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Earnings Inequality in Germany and Its Implications

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Abstract: The current paper discusses the evolution of earnings inequality in Germany with an eye to its potential lessons for China. Inequality is assessed from two different perspectives: the distribution of annual earnings, and the distribution of lifetime earnings. This paper proposes to implement closer monitoring of lifetime earnings and take a proactive stance in the formation of the wage-bargaining regime.

Keywords: earnings inequality, labor market institutions, Germany

I. Introduction

IN MOST COUNTRIES, EARNINGS FROM labor are the main source of income for the overwhelming majority of the population. Hence, the way in which earnings are distributed crucially affects economic and social inequality. The current paper discusses the evolution of earnings inequality in Germany with an eye to its potential lessons for China.

There are various reasons why Germany is a worthwhile object of scrutiny. First, there exist plenty of statistical data on German earnings, reaching back to the years immediately after the Second World War. This has allowed researchers to establish a number of interesting facts about the evolution of earnings inequality and to evaluate possible explanations of those facts. Second, Germany is the largest European economy, with a highly diversified production structure, considerably shaped by its manufacturing sector. The German economy is highly integrated in the world economy and the value of its exports amounts to about half of the German GDP. Since the turn of the century the German current account has displayed substantial surpluses, mainly from manufacturing. Third, current GDP per capita based on PPP in China is similar to what it was in Germany in the early 1980s, so that a look at the last few decades of earnings inequality in Germany might be instructive in order to better predict the evolution of the Chinese labor

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market and to identify appropriate policy responses.

Before reunification, which occurred on October 3, 1990, Germany consisted of two separate states with different economic systems: the Federal Republic of Germany (FRG) in the west—a member of NATO and a market economy, with a population of almost 62 million; and the German Democratic Republic (GDR) in the east—a member of the Warsaw Pact and a centrally-planned economy, with a population of about 17 million. This article deals with the FRG before reunification and with both the East of Germany (the former GDR and West Berlin) and the West (the rest) after reunification.

The economic system of the FRG before reunification can be described as a corporatist variant of capitalism, sometimes referred to as *Rhine Capitalism*.[1] It had two distinctive traits: cooperative industrial relations, both at the firm and the industry level; and a highly developed social security system of the Bismarckian variety—strongly relying on the equivalence principle and heavily conditioning on the work biography and the family situation of the insured. After reunification, several elements borrowed from the Anglo-Saxon world of capitalism have been imported to Germany, entailing in particular a substantial institutional change in the labor market.

Since labor-market institutions impact the wage formation process and how earnings are distributed, the next section offers an overview of the main institutional changes that have occurred in the German labor market since reunification. Sections III and IV then discuss earnings inequality in Germany from two different perspectives: the distribution of yearly earnings, and the distribution of lifetime earnings. In each of those two sections, I first present the evolution of inequality and then deal with the main explanations that have been offered by the literature. The final Section V briefly summarizes the main findings and derives a few insights for labor-market policies in China.

II. Institutional Change in the Labor Market

A remarkable decline of workers' trade unions constitutes one of the main changes in the German labor market over the last two decades. Trade unions used to substantially affect the entire wage formation process in the FRG before reunification. For the majority of workers, their wages

[1] See, e.g., Dyson and Padgett (2006) and Corneo, Zmerli, and Pollak (2014).

were determined by industry-level negotiations between trade unions and employers' representatives. Negotiations often occurred at a regional level and outcomes were usually driven by those reached by the metal working industry—which played a pivotal role in setting the growth rate of the average wage in the overall economy. Soon after reunification, firm-level bargaining began to replace industry-level bargaining and, even when the latter took place, opening clauses in collective wage agreements often allowed for firm-level derogation. Furthermore, especially in East Germany, many employers began to unilaterally set their wages, without any formal agreement with unions or worker representatives.

In Germany, collective agreements reached by a union for a given industry or firm cover all workers in that industry or firm, irrespective of workers' union membership—an arrangement called "open shop." The union's bargaining power heavily depends on the share of union members in the corresponding industry or firm, both because it correlates with the union's legitimacy at the bargaining table and because it enhances the union's ability to organize industrial actions like strikes (Corneo, 1993).

Trade union membership peaked just after reunification, at a time when about 36% of all employees in Germany were union members. In the sequel, union density steadily declined to about half that level, see Figure 1.

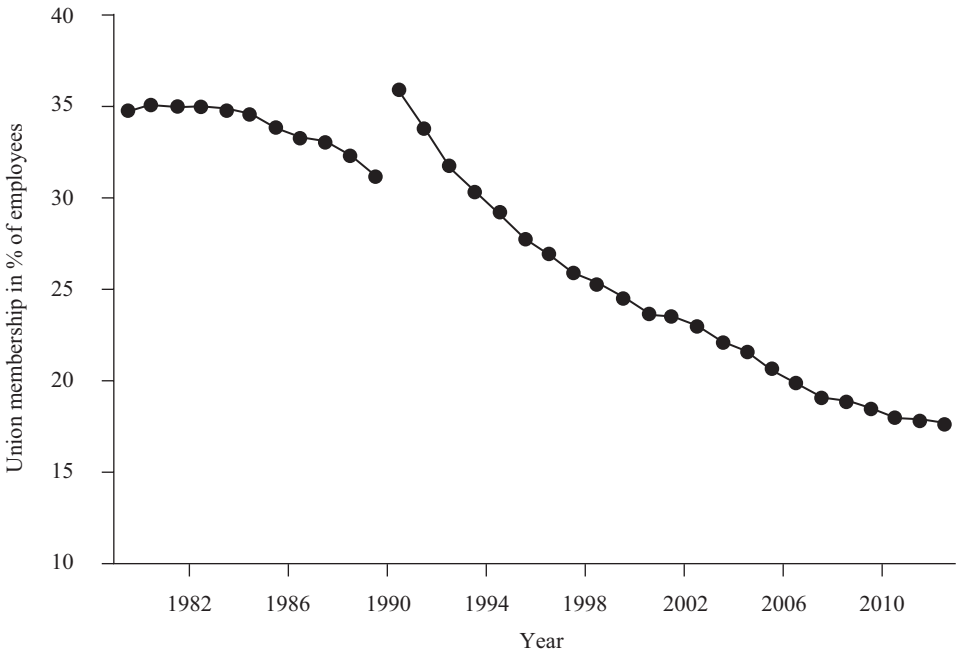

FIGURE 1. Union Membership among Employees in Germany

Data Source: OECD Labor Force Statistics and administrative data of affiliated and independent unions.

