantees being increased from an average of two years to six or seven years (Jürgens, 2006: 23). These contracts usually stipulate that workers cannot be laid off due to economic reasons for periods of five to seven years, including the implementation of new technology.[22] IG Metall often focuses on the role of technology in its strategy to *increase* employment or at least keep jobs in Germany. For example, its *Better not Cheaper* program was designed to reduce relocation of workplaces by advocating for innovation within plants to drive down production costs while avoiding layoffs and deterioration in pay (Lenderhoff, 2011: 17-18). Works councils are active in supporting such programs, which Lehndroff (2011: 19) notes have a deep level of expertise in areas such as accounting, consulting, and even engineering, which can formulate alternative proposals that avoid job losses or outsourcing. Attempts were also made to lower the retirement age to 60 on top of bargaining for wage increases. Although unsuccessful, employers agreed that workers with more seniority could enter early phased retirement (*Altersteilzeit*), which allows workers to spend their final six years working half of the time (Mueller, interview).[23]

The Daimler plant in Kassel illustrates the derogation trends seen in the German automobile industry.[24] In 2004 a new management chief was installed at the Kassel plant who argued that if the plant cannot become profitable it must be

[22] IG Metall has found that job security is not enough. When IG Metall agreed to reduced working hours at VW in the 1990s they also found that the overall headcount was being reduced through attrition, prompting IG Metall to also fight to keep the number of positions within job sites fixed to a certain number (Mueller, interview, August 8, 2013).
[23] Renate Mueller, former vice-president of the Volkswagen Kassel plant, is a participant in this program. She indicates phased retirement has allowed her to spend her final six years working half time. In practice many employees work full-time the first three years and then spend their final three years getting paid at a full income. The employers partially compensate for retiring early but do not cover the entire shortfall in income that is incurred for retiring early (Mueller, interview, August 8, 2013).
[24] The Daimler plant produces axles for trucks and gearboxes and employs approximately 3,000 workers, of which 1,200 work in production (85 percent are classified as skilled workers). Dieter Seidel, president of the works council at the site, provided an in-depth interview about labor's situation at the plant.

shutdown. Daimler claimed that of the 3,000 employees at the plant, 600 needed to be laid off in order for Daimler to justify operations there. The works council and IG Metall fought this proposal. The works council hired its own consultant to evaluate how costs could be reduced at the plant without eroding wages or enacting layoffs. After negotiating with management, the works council agreed to cut costs and allow for further efficiencies within the plant in exchange for a guarantee that all jobs at the site were secure. IG Metall and the works council were successful in fixing job positions at 2,700 to ensure retired workers were replaced with newer hires. Attempts by management to outsource maintenance, logistics, kitchen facility staff and security were also successfully defended against. However, workers in these areas were required to go from a 35-hour week to a 39-hour week in order to ensure their positions were secure.

It can be argued that while these agreements tend to protect the core workforce, they do little to protect the growing contingent of temporary workers in the auto industry. Employers have indeed also increased flexibilization by resorting to precarious temporary workers (*Leiharbeiter*). However, Jürgens et al. (2006: 24) contend that within the car industry the introduction of agency workers has occurred in a "regulated and negotiated way" with works councils playing an important role in how temporary workers are utilized[25] and agreements between the union and employers dictate that temporary workers *must* also have a collective bargaining agreement (many temporary workers are also IG Metall members). The use of temporary workers is also fixed at many plants. For example, at the Daimler Kassel plant, only 8 percent of production workers can be temporary workers, and the works council has been successful in having temporary workers shifted to fixed contract positions (Seidel, interview, August 15, 2013). In general, the erosion in German industrial relations has taken place in a controlled manner with an emphasis on secure jobs and working sites.

3.3. Collective Bargaining and Union Strategy in the US

The UAW is the largest union representing automotive workers in the US. The central offices of the UAW are responsible for national collective agreements, which focus on areas such as compensation, wages, overtime and transfers while local unions are responsible for bargaining at the plant-level. Local unions help "define work rules such as the form of the seniority ladder, job characteristics, job bidding and transfer rights, health and safety standards, production standards, and an array of other rules, that guide shop-floor production" (Katz et al., 2013: 60). As a result, local unions within the UAW take on the role of both works councils and unions in Germany.[26]

[25] The Kassel VW plant serves as an example, with the works council and union in a constant struggle to secure part-time, often precarious positions, into full-time positions. Interviews indicate that in the last bargaining round they managed to transfer 1,000 temporary part-time positions into full-time positions.

[26] However, it should be noted that local unions are not protected by the same stringent laws afforded to works councils in German. This leaves local unions dependent on collective bargaining agreements that are subject to constant change when they must be renegotiated.

Prior to the 1980s, UAW contracts served to set pattern bargaining within the US, routinely providing real wage increases to workers. Given consistently growing demand for automobiles, strong union density, and little in terms of import competition, employers and unions were able to coexist and bargain effectively (ibid.) During this period the UAW also wielded significant power based on its member count, reaching a high point in 1979 of 1.5 million workers.[27] However, the 1980s marked the beginning of a turbulent period for the UAW. As previously noted (Section 3.2.), foreign transplants moved into the US, eating up market share. It was assumed at the time that the UAW would successfully unionize these transplants, which never occurred despite numerous attempts.

From the beginning of the 1980s there was an explicit emphasis in the US on protecting workers from the effects of technology or work reorganization, primarily through job security. For example, the 1984 bargaining agreements featured two nearly identical programs, the Protected Employee Program (PEP) at Ford and the Job Opportunity Program (JOBS) at GM. The programs gave protection to employees with at least one year of employment from productivity improvements related to areas such as technological change, reorganization of plants, and outsourcing (Block, 2006: 8). These job security protections would not extend to a decline in demand, thus enabling auto producers to reduce headcounts due to economic conditions. However, employees were still entitled to Supplemental Unemployment Benefits (SUB). Due to the cyclical nature of the automobile industry, SUB benefits allowed employees who were laid off during downturns to receive pay equal to approximately 95 percent of their former salary (McAlinden, 2004). In effect, layoffs were seen as only temporary phenomena which would be remedied when economic upswings returned.

Bargaining agreements in 1987 further demonstrated job security was a priority for the UAW, with two new agreements coming to the fore. One was the Secured Employment Levels (SEL) at GM and Guaranteed Employment Numbers (GEN) at Ford. These arrangements would guarantee employee positions but would reduce fixed positions of employees overall through normal attrition (Block, 2006: 10). Furthermore, neither company was permitted to close any plants and SUB benefits continued under the 1987 contract. These agreements also featured concessions by the UAW. The UAW had agreed that work practices and production methods be examined at the plant level in order to exploit the idea of team concepts and reorganized work arrangements for increased quality and productivity (Katz et al., 1987: 687).

Katz et al. (1987: 686) note that overall the collective bargaining agreements of the 1980s reflected increased pressure from foreign transplants which manifested itself through wage settlements between the Big Three. These wage agreements

[27] One of the notable aspects of the UAW's membership composition in 1979 is that it was almost entirely composed of autoworkers whereas today the UAW has a sizeable portion of workers employed at academic institutions and in the casino industry. The 1.5 million members in 1979 also represents a larger number than all auto workers in both union and non-union employment in the US today.

were on average smaller than the three percent yearly wage increases in addition to cost-of-living increases that were a feature of bargaining after World War II and prior to 1980 (ibid.). Another stipulation labor secured in the mid 1980s was an "accretion clause" which required all workers hired in new plants opened by the Big Three in the US to be represented by the UAW, which later provided incentive for Big Three parts plants to offshore production in order to avoid unionization (Sturgeon and Florida, 1999: 65). In 1990, the UAW was successful strengthening the job banks program during bargaining rounds. Workers laid off were placed into these banks if another position was not open, ensuring that no worker was ultimately let go for any reason (Katz and MacDuffie, 1996).