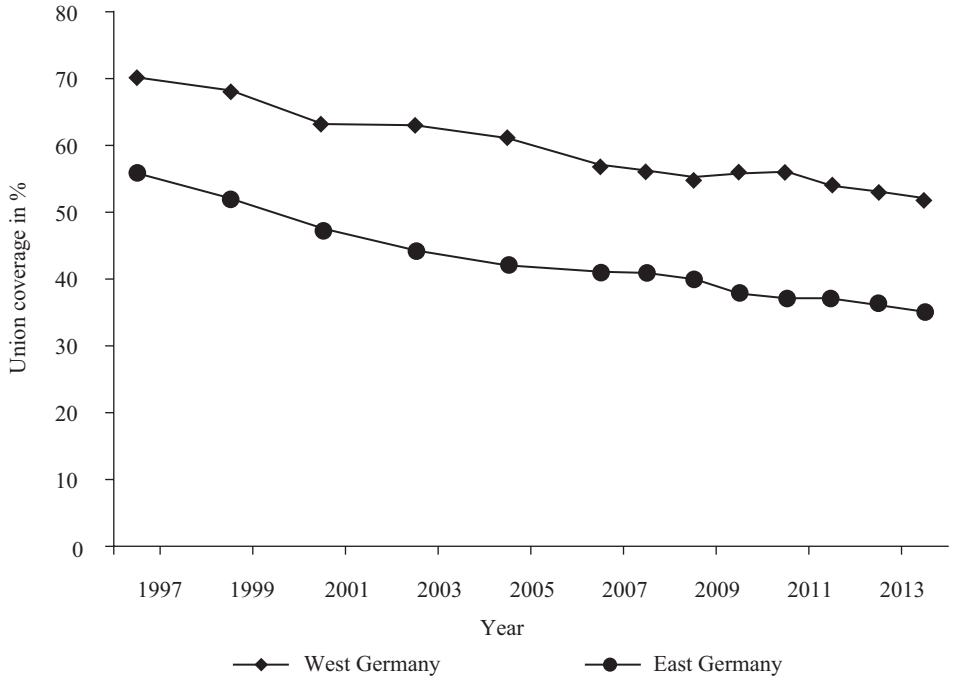

FIGURE 2. Union Coverage through Industry-level Agreements

Data Source: IAB Establishment Panel, Ellguth and Kohaut (2014).

After reunification, union coverage of wage setting was lower in the East than in the West of Germany. Since then, in both parts of Germany union coverage has substantially decreased. Figure 2 depicts that evolution for the share of employees covered by a collective wage agreement at the industry level. Firm-level collective agreements covered in 2011 about 7% of the employees in West Germany and 12% in East Germany. As a result, 39% of employees in West Germany and 51% in East Germany were not covered by any collective wage agreement in 2011.

The progressive disappearance of trade unions and collective wage bargaining from an increasing share of the German labor market has produced a stark dualism. Within the unionized sector there are workers who are employed by highly profitable industrial firms that export to the world market, offer stable jobs and pay high and growing wages as well as

substantial wage premiums. At the same time, pay and working conditions are much less favorable to workers in other firms. Especially in the service sector, unions are often absent and even when wages are set by a collective agreement, such labor contracts have often been stipulated many years ago without any later adjustment of nominal wages.

Another major institutional change in the German labor market has been the decline of *public employment* and the stagnation of public wages. As the government is a very large employer, its wage and employment policy has a first-order impact on the entire labor market. In Germany, public employment fell from 6.7 million individuals in 1991 to 4.5 million in 2009. At the same time, the share of full-time employment in total public employment severely diminished. An especially strong downturn occurred in 1995 when the railroads and the post were turned into private-law companies. If one focuses on the public administration narrowly defined, public employment fell from 5.2 million to 3.6 million in the same period. The decline was much stronger in the East, where the public administration lost about half of its staff during that period (Schulte, 2011).

Public wages have experienced a very modest increase since the mid-1990s, especially so if compared to the growth of wages in the manufacturing sector. In West Germany, nominal collective wages increased by about 30% between 1997 and 2008 in manufacturing and by only 20% in the public sector. In East Germany, the wage dynamics exhibited a somewhat different pattern in the first years after reunification because wages started from a much lower level than in West Germany and the public sector had to speed up the process of convergence of regional living standards by increasing nominal wages in the East.

As a result of reduced public employment and a stagnation of public wages, public expenditure for wages and salaries as a share of GDP has substantially diminished since the mid-1990s. This was sought for by the government in order to fight against the problem of mounting public debt, a problem that became much more acute in the wake of reunification. However, the policy of cutting public wages and eliminating public jobs has also led to a deterioration of public services, especially concerning the provision of education and infrastructure, which may eventually increase the ratio of public debt to GDP.

The third major institutional change affecting the German labor market after reunification was the introduction of far-reaching *labor-market reforms*, known as the Hartz reforms. The Hartz reforms were introduced in four steps from 2003 to 2005. In 2003, the Hartz-I and Hartz-II laws were passed. They

entailed the following changes: tighter obligations to work for the recipients of unemployment benefits; creation of new agencies to place temporary workers and deregulation of temporary employment; and subsidization of minor employment and self-employment. The Hartz-III law of 2004 further tightened the sanction regime for the unemployed and created new public offices to help them to find a job. Another law in the same year reduced the maximum duration of benefits from unemployment insurance and increased the minimum time a person has to have been employed in order to be entitled to those benefits.

In 2005, with registered unemployment approaching the five-million bar, the hotly debated Hartz-IV law was introduced. Prior to that law, the benefit system consisted of three layers: unemployment insurance, unemployment assistance, and social assistance. The second layer implied that unemployed individuals received means-tested earnings-related unemployment assistance after the exhaustion of unemployment-insurance benefits. The duration of unemployment assistance was virtually unlimited. The new law abolished unemployment assistance and replaced it with social assistance. Those who would have received unemployment assistance in the old system have now to apply for the new, means-tested unemployment benefit.[2] In most cases, the resulting social transfer is significantly lower than under the previous system. However, the new system entails stronger incentives for transfer recipients to supplement their transfer by taking up some work.

The Hartz reforms have promoted so-called atypical employment relationships (e.g., marginal part-time work is partially exempted from social security contributions, usually under a fixed-term employment contract). By 2011, only two thirds of employees in Germany had been subject to social security contributions and hence eligible for unemployment benefits (Bundesagentur für Arbeit, 2011). Marginal part-time work is now a major form of employment in the retail, cleaning, and the hospitality sector. Some 1.3 million persons combine their low market wages with the new unemployment benefit introduced by the Hartz-IV law.

The Hartz reforms contributed to increase the labor supply of low-skilled workers. In turn, that supply increase is bound to exert a downward pressure on the wages of the low-skilled. Benefit abuse seems to have become less frequent, while bureaucratic load, heavy controls and legal disputes before courts have increased. The official unemployment rate has substantially decreased in the wake of the Hartz reforms. Differently from most advanced

[2] Currently, about 70% of the unemployed receive that benefit.

economies, Germany used to have no national *minimum wage* until recently. For a long time, the common wisdom was that wage issues should be settled by the "social partners," i.e., the representatives of employers and workers, without governmental interference. Minimum wages were viewed as unwarranted and undesirable. This attitude began to evolve in the 2000s, a period which witnessed a rapid expansion of labor-market segments offering badly-paid jobs. Over time, most trade unions, some political parties and some large employers, which compete against domestic low-wage paying firms, have come to ask for the introduction of a legislated minimum wage. In 2015, an economy-wide minimum wage of 8.50 euros per hour is introduced.

III. The Evolution of Wage Inequality in Cross-sections

1. Main Findings

Most investigations of the evolution of earnings inequality in Germany are based on repeated cross-sections. They give snapshots of the earnings distribution in a given country in a given year and allow us to understand how the earnings distribution changes over time.

Investigations of cross-sectional earnings inequality in Germany are mainly based on two types of data: the German Socio-Economic Panel (SOEP) and administrative records from the social security system assembled by the Institute for Employment Research (IAB). The SOEP is a household survey conducted on a yearly basis in the FRG since 1984. Some 10,000 to 12,000 households are observed. Participation is voluntary and there are no penalties for wrongly reporting earnings information. Sample size is relatively small but the SOEP-households and their weighting factors are selected so as for findings to be highly representative of the overall population. Earnings data drawn from social security are more reliable—since firms are sanctioned if they misreport their employees' earnings—and the sample size is much bigger. However, datasets based on social security records exclude civil servants and self-employed workers—who account for about 20% of the German workforce. Moreover, those datasets contain no information about working hours and the earnings data are censored at the social security earnings maximum. Censoring concerns about one male worker out of ten while it is less frequent in the case of women.

The bulk of the literature has tried to pin down the evolution of inequality

among male full-time workers in West Germany. The main unanimous finding of the literature is that starting in the early 1990s, earnings inequality has been rapidly increasing. The rise of inequality is not limited to male full-time workers in West Germany but it extends—with some caveats—to female workers and East Germans. There is however disagreement in the literature about when inequality started to rise. As is well known, in the USA wage and earnings inequality started to increase in the late 1970s, and comparing this to the corresponding start in Germany would be a valuable hint for detecting the drivers of inequality. According to Steiner and Wagner (1998), Prasad (2004), Gernandt and Pfeiffer (2007), and Fuchs-Schündeln, Krueger, and Sommer (2010), the German earnings distribution was fairly stable throughout the 1980s. Only after the severe macroeconomic downturn of 1992-1993 did inequality begin to rise. Fitzenberger (1999), Dustmann, Ludsteck, and Schönberg (2009), and Card, Heining, and Kleine (2013) claim instead that the inequality rise in Germany dates back to the 1980s. The first two contributions find that wage inequality increased in the 1980s in West Germany, but only in the upper part of the distribution. According to the third one, also inequality in the lower part of the distribution was on the rise in the second half of the 1980s.

The contradicting dating of the start of the inequality increase in Germany is related to the data sources that researchers have utilized. While SOEP data show almost no change in the earnings distribution in the 1980s, data from social security display an inequality increase. Given that neither data source is perfect, it is hard to find compelling arguments for subscribing to one view against the other. However, one should not exaggerate the problem: even if one believes more in the social security data, the inequality increase that they show during the 1980s and early 1990s is one that occurred at a significantly slower pace than in the subsequent period. Hence, there is at least a consensus that in the 1990s the rise of inequality accelerated for the entire wage distribution in Germany.