The 1999 bargaining agreement marked the first time that the UAW was able to secure real wage increases since the 1980s, and was bargained against the backdrop of a highly successful automobile industry (MacClinden, 2004). However, the union was further challenged throughout the 2000s. During bargaining agreements in 2004, the UAW allowed contract language on rationalization and the implementation of technology which led plants to increase efficiencies within production, creating excess employees (Browning Interview, September 23, 2013). Katz et al. (2013: 64) write that adding to the UAW's deteriorating membership during that period were massive redundancies in the companies' workforces from October 2005 through 2009, achieved largely through voluntary severance and early retirement plans. They further write that the job banks programs was initially provided to workers to deal with technological innovation's unemployment effects but ultimately due to falling market share many of these workers were unable to reenter the workforce.

The growth of parts suppliers further weakened the UAW's ability to coordinate wages. In 1999, Ford and GM spun-off their internal parts divisions (Delphi from GM and Visteon from Ford) despite protests from the UAW (Sturgeon and Florida, 1999: 92). While the employees were often retained, wages were significantly reduced, with non-union part plants paying 40 percent less than final assembly jobs and unionized part manufacturing plants paid an average of 30 percent less (Sturgeon and Florida, 1999: 93). Ultimately neither Visteon nor Delphi was successful and thousands of UAW workers were laid off. Parts suppliers are generally not heavily unionized either, with approximately 78 percent of the parts going into Big Three vehicles coming from non-union suppliers.[28]

Over time, falling market share, membership declines through attrition, and deteriorating truck demand led to steady employment reductions at the Big Three firms. As can be seen, one of the key themes of bargaining in the 1980s and 1990s was a focus on job security. Layoffs owing to new technology or increased

[28] Reid notes (interview, September 27, 2013) that in some areas the union has remained strong, such as seating production where they have a 90 percent unionization rate and brakes where they have a 50 to 70 percent unionization rate. Brake design is research intensive making it difficult for new suppliers to break into the field. As a result, firms unionized long ago have stayed union. Seats are labor-intensive and demand a skilled workforce. As a result, labor is secure and well-paid, earning approximately $20 per hour seat production.

productivity were eliminated as a factor in workplace reductions as most employment losses came through retirement or buyouts (Block, 2006: 9). The UAW was successful in this endeavor but the price for such security usually entailed increased flexibility and reduced pay. While the 2000s marked a gradual decrease in the UAW's bargaining power, the 2008 financial crisis became a virtual existential threat for the union, calling its very future into question.

3.4. The 2008 Crisis in Germany and the US

Following the 2008 crisis, both labor and employers were faced with massive challenges in the US and Germany. It is clear that following the crisis, falling employment levels in the auto sector were not directly related to productivity increases, as the primary catalyst for the crisis for automakers related to falling demand. That being said, the crisis became an opportunity for employers in the US to rationalize production and to fully exploit productivity advances that were materializing even before the crisis. As a result, it is worth exploring how governments and employers reacted in both countries since their actions had a significant impact on labor. As automakers in the US have emerged from the crisis, the massive amount of workers laid off were not rehired in significant numbers despite production increases and record profits. Many of the workers since hired have been brought in on Tier II wages, which are substantially lower than what UAW employees previously earned. The UAW's membership has fallen dramatically during the 2000s with this trend accelerating after the crisis. More than a third of members were lost from 2001 to 2012, going from 701,818 members to approximately 383,000.[29] The German government played a fundamentally different role during the crisis.[30] Instead of letting markets dictate demand and labor utilization, as in the case of LMEs, the German government actively intervened, using tools and policy to influence employment outcomes.

As some authors note, the crisis provided a sort of revitalization of the German corporatist model, as the government actively coordinated the German economy's recovery (Müller-Jentsch, 2010, as cited by Haipeter, 2013). Germany's response featured less *ad hoc* measures than the US, instead relying on already established tools, many of which were specifically designed to secure employment. Following a drop in demand, the auto industry did not immediately begin layoffs. Instead, workers were first paid out through working-time accounts, which banked up to 300 hours of overtime prior to the crisis. These accounts are

[29] A little over half of UAW's members are in the automobile industry (Browning, Interview, September 23, 2013).

[30] One area of convergence between the US and Germany following the crisis has been government implemented car scrapping or trade-in schemes. In the US, the Car Allowance Rebate System (CARS), known as Cash for Clunkers, provided up to $4500 to trade in a vehicle with lower fuel economy standards (EPA Report). It was estimated by the EPA that the program resulted in 677,081 vehicle purchases in 2009 (Cooper et al., 2010). In Germany a similar program was initiated, in which the government subsidized the cost of vehicles when their older car was scrapped (Dribbusch and Birke, 2012: 15). Although the schemes were effective at boosting demand temporarily, they served only as a temporary measure, albeit an effective one. The upside for labor was that it signaled a willingness of government in both countries to attempt to mediate the crisis in favor of raising demand.

partially designed to provide a cushion to workers when production slows (Seidel, interview, August 15, 2013). However, due to the severity of the crisis, the German government's tool of short-time work (*Kurzarbeit*) was utilized when working-time accounts were exhausted and has been credited for helping stabilize employment levels. The German government extended the program from a limit of 18 months to 24 months in response to the crisis. In May of 2009, nearly 1.5 million employees were on short-time work with 902,000 of those workers (62 percent) in the metal and electrical industry (Dribbusch and Brike, 2012: 15). The program ensures that when workers cannot work, they receive 60 percent of their wages with additional money provided when workers have children. VDA noted that the system proved a "masterstroke" with up to 1.9 million workers at its peak affected by the program, proving much less costly than redundancies. The Federal Labor Agency estimates that at least 300,000 jobs were saved by short-time work in 2009 alone (VDA Annual Report, 2011: 17). Automobile companies would often supplement this income as well. VW ensured employees were paid 100 percent of their wages while Daimler paid 85 percent (Dietzel, interview, August 15, 2013). Peter Donath, head of company and sector policy at IG Metall, noted (interview, October 2, 2013) that the 20 percent decline in autoworkers following the 1994 crisis was a situation that Germany's automakers wanted to avoid in 2008. Following 1994, automakers incurred large costs in hiring and training workers when market conditions improved, leading employers to also lobby for government intervention in 2008 (ibid.).

While deviations in collective agreements still persist in Germany following the crisis,[31] one of the greatest concerns has actually been the growing use of temporary workers.[32] IG Metall has made moderating the use of temporary workers a core issue. In 2008, many employers reacted to falling demand by failing to renew temporary worker contracts, making it possible for employers and even core workers to "externalize the crisis" (Dribbusch and Birke, 2012: 8). IG Metall indicates that their first success in collective bargaining stemmed from 2010 and 2012 agreements in the steel industry, which secured equal pay for temporary workers (Vogel, 2012). Interviews with German academics also note that IG Metall has been aggressive about clamping down on temporary work. Campaigns against plants that utilize a disproportionate amount of temporary workers such BMW's plant in Leipzig have been effective in reducing the amount of temporary workers utilized (Jürgens, interview, October 10, 2013). However,

[31] Jürgens et al. (2006: 23-24) provides an example of Mercedes strategy: "Securing the Future 2012". They note the main elements of the strategy include management commitment to specific levels of investment and the ruling out of redundancies until 2011. Mercedes agreed to keep the level of vocational training while the works council accepted a 2.79 percent reduction in wages for employees. In addition, new hires would receive 8 percent less than other workers. A program called DC "Move" also increased flexibilization of the workforce by mandating all new hires and apprentice graduates may be transferred to any site within the company for 36 months.

[32] The UAW has a notable leg-up on IG Metall when it comes to the use of temporary workers, noting that there are very little part-time or temporary workers employed in the auto industry. In this regard, UAW has managed to avoid an issue that has a tendency to divide workers.

perhaps just as important for this development is the shrinking labor pool of skilled temporary workers. Automakers are finding it increasingly difficult to find skilled and dependable workers due to the health of the of the German economy, a situation that is remarkably different from just five to ten years ago (Kuhlmann, interview, October 25, 2013).

While the US government also played a prominent role during the crisis, this aid mostly took the form of bailout money and tax breaks due to the financial weakness of Chrysler and GM. Prior to 2008, the Big Three were already in a constant state of restructuring, closing plants, buying out or laying off workers. Basically the crisis accelerated a transformation that was already taking place in the automobile industry. While the bailout may have saved the US auto industry from catastrophic job losses, it did not have any strong provisions for securing employment. In fact, the UAW was essentially forced to agree to tens of thousands of job cuts as a part of the negotiated bailout package. Following the bankruptcies, GM and Chrysler enacted harsh cost-cutting measures. General Motors made plans to close a third of its plants (14 plants) and layoff 21,000 workers, reducing its hourly employment from 61,000 in 2008 to 40,000 in 2010 (Platzer and Harrison, 2009: 8). Chrysler responded by closing a number of plants as well. Despite recoveries following the crisis, US automakers are reluctant to hire, and are instead pushing capacity at plants that survived the bailout through increased working hours and weekend shifts (see Section 7, Figure 6, to observe the increase in automotive working hours in the US). Arguments that employment has fallen in the US due to the unprofitability of its automakers are not particularly valid either considering the Big Three have all been posting record profits, with even Chrysler returning to profitability after many years of losses.[33]

Part of the reason automobile profits have surged while employment remains slack is that agreements 2007 and 2009 with the UAW allowed automakers to "take full advantage" of productivity improvements (Platzer and Harrison, 2009: 18). A presentation by GM on the UAW agreement exemplifies automotive strategies towards reducing labor and costs following these agreements.[34] GM indicates that demographics at the company skew towards a large percentage of workers eligible for early retirement, and notes the company wishes to "retain the ability to adjust the workforce based on market conditions and productivity gains" and eventually "transition significant number of positions to the Tier II wage structure."[35] Automakers emerged from bankruptcies in a substantially stronger position vis-à-vis labor, leading to increased profit for companies and increased pressure for labor.

[33] Annual reports indicated that in 2012 Ford posted a $5.7 billion profit, GM a $4.9 billion profit and Chrysler earned $1.7 billion.
[34] Presentation by GM on their 2007 agreement with the UAW, slides 25 and 39, accessed at: media.corporate-ir.net/.../2007_GM_UAW_Labor_Agreement_Call.pdf.
[35] Ibid.

4. EXPLORING CME AND LME INFLUENCE IN THE AUTOMOBILE INDUSTRY

4.1. Capital Markets, Co-Determination and Institutional Actors in the US and Germany

The US and German response during the 2008 crisis did not occur in a vacuum but instead reflects how LMEs and CMEs can be expected to treat issues surrounding industrial relations and employment security. Labor's ability to sustain decent wages, fight relocation and moderate technological influence stem not only from union size but its position as a stakeholder in the institutional arrangement of a country. Labor and companies in the auto industry are challenged on a whole range of issues within LME economies. These issues pertain to healthcare costs, an inability to coordinate on a national basis and lack of government support for skill apprehension. Furthermore, the UAW's collective bargaining agreements following the crisis have increasingly undermined its capacity to provide job security for its members. Given the UAW's weakened position, it is increasingly unable to confront employers on issues of technological change, maintaining job control, and demanding a greater share of productivity gains in the form of wages and other benefits.

According to VoC theory, the way capital is organized and markets are structured in LME and CME economies has a profound impact on firm strategy. CMEs are more likely to encourage long-term investment while LMEs tend to concentrate on short-term profits (Jes Iverson, 2010: 665). This relates to strategies concerning LME's radical innovation approach and CME's incremental innovation of pre-existing products. Although capital markets and ownership structures do not at first glance appear to relate to productivity increases or the implementation of technological change, they have a profound effect in these areas as well. Consulting firms such as McKinsey (2002) have criticized Germany's codetermination laws, claiming the market structures in the country do not drive profit-oriented innovation and productivity increases. McKinsey indicates Germany's OEMs are not under enough pressure from shareholders to generate profit, pointing to different lower profitability levels at German auto firms compared to US auto firms to support their assertion. The German stakeholder model is to blame for this, which gives half the seats on a supervisory board to employees and unions. McKinsey further states that given the way boards are elected, it is difficult for members who want to cut costs through employee downsizing to make it on to a board, driving down profits (McKinsey, 2002: 19).

However, there is much evidence to dispute such claims. For one, since the report, the fundamental structure of German companies has not changed in regards to co-determination, and yet, German companies have proven themselves to be far more profitable than US auto firms. Furthermore, McKinsey's claim that German auto firms' lack a profit-driven capital structure might be accurate but *may actually account for why German firms have been more*

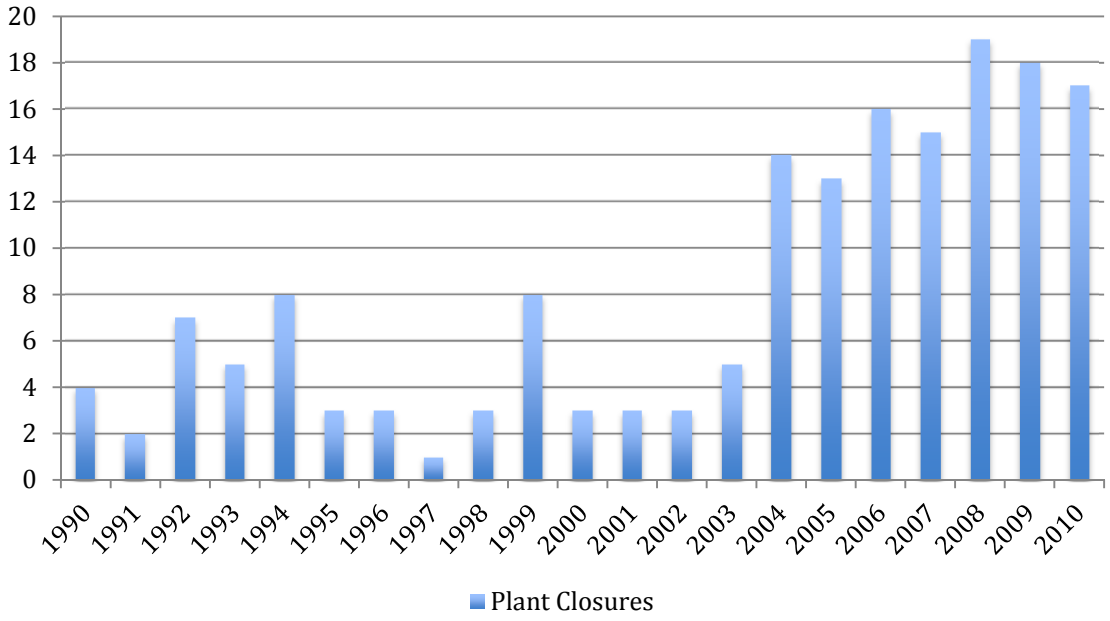
profitable. Martin Kuhlmann (interview, October 25, 2013)[36] notes the short-term profit motives that drive US auto firms is not nearly as present in the German system, and partly reflects a German cultural inclination. He indicates that long-term profit-driven approaches may prove costly in the short-term but can ultimately provide for the long-term health of the company. He notes that companies such as VW and BMW have less shareholder pressure, as VW is partly owned by labor and government while BMW is mostly family-owned. The general philosophy of these firms is to focus on engineering and producing quality products with the belief that this will lead to profit. For German auto companies, pressuring skilled labor by constantly cutting costs to appease the short-term desires of shareholders would jeopardize firm strategy. This leads firms to focus on product innovation and increasing productivity through other means, such as technological implementation in the production process. Despite Daimler being the most market-driven of the large German producers (as reflected in its capital structure) it also happens to be the most troubled of the German firms as of late.[37]