Strikingly, that inequality increase went along with real wage losses for workers in the lower part of the distribution. For instance, comparing the SOEP data of 1994 with those of 2005, real hourly wages have decreased for West-German male workers in the bottom quartile of the distribution (Gernandt and Pfeiffer, 2007). In West Germany, wage and earnings inequality increased more in the lower half of the distribution than in its upper half. Gernandt and Pfeiffer (2007) also detect a significant positive gap between high-tenure and low-tenure workers in terms of respective wage growth rates. Those authors suggest that the adjustment of wages to

worsening labor market conditions hit the entrants in the labor market much more severely than the incumbent employees.

Becker (2006) exploits the SOEP to compare the years 1998 and 2003 in terms of inequality of hourly wages. She also finds that workers without a full-time job suffered from wage stagnation in that period. Moreover, she shows that a low-pay sector was already developing before the introduction of the labor-market reforms of the Hartz legislation. Hourly wages were also investigated by Antonczyk, Fitzenberger, and Sommerfeld (2010), who use the 2001 and 2006 repeated cross-sections of the Structure of Earnings Survey (GSES) of the German Statistical Office. For both men and women they find a dramatic rise of wage inequality, accompanied by negative growth of real wages for the bottom part of the distribution. While there is less wage dispersion in the sector covered by collective wage bargaining, they detect an inequality increase within all bargaining regimes.

As stressed by Corneo, Zmerli, and Pollak (2014), the main findings of the literature on West Germany carry over to Germany as a whole. In particular, Germany experienced a substantial increase of earnings inequality in the lower part of the distribution during the first decade of this century. The corresponding emergence of a low-pay sector brought about a strong dualism in the German labor market that contrasts with the experience of the previous decades. The only noticeable difference with respect to West Germany concerns the evolution of earnings inequality at the bottom of the distribution in the years immediately after reunification—for Germany as a whole that inequality decreased. This was driven by a partial catching up of wages in the regions of the former GDR. Those wages started from a low level and were raised in a period of few years to levels close to three-quarters of comparable West-German wages.

Interestingly, the rapid increase of inequality in the German labor market since the early 1990s is a phenomenon that manifests itself also within groups. That is, groups—defined on the basis of gender, age, or educational attainment—tended to display an upward trend of within-group wage inequality during the last two decades. This fact is important in order to tackle the question about the drivers of such a broad-based inequality increase.

A limitation of the existing literature is its focus on employees, with little or no attention paid to civil servants and the self-employed. An exception is Bach, Corneo, and Steiner (2009) who investigate the distribution of individual market income for the entire adult population living in Germany on the basis of income-tax microdata. Market income includes, along with

wages, the salaries of civil servants and the income of professionals, and also income from business and capital. During the period from 1992 to 2003 they find for Germany as a whole a steady increase of the Gini coefficient of market income.

2. Explanations

The analysis of the drivers of earnings inequality in Germany that has received most attention in the literature is the one proposed by Dustmann, Ludsteck, and Schönberg (2009). They put forward three main drivers: (a) skill-biased technological change, as an important factor of increasing inequality in the upper part of the distribution; (b) declining union power and vanishing coverage through collective wage agreements, which they consider key factors of increased inequality in the lower part of the distribution; and (c) immigration waves, especially in the early 1990s, as a driver of inequality at the bottom.

Actually, *skill-biased technological change* should have affected the lower part of the wage distribution already in the 1980s, a period of steeply rising wage inequality in the USA which is often attributed to technological change. But the lower part of the wage distribution did not change much in the 1980s in Germany. This may have been caused by strong unions and relatively generous social assistance. To some extent, the evidence presented by Dustmann, Ludsteck, and Schönberg (2009) is consistent with the polarization hypothesis that computer technology has decreased the demand for jobs that require routine skills that are common in the middle of the wage distribution (Autor, Levy, and Murnane, 2003). Further supporting evidence is provided by Spitz-Oener (2006). At the same time, wage polarization cannot explain the dynamics of inequality since the mid-1990s in the lower part of the distribution: contrary to it, in Germany low wages lost ground as compared to median wages (Antonczyk , Fitzenberger, and Sommerfeld, 2011). Also the evidence about the returns to education is much more mixed in Germany than in the USA: according to Antonszyk, Fitzenberger, and Sommerfeld (2011), rising returns to education contributed little to the increase of wage inequality, and Boockmann and Steiner (2006) even cast doubts that those returns have increased in the first place. All in all, the evidence that skill-biased technological change was a major driver of the increase of wage inequality in Germany is not very impressive.

A similar effect on inequality as the one from technological change may be expected arising from sectoral reallocations from manufacturing to services.

Empirically, capital is relatively complementary to low-skilled labor in manufacturing whereas it is complementary to high-skilled labor in the service sector (Blum, 2008). For Germany, Henze (2014) finds that the reallocation from manufacturing to services since 1975 significantly increased the wage gap between the 75th and the 25th percentile of the wage distribution. Further explorations of this hypothesis by means of cross-country data may valuably contribute to explain the drivers of wage inequality in Germany.

Increased wage inequality may have been caused by the decline of both *trade unions and industry-level collective bargaining*. Dustmann, Ludsteck, and Schönberg (2009) attribute approximately 28% of the increase in lower-tail inequality among male workers between 1995 and 2004 to the decline in bargaining coverage. The corresponding share for the upper part of the distribution is only 11%. As pointed out by Antonszyk, Fitzenberger, and Sommerfeld (2011), the bargaining coverage declined in similar proportions across all sectors of the economy. While they agree that the decline of collective bargaining played some role in the inequality increase, they stress more in general the role of increased workplace heterogeneity, a role stressed also by Card, Heining, and Kleine (2013) and Dustmann *et al*. (2014). To some extent, this is related to the decline of industry-level collective bargaining and the fact that an increasing share of new establishments have opted out of that bargaining system. Increased wage inequality because of increased workplace heterogeneity may however have drivers beyond the decline of trade unions. For instance, it could reflect changes in management practices, like the increased use of performance-related pay, or it may result from increasingly different technology choices. Whatever its drivers, the rise of workplace heterogeneity means that Germany is increasingly characterized by a dual labor market—with employers offering significantly different wages for apparently similar jobs.

Immigration may have acted as a substantial labor-supply shock that fostered earnings inequality in Germany. Between 1987 and 2001, more than 2.8 million ethnic Germans arrived from Eastern Europe and the former Soviet Union, and most of them were low-skilled workers.[3] According to Dustmann, Ludsteck, and Schönberg (2009), such large inflows of labor force had a profound impact on the wage structure in the lower part of the distribution. Contradicting this, Glitz (2012) finds no systematic evidence of significant direct effects of immigration on relative wages. However, his findings point to a considerable displacement effect: for every 10 immigrant

[3] Thereby, the German population increased by 3.5%.

workers finding employment, about 3.1 resident workers have lost their jobs. This is likely to have generated general-equilibrium effects leading to more wage dispersion.

The analysis of Dustmann, Ludsteck, and Schönberg (2009) is rather silent about the effects of *globalization* on the German wage distribution. Actually, the period of increasing wage inequality—which started in the early 1990s—coincided with a period of intensified international trade and foreign investment of German firms. In Germany, exports as a share of GDP almost doubled since reunification, and both inward and outward direct investment witnessed an extraordinary dynamics. While the link between international trade and inequality is often put forward in policy debates, empirical investigations have found little support for it. For instance, Berman, Bound, and Machin (1998) find that most of the skill upgrade during periods of increased international trade occurred at the intra-industry level. This suggests that the reallocation between unskilled-intensive and skilled-intensive sectors—that one would expect from the rise in trade—played at best a minor role. Furthermore, wage inequality also increased in most developing and middle-income countries, where unskilled-labor production and unskilled-labor wages were supposed to increase in relative terms. As a result, most of the academic literature dismisses an appreciable inequality-increasing role of international trade as predicted by the standard Heckscher-Ohlin framework. For Germany, Baumgarten (2013) finds indeed only moderate inequality-increasing effects.[4]

By contrast, *outsourcing*—understood as the shift abroad of low-skilled labor intensive production stages and the corresponding import of intermediate goods by domestic firms—is often considered to be an important driver of wage inequality, at least for the USA (e.g., Feenstra and Hanson, 1999). The fact that German employers in the early 1990s got access to neighboring Eastern European countries characterized by much lower labor cost suggests that outsourcing might have generated some inequality in the domestic labor market. Some empirical support is offered by Geishecker and Görg (2008), while Baumgarten, Geishecker, and Görg (2013) find that offshoring had substantial and highly heterogeneous wage effects depending on the type of

[4] However, recent work by Helpman *et al*. (2014) finds evidence of a sizable effect of trade on wage inequality. They use a heterogeneous firm model of trade and inequality and test it on linked employer-employee data for Brazil.

tasks workers perform.[5]

A clear limitation of the literature on the drivers of the rise of earnings inequality in Germany is its insufficient account of the interdependencies that link the various drivers to each other. For instance, outsourcing can lead to de-unionization through a threat effect and, at the same time, de-unionization can increase firms' incentives to foreign outsourcing (Lommerud, Meland, and Straume, 2009; Bognetti and Santoni, 2010). While such interdependencies have successfully been investigated in theoretical work, much remains to be done in order to empirically disentangle the various effects and quantitatively assess their distinctive role.

IV. The Evolution of Inequality of Long-term Earnings across Cohorts

Hitherto I have discussed earnings inequality as exhibited by cross-sections of yearly earnings data. However, welfare economics points to *lifetime*—rather than annual—income as the crucial variable in order to determine the opportunity sets faced by consumers and hence how well they fare in economic terms. Analyses of inequality that are based on repeated cross-sections of yearly earnings may tell us little about the evolution of lifetime inequality. They utilize samples that include individuals of different age and educational attainment, characterized by heterogeneous patterns of earnings dynamics. As sample composition may substantially change over long periods of time, it is unclear whether the evolution of inequality displayed by cross-sectional analyses corresponds to a similar evolution of long-term inequality or simply mirrors sample changes with little connection to the evolution of lifetime inequality.

The fact that the bulk of the literature on earnings inequality focuses on yearly cross-sections is due to the paucity of data that track the income path of workers over their entire life cycle. As it turns out, however, Germany is a country for which an analysis based on such data has been conducted.

[5] Privatization is another potential candidate for explaining the rise of wage inequality but this factor still awaits a thorough investigation. In Germany, the low-skilled tend to receive a considerable wage premium in the public sector. Therefore, the wave of privatization in the 1990s may have led some low-skilled workers to lose their wage premiums, which tends to increase wage disparity.

1. Main Findings

In what follows I draw from an ongoing research project with Timm Bönke and Holger Lüthen (Bönke, Corneo, and Lüthen, 2015). Its focus is on intra-cohort lifetime earnings inequality, i.e., investigating inequality among employees in Germany who were born in the same year. In this project we analyze waves of administrative data from the German social security system that include monthly information about earnings, employment status, sickness and other variables of interest for some 240,000 individuals. Based on this dataset we have built a sample that constitutes the main object of our investigation. Our sample includes West Germans only, so as to avoid the issue of comparing earnings received in the FRG with earnings received in the GDR. We focus on mandatorily insured West German natives born in 1935 or later and exclude so-called fragmentary biographies. In this way we exclude people who have worked only for a short period as employees, typically because they later became self-employed or civil servants, and for whom no complete earnings histories are available. The resulting sample covers some 80% of the West-German labor force.