The German co-determination model, featuring a strong voice for labor on supervisory boards and partial ownership by families or governmental entities, has also greatly benefitted labor in the context of plant closings. OEM plant closings are a routine occurrence in the US, underlining the chaotic market conditions that often guide LME countries (Figures 4 and 5). The Big Three have been especially hard hit. On the other hand, Germany has not seen a single assembly plant closed in decades with the exception of the GM-owned Opel plant in Bochum. While the UAW has been successful in the past at ensuring a moratorium on plant closures when its bargaining position was stronger, firms were also struggling to find new ways to utilize plants they could not close and were not being fully utilized, presenting problems for both management and labor (Perkins, interview, September 23, 2013). Eventually, the constant market "destruction" within the US eventually eroded such protections, resulting in workers thrown from jobs in which they were often trained in a plant-specific manner. Given the inability or unwillingness of employers to initiate plant closures in Germany, reorganization of work often takes place within the plant.

[36] Martin Kuhlmann is a researcher at the *Soziologisches Forschungsinstitut Göttingen* SOFI Institute.

[37] Seidel (interview, August 15, 2013) noted that he expects bargaining with Daimler to face some difficulties due to its lower profit margins. Its main competitors, BMW and Audi, both have profit margins of 11 to 12 percent on their vehicles while Daimler is only earning 7 to 8 percent.

Figure 4: OEM Plant Closures in the US



Source: CAR Research

Figure 5: Plant Closures of the Big Three, 2000 to 2011

Year	Company	Plants in the U.S.	Plants in Canada	Plants in Mexico
2000	GM	21	3	3
	Ford	16	3	2
	Chrysler	11	3	3
2011	GM	11	3	3
	Ford	9	2	2
	Chrysler	7	2	2

Source: Katz et al. 2013

For example, the state of Lower Saxony's partial ownership of VW places a strong emphasis on keeping plants running (Kuhlmann, interview, October 25, 2013), especially as governments are greatly concerned about the job impact a plant closure would have on the local economy.

Any OEM plant closure requires a supervisory board vote where labor's share of votes amounts to 50 percent, resulting in companies unwilling to challenge labor on the issue. VW goes even farther and any plant closure required a vote of two-thirds. There are also social and cultural aspects that frame such decisions, with a general sense that closures and layoffs are a sign of weakness in the German business community (Kuhlmann, interview, October 25, 2013). This relates back to Hall and Soskice's observance on *socializing agencies* and institutional hierarchies which help guide norms and values within the political economy. Within the

German auto industry plants may lose a certain task at the plant-level but subsequent work is often found that allows workers to keep their positions and the plant running at capacity, both to avoid conflict, to honor job security guarantees and avoid the stigma of layoffs. For example, at the VW Kassel plant,[38] there was significant pressure from management to make the exhaustion production profitable. The works council, working with an independent consultant, devised a plan to increase efficiency in the area through the introduction of new machinery and reorganized work. The staff in the exhaust department was reduced from 800 to 550. However, the 250 workers removed from that department were transferred to transmission production (Mueller, interview, August 8, 2013). Given that all the major automobile suppliers have had agreements in place to ensure there are no worker layoffs, workers are often retrained and transferred to new areas of plants. If that is not possible, they are transferred to another plant but keep their jobs.

It could be argued that the US's intervention into the automotive sector constituted a deviation from the standard LME economic paradigm. However, the Obama administration made it clear from the beginning that saving GM and Chrysler from bankruptcy would be produced through restructuring of "manufacturing, headcount, brand, nameplate, and retail network[s]" (Scott, 2009: 2). Unlike the German government, the Obama administration sought to save US auto producers through aggressive rationalization policies with little concern with how this was achieved.

On the other hand, the ownership structure of German plants, cultural factors, and the success of German products have kept plants running for decades while collective bargaining agreements ensure that the job positions *within* plants have remained relatively secure. These two factors combine to create a much more stable environment for labor than the purely market-oriented US producers. Following the 2008 crisis, the US government had an opportunity to help influence employment security at US plants through its partial ownership of Chrysler[39] and the substantial amount of loans provided to GM. A US government introduction of short-work weeks and other subsidies could have helped stave off bankruptcy and labor shedding. Instead the US operated mostly how an LME would be expected to in the context of a major recession.

4.2. Welfare, Healthcare, and their Relationship to Labor and Capital

Firms' ability to survive in LMEs and CMEs extends far beyond capital markets and industrial relations. While not relating to issues of productivity directly, legacy costs have had a substantial impact on the competitive disadvantage US domestic producers face—illustrating how nationwide welfare schemes affect far

[38] The VW Kassel plant employs approximately 16,000 workers and produces approximately 4 million automatic and manual transmissions and 4 million exhaust systems per year.
[39] The US government has since sold its shares of Chrysler.

more than the individual worker—but also the wellbeing of societal stakeholders, firms included. While the Big Three have been competitive with transplants in regards to wages, especially since the introduction of Tier II wages, legacy costs in the form of health insurance and pensions to retirees have been a substantial drag on the Big Three. In 2007 it was estimated that due to legacy costs $1,800 is added to the cost of each vehicle produced by the Big Three compared to foreign transplant companies. The Big Three also feature many more retirees than current employees with GM at one point following the crisis had approximately 60,000 workers and 450,000 retired employees, which entailed a massive burden on the financial health of the company (Browning interview, September 23, 2013). Since companies were wrestling with mismanaged retiree funds instead of upgrading plants, these costs discouraged reinvestment, affecting the Big Three's ability to increase efficiency and innovate. Transplants also feature a younger workforce, fewer retirees and poorer benefit packages, exacerbating the Big Three's competitive disadvantage.

In 2007 collective bargaining agreements produced the Voluntary Employee Benefit Association (VEBA), which transferred the costs of health care and retiree benefits to a trust managed by the UAW from the Big Three (Browning, interview, September 23, 2013). Under this plan, the VEBA is mostly funded by stock instead of cash, making the ability to service healthcare plans of UAW's member's contingent upon the market performance of the Big Three. With Big Three stock prices up substantially since the crisis, this program has functioned properly and allowed UAW members to receive healthcare benefits. While the UAW has already sold some of its shares, in general healthcare coverage for retirees is now contingent on market forces, creating uncertainty in the long run.[40]

The UAW is aware of the problem, but has been forced to create "social democracy at the company-level" while outside market forces challenge this effort (Perkins, interview, September 23, 2013). As a result, the union would like a national healthcare system and more socialized system of welfare. Welfare and socialized pensions significantly factor into ensuring companies that employ large labor forces, such as the automobile industry, are not competing as intensely on labor costs, helping to dissipate distributional conflicts. The lack of centralized bargaining and the difficulties in organizing unions in the US has also led to foreign transplants being able to compete more effectively by undercutting labor costs the Big Three, even if labor costs only factor into a small fraction of the total costs of vehicles.[41] Benefit schemes and subsidized pension costs have made labor costs far less consequential for German producers in comparison to the US. The German government has a nationalized health scheme

[40] As of 2013, UAW now owns 41 percent of Chrysler.

[41] According to the UAW Research Department, total labor costs account for only about 10 percent of a vehicle. Other writers have put labor costs between ten and fifteen percent in general (Rifkin, 1995). The UAW research indicates the "total labor cost of a new vehicle produced in the United States is about $2,400, which includes direct, indirect and salaried labor for engines, stamping and assembly at the automakers' plants." Most of the costs of a vehicle stem from materials, energy, marketing, executive compensation, transportation, and so on.

in which employees and employers pay an equal percentage into a health fund. This takes the active management of health benefits out of the control of employers. The German government also is very active in reducing healthcare costs through a coordinated governmental approach. This structure allowing domestic producers to focus on innovation, marketing, and gaining efficiency instead of focusing inordinately on ancillary issues such as benefits.

4.3. Outsourcing in the Automobile Industry

When analyzing Germany and the US, the consequences of outsourcing cannot be discounted. The basic function of outsourcing in the last twenty to thirty years has been to cut labors costs, both by shifting labor abroad *and* pressuring labor on costs at home. Haugh et al. (2005: 5) write that factors such as "Market saturation in OECD countries, high shipping costs and efforts by automakers to gain market share by locating production where they sell have encouraged [outsourcing]." However, gaining market share in foreign countries is clearly not the only factor contributing to outsourcing. Modern offshore facilities do not necessarily produce vehicles any more efficiently than plants from home countries. However, producers still build plants where vehicles are sold, which increasingly means expanding in fast growing areas such as Asia.

Global supply chains now stretch across the world, with many components sourced from China, Eastern Europe or Mexico, areas where labor costs are significantly cheaper. Ultimately, the threat of relocation is a powerful tool to discipline labor's demands in the US and Germany. German and US labor feature much higher wages than Mexico or countries in Eastern Europe, creating a competitive disadvantage for labor.[42] Even with labor concessions on wages, countries such as Mexico feature wages low enough that US workers are unlikely to be able to match them anytime in the near future, if ever.

What elements of production end up outsourced also often has something to do with technology and automation as well. Sturgeon (1999: 80) notes the trend has been a push for labor-intensive processes (i.e. wire harnessing or certain component assembly) to be outsourced while those areas that are capital intensive (paint coatings) tend to remain in countries with higher wages such as the US or Germany. Furthermore, areas that were once labor-intensive but became rapidly automated have a more distributed pattern, such as circuit-board assembly. The cost of shifting production offshore also becomes significantly cheaper as communication and transportation costs fall, allowing the global supply chain to become more integrated and functional.

While German and US auto industries have both partaken in extensive outsourcing, the VoC model contends that the institutional arrangement of a country will determine how outsourcing will develop. Soskice and Hall argue that companies will not immediately move operations abroad to secure cheap labor (Soskice and Hall, 2011: 55). While cheaper skilled labor is attractive, "Firms also

[42] The UAW indicates that their members' wages are often 20 times the cost of labor in Mexico (Reid, Interview, September 27, 2013).

derive competitive advantage from the institutions in their home country that support specific types of inter- and intra-firm relationships. Many firms will be reluctant to give these up simply to reduce wages" (ibid). They note that LMEs may be more likely than CMEs to move their labor offshore as LMEs are more governed by market forces while CMEs often pursue strategies that "rely on the high skills and institutional infrastructure that are difficult to secure elsewhere" (Soskice and Hall, 2001: 57). CME's institutional comparative advantage in the form of "supportive regulatory regimes" enforces opposition to outsourcing. Furthermore, business and labor in CMEs often have shared and equal investments in areas such as skill enhancement that is specific to a particular industry (ibid.).

While German and US auto producers are rapidly pushing into international markets, much of the US's foreign expansion has also contributed to decreased employment in the US and increased employment in Mexico. Between 2010 and 2012, Mexico added approximately 100,000 auto manufacturing jobs and as of 2012 accounts for 39.1 percent of all North American automobile jobs, up from 27.1 percent in 2000 (Muro et al., 2013). Interviews with UAW officials underline the crisis that the NAFTA agreement brought upon autoworkers in the US.[43] They highlight the lack of worker rights, the unfair wages that UAW workers cannot compete on, and the lack of intervention by the government on the issue. Approximately half of the parts produced in North America now come from Mexico.

Germany has bucked this trend to some extent. In 2011, German vehicle makers built 12.7 million vehicles with 6.09 million of those vehicles built abroad and only 5.55 built inside Germany, the first time international production outpaced domestic production (VDA, 2011: 29). However, German employment has remained stable despite this increase in foreign production. The 5.55 million vehicles built domestically actually represented a 12 percent increase from 2010, a record output. The VDA further argues that many foreign vehicles are built using German produced parts, which further secures employment (ibid.).[44] While Daimler and other automobile companies are expanding global operations, they usually indicate that they wish to "maintain existing jobs in Germany."[45] However, keeping jobs in Germany often means wage concessions. For example, in 2009 IG Metall agreed to Daimler's demands to reduce labor costs in order to keep jobs in Germany. Of Daimler's 162,800 employees in Germany, three-quarters accepted reduced working hours as a part of the agreement.[46] VW also forced employees to accept wage freezes until 2011 under the threat of laying off 30,000 workers.[47]

[43] NAFTA is a landmark free trade agreement between the US, Canada and Mexico. Since that time, numerous parts suppliers and OEMs have exploited the use of cheaper labor in Mexico, opening up plants there known as *maquiladoras*.
[44] For example, while the US has a trade deficit on auto parts with China at $9.1 billion in 2010, Germany has maintained a trade surplus of $6.2 billion (Scott and Wething, 2012: 9).
[45] Herbst, Moira "How Long Can Germany Keep Auto Jobs?" *BusinessWeek*, 2009 September 28.
[46] Ibid.
[47] Ibid.

Such concessions underline the threat offshoring has on taming German labor demands.

This threat has only been heightened as more countries become integrated into the EU, first with Spain in the 1980s and now with Eastern Europe beginning in the 1990s. These areas have offered automobile producers a cheap alternative to the high-wage workforce of Germany. The incentives for vertical disintegration are stressed by Nunnenkamp (2006) who finds that German auto producers can reduce unit labor costs by about 70 percent in several Central European countries through direct investment. Despite growth in both final assembly and parts manufacturing in areas outside of Germany, employment in the auto industry continues to grow in Germany, albeit at a modest pace. German producers are not nearly as concerned with labor costs as the US given their product model and institutional setting. Interviewees (Jürgens, October 10, 2013, and Kuhlmann, October 25, 2013) note that German producers still see many advantages to producing at home, and that the massive offshoring seen in the US simply has not occurred in Germany.