For the cohorts born between 1935 and 1952 we can observe the earnings that they received up to age 60. Those discounted earnings are defined as their lifetime earnings. In order to discount earnings we use a time-varying average of nominal interest rates on federal governmental bonds. We find that the distribution of lifetime earnings in Germany is rather compressed, with a Gini coefficient around 0.16 for the cohorts born in the 1930s. This is less than two thirds of the average value of the Gini coefficients of the distributions of yearly earnings of those same cohorts. The lower degree of inequality, once it is assessed from a lifetime perspective, is due to the intertemporal mobility of the individuals in the distribution of yearly earnings. In particular, highly educated individuals tend to receive relatively high earnings in the second half of their active life cycle, while they tend to receive relatively low earnings when they are in their twenties. Such age-earnings profiles considerably reduce lifetime inequality as compared to annual inequality.

In order to gauge the evolution of long-term inequality across cohorts, we have generalized the concept of lifetime earnings to be one of the *up-to-age-X earnings* (UAX, defined as the present value of earnings received until age X and discounted to the year when the individual turned age 17). Lifetime earnings are defined as the present value of earnings received until age 60 and discounted to the year when the individual turned 17. Thus, lifetime

earnings are a special case of UAX when X equals 60.

The interest of the concept of UAX lies in the following observation. Suppose we consider cohorts that are still active and try to trace out the evolution of inequality of the cohort-specific UAX distributions. If over the birth year of cohorts the Gini coefficient of a selected UAX distribution is increasing and this upward trend of the Gini coefficient is found for every X, this would indicate that a secular trend of increasing lifetime earnings inequality is underway. By contrast, if we do not find such an upward trend or if we find contrasting evolutions for different definitions of X, then we could not derive such a conclusion.

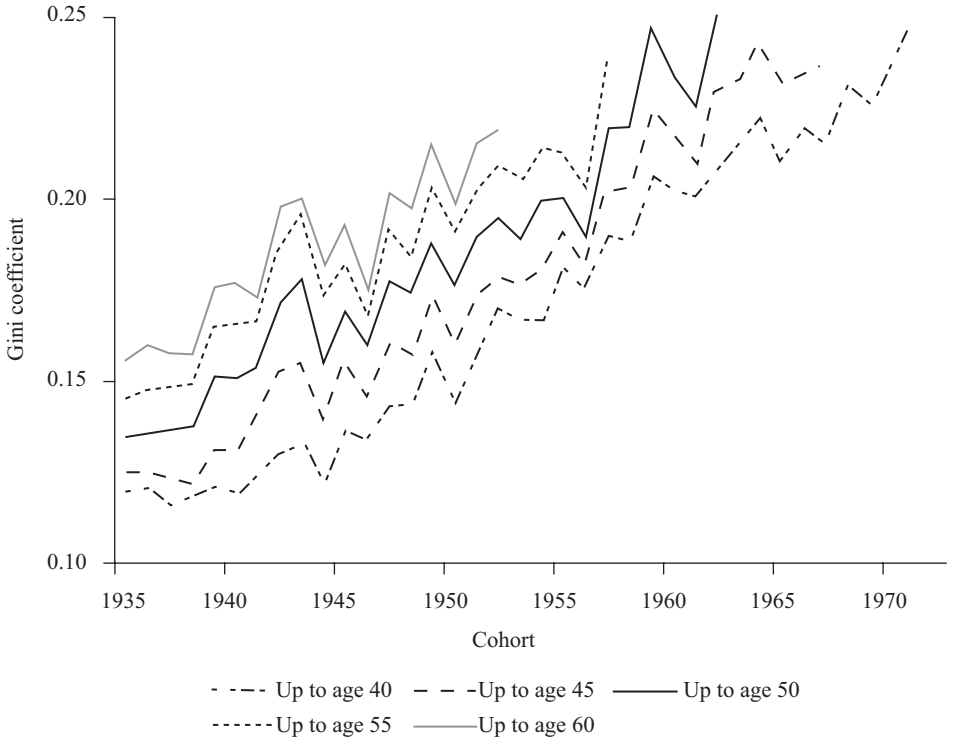

FIGURE 3. Gini Coefficients of UAX for Cohorts 1935-1972

Data Source: own calculations using weighted data based on FDZ-RV–VSKT2002 and 2004-2012_Bönke.

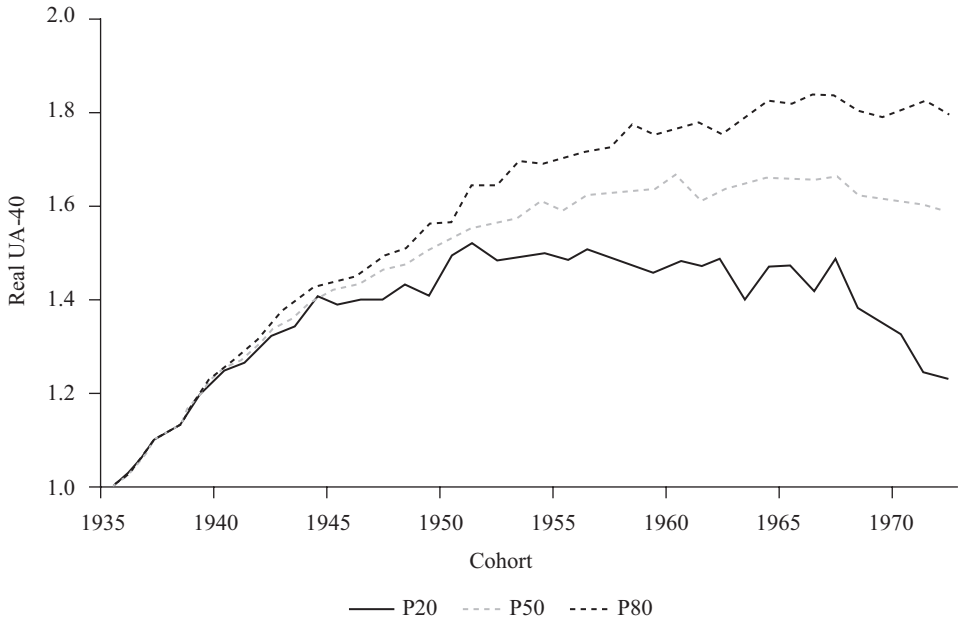

FIGURE 4. Growth Factors of Real UA-40 for Median, P20 and P80

Data Source: own calculations using weighted data based on FDZ-RV−VSKT2002 and 2004-2012_Bönke.