Organized labor in the US has not only been challenged by producers in Mexico or cheap parts coming from Asia, but also by regional factors within the country. Most foreign transplants have been built in the south of the US where states have passed right-to-work laws and union hostility remains high.[48] These states have also provided substantial tax breaks and investments to lure companies there. The growth in foreign transplants has not offset job losses at the Big Three with Platzer and Harrison noting (2009: 23) that with the "greater efficiency of the foreign-owned plants, fewer jobs appear to be created than those lost." This increases competitive pressure not only on the Big Three, but pressure on organized labor in the US, as the UAW has been unable to organize these southern plants. As a result, there has been a race to lower labor costs, with transplants entering the south and now the Big Three increasingly shifting production to Mexico, where labor costs are even cheaper.

Due to outsourcing, labor has often become involved in a quandary, whereas innovation and more efficient operations must be utilized in home countries to create cost advantages while at the same time those productivity increases create the potential for a decreased need for labor. Institutional models have a capacity for mediating this conundrum, at least in CMEs, where capital is more fixed. In Germany, industrial relations, the strength of labor, product strategies and company culture all discourage offshoring and vertical disintegration to the extent seen in LMEs.

[48] Maynard, Michelle "The UAW's Last-Ditch Push To Organize Southern Car Plants" *Forbes*, 2013 October 10.

5. SKILLS, EMPLOYMENT, AND TECHNOLOGY

5.1. Skill Development in Germany and the US

The relationship between skill development, product strategy, and institutional arrangements is an important factor when examining wage and employment differences between Germany and the US. Employers increasingly demand flexibilization of the workforce in response to productivity increases introduced by the Japanese through lean production. In addition, technological advances are constantly changing the worker's role, placing a higher value on problem solving and analytical skills (Lynch, 1994; Berg, 1994 and Kochan and Lansbury, 1996). Institutional stakeholders have pursued different strategies in LME and CME countries. The vocational system in Germany is strongly regulated and institutionalized at the federal level whereas the US features a more decentralized system that focuses on company-level training, reflecting broader trends in the political economies of the two countries. Different institutional perspectives on training inevitably lead to different skill-sets formations within the workforce. MacDuffie and Kochan (1995: 164-165) write, "Training prompted by national government policies or institutionalized throughout the national industrial relations system is more likely to emphasize the development of technical skills that are portable across jobs and therefore taught, evaluated, and certified according to national standards. Training carried out entirely by the firm is likely to emphasize motivation as well as technical skill, and focus on firm-specific skills." These skill-sets have the potential to either strengthen or weaken labor based on the general institutional arrangements, technological implementation, and product demand.

Historically, Germany has a reputation for producing skilled apprentices for its industrial sector whose costs was subsidized and regulated by the state (Braverman, 1974: 110-111). To this day, workers in the automobile sector undergo an extensive apprenticeship system with the understanding that they will generally be absorbed into the workforce upon completion. The curriculum of this system is governed through a tripartite process involving the government, labor and employers' associations. Characteristic of the German model is an emphasis on training workers beyond what they would need for any particular job site and providing a broad range of skills. In Germany, apprentices divide their time between onsite training with a particular employer and a more theoretical portion in schools outside of their apprenticeship site. Works councils also help regulate the training process, serving in an advisory capacity on issues such as skill development (Kochan and Lansbury, 1996: 9).

Using the safety of the industrial relations system in Germany, unions have sought a broadening of job content to ensure higher wages (Berg, 1994: 89). Both the government and firms have co-invested in workforce training, which leaves all major stakeholders, including labor, with a stake in skill development. German workers, who generally trust in the apprenticeship system, accept lower wages

during their apprenticeships, allowing firms to offer more training, thus creating a self-reinforcing cycle (ibid: 8).

Germany utilizes a diversified quality production strategy that requires a skilled labor force. Within the automobile industry, this diversified quality production is embodied in Germany's higher differentiation strategies. Differentiation strategies constitute offering greater product variety, which often increases the complexity of products while creating greater "discontinuities" within the production process (Gorlach and Wessel, 2008: 2). This has the potential to increase labor input. Given the greater complexity of German vehicles over those of US domestic producers [49] labor has a significant advantage over their counterparts in the US in terms of extracting compensation for their work.

The idea that apprenticeships are socialized and standardized throughout German society reinforces the idea that they are vital to Germany's industrial success, increasing their value in both the eyes of the public and within the political economy. Kuhlmann (interview, October 25, 2013) indicated that it is frowned upon in the German economic system to cut jobs in the industrial sector, as this is viewed as both a weakness and a source of both social and political scorn. The apprenticeship system, given its wide application in German society, and its value do not merely stem from a social perception, but has demonstrated its success in the industrial sector. The UAW's approach to securing employment and wages has not relied so much on emphasizing training on "broad and transferable" skills but on securing job protection through job control (Berg, 1994: 80).

In the US, there is no federally coordinated system for apprenticeships in industrial production. Although there are some state and local initiatives, they vary in quality, length of training, and course material. The automobile industry in the US does its training primarily onsite with the majority of the cost deriving from wages paid to workers while they are in training—there are few government programs that pay a wage subsidy. The only element comparable to Germany's apprentice system is within the skilled trades where workers go through extensive years of training.[50] As a result, there is only a portion of the auto manufacturing workforce with in-depth apprenticeships and a specialized skill-set, allowing these particular workers to command a wage premium over other workers in production.[51]

The number of hours committed to training in the automobile sector further illustrates the divide between the US and Germany. Studies have found that the average amount of hours for newly hired production workers in the United States

[49] A report by McKinsey (2002: 19) calculated all potential variations between a typical German and US mid-size car (in regards to colors, engines, bodies and add-ons). They found that the German car, an Opel Vectra, featured 5.8 million variations while the US car, a Ford Contour, featured only 170,000. McKinsey further noted this had a significant impact on labor inputs between the two countries.
[50] Skilled trade workers require 8,000 hours of training over a four-year period in order to obtain journeyman status and receive their certification through the state.
[51] Skilled trade workers make $33 an hour while Tier II workers make $19 an hour.

was 42 hours, while in Europe it was an average of 178 hours (MacDuffie and Kochan, 1995).[52] Within Germany, approximately two-thirds of the automobile workforce could be classified at an intermediate skill-level in Germany[53] while in the US only a sixth were. Nearly two-thirds percent in the US were classified as low skilled (Mason and O'Mahony, 1998, based on 1993 figures, cited in Jürgens et al., 2006). Given the lack of investment in training in the US auto industry, both by the government and firms, the costs related to losing workers are not as steep as they are in Germany. This has likely encouraged US auto producers to pursue product strategies that do not rely as highly on skilled labor, further exacerbating problems for organized labor there.

5.2. Polarization of Job Skills

Technological development has a measurable impact on the skill-set required of the workforce in the automobile industry. Some have alleged that new technologies being introduced to the automobile industry "require a higher order of both analytical and behavioral skills" (Kochan and Lansbury, 1996: 3). However, it is unclear whom this really applies to: white-collar workers, production workers, or both? While some have contended that lean production was supposed to increase labor input and lead to an up-skilling in the production workforce (Womack et al. 1990), there is much evidence that this has not been the trend in the US. Katz et al. (2013) contend that the Big Three does not rely heavily on lean production, and has oriented itself more towards "efficient mass production" characterized by increased automation and maintaining low inventories. Estévez-Abe et al. (2001: 148) argue that the US automobile sector never really abandoned the Fordist mass production system, resulting in less dependence on highly trained production workers. The prime beneficiaries of growing technological development in the auto industry appear to be white-collar workers, with the economy placing a wage premium on college education, posing a crisis for those with lower educational levels (Lynch, 1994: 2).

There is no doubt that the complexity of vehicles and vehicle parts has grown since the 1970s while labor input has only fallen. This product complexity can be found throughout the vehicle, such as computerized fuel injection components in engines to electronic throttle control. The amount of software code within vehicles has continued to grow as well, with up to a 100 million lines in many

[52] According to MacDuffie and Kochan (1995), Japanese transplants in the US featured 225 hours of training. A similar study conducted by Krafcik (1990) determined that new hires at Japanese plants completed 310 hours of training while US workers completed only 48 hours. Again, workers in Japanese transplants trained significantly longer at 280. The fact that workers in the US at Japanese transplants train for more hours might call into question the institutional role on training. Production methods also have a lasting effect and the culture of the company as well, with perhaps national characteristics embodying themselves outside of a company's home country. This perhaps represents a further area of research. MacDuffie and Kochan's study also called into question the higher-skilled requirements associated with production methods, finding that plants with similar levels of automation had highly differentiated training hour requirements for employees.

[53] These intermediate skilled workers are referred to as *Facharbeiter*.

modern vehicles.[54] A study conducted by Loire et al. (2009) found that electric components and software are the driving force behind developments in the automobile industry, making software skills the most important skill for future automobile workers. Such developments do not necessarily mean a substantial increase of workers in production. Considering white-collar jobs are not typically as labor-intensive as production floor jobs, demand for white-collar workers in the form of engineers and programmers has increased while the overall share of production workers has fallen.

Even burgeoning areas in green technology are geared towards engineering occupations that require substantial educational investment. A research study commissioned by the U.S. Department of Employment and Training explored advances in green technology and its potential to effect employment in the industry.[55] The paper discusses the powertrain assembly process, noting how engineers must become more diversified in terms of their knowledge to meet the challenges of green technology. However, for production workers, this is not necessarily the case. They write, "the powertrain itself may become more green or complex, but the manufacturing of these advanced powertrains will not change significantly. In most powertrain production facilities, working on advanced technologies requires only a few hours more training than would be needed for any new product introduction" and that a "change under the hood impacts only a few processes on the assembly line." [56] In essence, the adoption of new technology within a vehicle does not always entail a complete reorganization of the process of producing that vehicle.

In the US, the use of skilled trades workers has decreased in overall numbers and as a percentage of the workforce. Between 2001 and 2009 skilled trades at the Big Three saw a 61 percent reduction, dropping below 25,000 workers in production in 2009.[57] Even after returning to profit following the crisis, automakers are still looking to cut costs by reducing skilled labor in production. This has the potential to decrease skill polarization *within* production but further increase it between white-collar and production positions. There are three factors driving a reduction in skilled workers in the Big Three. One is cost, with skilled trades workers earning more than other workers. The second strictly relates to technology. Plants in the US are using increasing amounts of automation with newly designed machines that are easier to operate and less susceptible to failure, reducing the need for maintenance, an area typically covered by skilled trades.[58] The second strategy is

[54] Motovalli, Jim "The Dozens of Computers That Make Modern Cars Go (and Stop)" *The New York Times*, 2010 February 4.
[55] A large consortium of research institutions contributed to the 2011 report entitled "Driving Workforce Change: Regional Impact and Implications of Auto Industry Transformation to a Green Economy" including the Center for Automotive Research, Indiana Workforce Development, Ohio Department of Job and Family Services, the Indiana University Kelley School of Business, and Case Western Reserve University.
[56] Ibid.
[57] Dziczek , Kristen "What's In the 2011 Detroit 3–UAW Labor Contracts" *CAR Research Presentation* 29 November 2011.
[58] Bomey, Nathan "GM Looks to Trim Number of Skilled-Trades Workers" *Detroit Free Press,* 2013 April 8.

to rationalize the work that is left.[59] The UAW's strategy of job control was severely weakened following bargaining in 2011 that reduced job classifications or phased them out entirely. Previously there had been 27 different classifications but with the new agreement, only 5 to 12 exist depending on local agreements (Cooper, interview, September 25, 2013). Many of the skilled trades have been merged into three categories covering a broad range of jobs categories. As a result, there has been pressure within plants for workers to take on more roles that only skilled workers could traditionally do.[60] This can be seen as not necessarily a de-skilling of the entire workforce, but also an effort to increase work intensity enabling employers to keep wages and employment levels under pressure.

The classifications within the German metal industry have also decreased from 42 to six in 1987 (Berg, 82, 1995). However, considering job control has not been as essential to German union strategy, this rationalization process has not had a substantially negative impact. Workers still extract much higher wages than US workers and employment remains strong. As previously noted, German unions embraced flexibilization process in the workforce as it fit well with the German model of diversified quality production. Furthermore, given sectoral arrangements, many white-collar workers in Germany have been successfully integrated into IG Metall along with some elements of management. This creates an additional layer of protection to production work by enabling white-collar workers and production workers to cross-identify with one another through union membership, thus increasing labor solidarity.

Within the manufacturing sector of the US, approximately 70 percent of workers have a high school diploma or less.[61] Job losses in the traditional auto producing area of the US (Michigan, Ohio and Indiana) were the hardest area hit during the crisis with 57,000 "team assemblers and assemblers/fabricators" losing their jobs and more than 60 percent of those workers had only a high school education (IBRC, 2011: 2). While LME countries lacking coordinated vocational programs leave less educated workers increasingly vulnerable, CME countries "with well-developed (and competitive) vocational training systems provide a stable economic future even to those students who are not academically strong" (Estévez-Abe et al., 2001: 156). The LME model has further fomented a lack of incentive for skill upgrading and lack of positions in production that require higher skill to retain employment security and an increase in wages. A growing labor pool of unemployed workers applies further leverage on the part of

[59] Katz (1987: 686) indicated that US management tried to improve efficiency and lower costs through reduction of job classifications. This coincided with an increasing approach of mimicking lean production methods through "team systems" and trying to reduce seniority rights within plants.
[60] However, in a reflection of heterogeneous system plant-level bargaining in the US, there is tremendous variation between plants in terms of demarcating the tasks allotted to skilled workers and standard production workers. For example, robotic maintenance can only performed by skilled trade workers in some plants while in others standard production workers can perform such a task.
[61] American Census Bureau, based off American Community Survey.

employers in the US. Jürgens et al. (2006: 15) note that "market-centered systems to make use of the motivating and disciplining effects of inequality and markets risks in the wage and employment conditions" while CME countries "focus on employment security, long-term career opportunities and hierarchical control."