The result of this exercise is displayed in Figure 3. On the vertical axis are the Gini coefficients of the UAX distribution for all cohorts in our sample, the youngest being born in 1972. On the horizontal axis are the years of birth of the cohorts, starting with 1935. The first curve from above represents the evolution of the Gini coefficient of lifetime earnings, i.e. UA-60. A little below that curve is the one that portrays the Gini coefficients of the UA-55, which allows us to include five more cohorts. The same procedure applies to the UA-50, UA-45 and UA-40 distributions. We stop at age 40 because before age 40 intra-cohort mobility is still so high that at those early ages accumulated earnings are a relatively poor indicator of lifetime earnings. Figure 3 shows an upward trend of lifetime earnings inequality, with a secular rise from the cohorts born in the mid-1930s to those born in the early 1970s. This finding carries over to women, although the results for them are not as strong as for men and are statistically less stable.[6]

[6] Kopczuk, Saez, and Song (2010) compute Gini coefficients of cohort-specific long-term earnings distributions for the US. Long-term earnings here merely refer to a 12-year period. They find that the cohorts born after the mid-1930s have experienced an increasing inequality of such long-term earnings. This points to a likely common evolution in the US and Germany.

The increase in lifetime inequality is large. As an example, consider two cohorts, the one born in 1935 and the other in 1963, which may be seen as, respectively, statistical fathers and statistical sons. The Gini coefficient of the UA-45 distribution equals 0.126 for the fathers, and 0.233 for the sons. This implies a rise of inequality by 85%. This finding underscores the importance of the age composition of the workforce in determining the inequality of short-term earnings. Cohort size rapidly increased in Germany between the birth years 1945 and 1964. As younger cohorts are characterized by a relatively compressed distribution of annual earnings, this compositional change may have been responsible for the rather stable level of inequality of annual earnings that was observed in Germany until the early 1990s.

As we show in Bönke, Corneo, and Lüthen (2015), the increase of lifetime inequality affected both the top and the bottom of the distribution. But the increase has been stronger at the bottom, especially for generations born after the end of the Second World War. This is mirrored in the evolution of the absolute level of accumulated earnings at various percentiles of the distribution. Figure 4 shows the evolution of UA-40 measured in real terms for the P20, the median, and the P80. The corresponding UA-40 of the oldest cohort has been normalized to one. As shown by the figure, at the level of the P20 the youngest generation received before age 40 earnings that in real terms were only 23% higher than the earnings received by the P20 of the oldest cohort before that cohort became 40 years old. The real UA-40 of the P20 have even declined over the younger cohorts. Instead, the median of the youngest cohort, born in 1972, received earnings until that cohort was 40 years old that were 59% higher in real terms than the earnings received by the median of the oldest cohort until age 40. In the case of the P80, the increase of real UA-40 has been by almost 80%. This shows that the rise of lifetime earnings inequality is mainly hitting those in the lower part of the distribution.

2. Explanations

A first pass in order to better understand the rise of German lifetime inequality is to decompose it into two parts: the increase due to changes in wage dispersion (i.e., changes affecting strictly positive earnings) and the one due to the unequal evolution of unemployment spells (during which individuals receive zero earnings). The interest of this decomposition derives from the peculiar evolution of unemployment in Germany. Before the first oil shock, a situation of almost full employment prevailed there. After this

shock, a long-lasting stepwise increase of the unemployment rate set in. The low-skilled were severely hit, with a rate of unemployment about twice the overall unemployment rate. Since unemployment entails zero earnings, one may conjecture that unemployment has been a proximate cause of the rise of lifetime earnings inequality in Germany.

Our sample exhibits a very heterogeneous incidence of unemployment across cohorts at different parts of the distributions. If we rank individuals according to their UA-40, we find that the upper part of the distribution is hardly affected by unemployment, and this applies to all cohorts. Things change in the lower part of the distribution, especially so for the lowest quartile. For that group, the incidence of unemployment was very different across cohorts. In the case of the oldest cohorts in our sample, before reaching age 40 individuals in the lowest quartile spent on average some five months as unemployed. This is not very different from the average unemployment spell for the entire cohort. In the case of the youngest cohorts, before reaching age 40 individuals in the lowest quartile spent on average more than 40 months as unemployed—eight times as much.

In order to quantify the effect of unemployment on the rise of lifetime inequality, Bönke, Corneo, and Lüthen (2015) impute wages to the unemployed. It turns out that the unequal evolution of unemployment spells contributes to explain only some 20% to 40% of the total increase of lifetime earnings inequality. Furthermore, the evolution of unemployment does not contribute to explain the inequality rise in the upper part of the distribution. Thus, some 60% to 80% of the increase of lifetime inequality in Germany is due to increased cohort-specific wage inequality. Why has lifetime wage inequality increased so much?

A first possible explanation is that the same factors that led to increased cross-sectional wage inequality also led to increased lifetime wage inequality. Those factors could have increased lifetime wage inequality if firms consider workers from younger cohorts to be imperfect substitutes for workers from older cohorts. An obvious reason for this would be hiring, training and firing costs. This would imply that incumbent old workers have a relatively strong bargaining position vis-à-vis their firms and therefore could avoid carrying much of the burden of adjusting the labor market to the shocks that has hit the German labor market since the 1970s. According to this explanation, this burden was mainly carried by the less skilled of the younger cohorts—whence the rise of lifetime wage inequality.