Given the accelerating pace of technological change and product cycles, skill upgrading has become an increasingly uncertain and unrewarding process for production workers in the US. UAW interviews indicated that production workers, including skilled trades, are often trained only to see their job tasks change or find their acquired skills are no longer needed (Perkins, interview, September 23, 2013). With the elimination of job classifications following recent bargaining agreements coupled with industry pressure to buyout workers in skilled trades, workers are confronted with the possibility that skills they seek to acquire may no longer be needed depending on how the industry and technology develops. The LME model does not make it any easier for workers to decide whether skill upgrading within production is worthwhile either. Estévez-Abe et al. (2001: 145) write, "Young people are less likely to invest in specific skills if the risk of loss of employment opportunities that require those specific skills is high. Employers who rely on specific skills to compete effectively in international markets therefore need to institutionalize some sort of guarantee to insure workers against potential risks." Given the lack of training invested into the workforce at US auto plants, auto company unwillingness to pay for more training, and a failure for government to provide subsidies or coordination on training, a uniquely intractable problem has arisen for production workers in the US.

CONCLUSION

In an era where workers are experiencing the negative consequences related to productivity advances and an unstable globalized economy that is increasingly leaving workers behind, the role of political and social stakeholders becomes ever more important to manage the potential impact on labor. While elements of technological research, particularly in manufacturing, have continuously sought to develop labor-saving technology, many efforts to increase automation have presented significant problems in terms of complexity and applicability. However, this has not stopped employers from continuing to invest in such technology. As this study has demonstrated, auto producers have made steady gains in automation, reflecting a general trend seen in manufacturing. Output has increased while employment has fallen rapidly. The workforce has also seen increasing skill polarization, with a shift towards white-collar workers that are not unionized, at least in the context of the US. At the same time, a global crisis has exacerbated the differences between the CME and LME models, highlighting why a well regulated economy has proven beneficial to labor.

In many ways German workers in the automobile industry are facing the same pressures as auto workers in the US which have developed in part due to increased productivity at one end and threats to withdraw investments or offshore on the other. However, as noted, the UAW has over the years lost

significant bargaining power and membership in comparison to IG Metall. Overall, collective bargaining in the German automobile sector has somewhat mirrored bargaining patterns of the US, if not along the same timeline, then in the transition from demands for real wage increases into a more defensive posture featuring increased working hours and wage moderation. Despite this development, IG Metall has been far more effective at preserving its workforce and membership in large part due to the industrial relations model it operates within. Germany's eroding union membership and derogations should be placed in the overall context of secure employment and relatively well-paid jobs within the automotive sector.

Of course Germany and other CME countries did not "design" such a model to specifically ameliorate technological change or catastrophic financial crises, but instead the model, through its strong labor protection, has been successful at safeguarding against a variety of threats to labor. The fact that the German auto industry has been an export success continues to support employment and high wages in the auto industry, but that success also stems from the CME institutional framework itself. This framework has provided a skilled workforce, helped soften competition over unproductive conflicts over wages and benefits, and provides a strong voice for labor supported through sectoral bargaining and co-determination. Germany has also intervened at key times of crisis to ensure its workforce is maintained despite a massive drop in capacity at firms. These factors have further allowed German producers to successfully invest in further innovation and better compete in the automotive markets.

Given that the focus of this study has been on labor, the LME model offered by VoC poses some challenges. For one, it is considered to be a model that, despite the disadvantages to labor, has been successful from a narrow economic perspective. As a result, labor will continue to have difficulty reworking such a model, especially when a small but powerful minority benefits from such an institutional framework. In fact, due to the pressures of globalization, VoC sees more pressure on CMEs to transform into LMEs than vice-versa. Turning LMEs into a more functional system for labor likely entails a radical reworking of the political economy. Perhaps a piece-meal approach is the most realistic short-term strategy achievable through reform. Important elements that could emulate a more CME-type model include gaining more universal healthcare coverage, securing pensions through the state rather than at the company-level, easing difficulties in establishing unions and a push for sectoral bargaining.

A number of promising signs can be seen in the US system, such as healthcare reform, pushes to establish a union in southern plants, and a renewed interest in German apprenticeships.[62] However, the success of all these initiatives is tenuous

[62] There has been interest in application of German apprenticeships in the US but sparse application (Helper et al. 2012). Streeck (2011) claims that the US abandoned "high-road" manufacturing and apprenticeships as a viable model for the country in the 1990s, as the institutional structure and cultural inclinations were not there to support such a project. A "high-road" manufacturing path consisting of skilled workers making products of high

at best—with the push for a VW works council in Tennessee ultimately failing in 2014—and the market-oriented approach remains by far the dominant model governing industrial relations in the US. For the time being, Big Three producers will likely continue their focus on rationalization, reducing the workforce through automation, outsourcing, and increasing work intensity for current workers. There are also troubling signs for Germany, including shrinking union density and a growing low-wage sector. While German manufacturing may be strong now, issues raised by union representatives there also expressed worry for the time when demand has met its limitations in developing countries. As a result, labor in the US and Germany will likely continue to face similar challenges that require a radical reevaluation of the economic paradigms present in both countries.

W. Brian Arthur (2011) writes that technological progress has undoubtedly resulted in increased prosperity, but the growing challenge is how to *distribute* that prosperity. He further writes, "For centuries, wealth has traditionally been apportioned in the West through jobs, and jobs have always been forthcoming. When farm jobs disappeared, we still had manufacturing jobs, and when these disappeared we migrated to service jobs. With this digital transformation, this last repository of jobs is shrinking—fewer of us in the future may have white-collar business process jobs—and we face a problem" (ibid: 8). Workers displaced in manufacturing and other areas are not being properly reabsorbed back into the economy, and the question then becomes what can government, society, and labor leaders do to halt this progression. Ultimately, proposals such as reduced working time (and even initiatives like a Guaranteed Minimum Income) may be the best chance for creating a more equitable distribution of wealth in the face of growing productivity advances and globalization. Whatever the proposals may be, they will likely face resistance from vested interests and demagogues for market-oriented policies. Institutional settings and union strategies in Germany may show a different way for the US, but for the immediate future, labor in both countries will need to continue its struggle or face the consequences.

value is something that has been encouraged in the auto industry (IBRC, 2011; Helper et al. 2012), but one that faces substantial roadblocks.

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Dembowksi, J., coordinator for bargaining commission at VW Kassel Works
Mueller, R., retired vice-president of VW Kassel Works

August 15, 2013 – Interviews at DGB Solidarity House, Kassel
Seidel, D,. president of the works council at Daimler Kassel
Rudolph, M,. local chairperson for DGB in Nordhessen
Dietzel, O,. president of the IG Metall in Nordhessen

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Browning, C., Administrative Assistant to the President
Perkins, E., UAW Research Director

September 25, 2013 – Interview at UAW Headquarters, Detroit
Cooper, P., UAW-Chrysler International Representative

September 27, 2013 – Interviews at World Class Manufacturing, Chrysler, Detroit
Reid, G,. Sourcing Coordinator for UAW-Chrysler and co-lead of World Class Manufacturing
Gordon, D., UAW World Class Manufacturing Facilitator
Plant Tour, World Class Manufacturing

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Donath, P., head of the Department for Company and Sector Policy, IG Metall, Frankfurt.
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Jürgens, U., Head of the research group "Globalization, Work, and Production" at the *Wissenschaftszentrum Berlin für Sozialforschung* (WZB)

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Kuhlmann, M., Researcher at *Soziologisches Forschungsinstitut Göttingen* (SOFI)

November 28, 2013 – E-mail Interview
Bliesener, K., General Secretary of Porsche's Zuffenhausen Works Council

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