A second possible explanation is that the rise of lifetime wage inequality was generated by changes in the intra-cohort distribution of *lifetime work*

effort. I refer to work effort rather than simply working time because individual's lifetime wages are not only determined by the numbers of hours worked but also by a variety of individual decisions. Those include educational effort and occupational choice—for instance the choice to avoid unsafe, risky, or unpleasant occupations even if they would allow one to earn more. Lifetime work effort also includes work intensity, which may determine the level of performance-related pay and the likelihood of getting promoted.

Lifetime work effort is a multi-dimensional concept that is hard to measure empirically. Still, it should be taken into account. If changes in work effort were driving the rise of lifetime wage inequality, its policy implications would be very different from the ones that may be derived if factors like skill-biased technological change, union decline and immigration were the main culprits. Whereas the latter are circumstances beyond the control of individuals, effort has a volitional component, so that to some extent the inequality increase may be considered legitimate and acceptable.

There are at least two possible ways in which a change in the distribution of lifetime work effort might have generated a rise of lifetime wage inequality. The first channel is the evolution of social benefits and wage taxes in West Germany. After the 1960s, its tax-transfer system became more progressive as compared to the two previous decades. On the one hand, social transfers became more generous in terms of replacement rates and new social rights were granted. On the other hand, the marginal tax rates on wage incomes increased for the bulk of the workforce, especially so if one takes the tax component of social contributions into account.

The increase of progressivity in the tax-transfer system is likely to have generated different work incentives for people at different skill levels. For the low-skilled, both the substitution and the income effect may have pushed towards a reduction of work effort. For the high-skilled, the income effect is instead likely to have increased work effort. Hence, changes in taxes and transfers might have led to a stronger decrease of lifetime work effort for those in the lower part of the skill distribution and hence to more wage dispersion.

The second possible channel is based on the effect of sustained real wage growth—as it was the case until the mid-1990s—upon a population endowed with heterogeneous preferences for money versus leisure. Anecdotal evidence abounds in suggesting that people significantly differ with respect to the importance they attach to money. Some individuals endorse materialistic values, e.g., they especially like to drive luxury cars and spend holidays in expensive places. Others have instead post-materialistic priorities, e.g., they

like to read books, play soccer or chess with friends, and spend time with their children. They do not need a lot of money in order to realize their life goals.

Those different types of people may have always existed. However, it is conceivable that within the older cohorts, those with cheap tastes chose to exert much work effort for their earning ability was low—because of a generally low level of productivity at the time. Subsequent economic growth increased the earning potential of everybody, including people with cheap tastes. But in contrast to people with expensive tastes, those with cheap ones may have decided to devote part of that productivity gain to enjoy more leisure time with family, friends and so on, whence a rise of lifetime wage inequality.[7]

Evidence on self-reported happiness suggests that such a voluntary refusal of consumerism is unlikely to have played a role for workers in the lower part of the distribution. However, it could have done so for the high-skilled, thereby contributing to explain the increase of lifetime wage inequality in the upper part of the distribution.

V. Insights for China

Today's Germany is a more unequal country than in the 1980s, a time when Germany was one of the most egalitarian countries in the world. In the cross-sections, wage inequality began to significantly rise after the economic downturn of 1992-1993 and has kept growing since then. In terms of lifetime earnings, starting with the cohorts born in the late 1930s, intra-cohort inequality has continuously increased, to the point that generations born in the early 1970s are going to experience twice as much lifetime earnings inequality as those born in the late 1930s. This inequality increase was accompanied by a mutation of the German socio-economic compact: its traditional corporatist model imported a number of elements from the Anglo-Saxon one, giving rise to an original hybrid model. In international comparison, Germany still has a relatively egalitarian wage distribution, but during the last two decades inequality has mounted more rapidly than in most OECD countries. What insights can be derived from this narrative for China?

Let us be clear: avoiding any increase of wage inequality should not be the

[7] See Corneo (2015) for a graphical illustration.

top priority of labor-market policies in China, a middle-income country that faces distinctive labor-market problems like the low participation of older workers and the need to progressively dismantle the *hukou* system in favor of a standard population-registration system delinked from social entitlements.[8] But avoiding too much wage inequality can indeed be crucial for sustaining high levels of economic growth and achieving the transition to high-income status. First, because it can help to avoid that the less fortunate portion of the population finds itself in a poverty trap from which it cannot escape because of wealth constraints that prevent the poor from investing in education, skill training and upgrading, and business creation. Second, because large wage disparities may be perceived as unfair and hence give rise to social unrest as well as attempts by politicians to stabilize their own power by creating and feeding privileged constituencies. Invariably, such social and political damages come at considerable long-run costs to the overall economy. Hence, it is important to evaluate labor-market policies also in terms of their contribution to keep earnings inequality in check. There are two insights from the German experience that I would like to put forward. The first one concerns the monitoring of earnings inequality. To the extent that private savings and credit markets develop, lifetime earnings rather than short-term earnings become the key variable in determining workers' economic welfare. This means that more efforts should be made in order to monitor the distribution of lifetime earnings.

It is important to recognize that cross-sectional measures of wage inequality can be heavily affected by the age composition of the workforce and their evolution may be little informative of the evolution of lifetime inequality. So, the massive rise of cohort size in West Germany between the birth years 1945 and 1964 is likely to have stabilized the wage distribution in the 1970s and 1980s, hiding the fact that every new generation was becoming more unequal than the preceding one in terms of lifetime earnings. Such age-composition effects are likely to be very relevant for China, a country where cohort size has varied a lot since the demographic disaster of the "Great Leap Forward" and that is likely to experience a sustained decline of new entrants into its labor force in the years to come.

A second insight concerns the role of collective wage bargaining. The German experience is consistent with the presumption that a wider coverage of wage setting by means of union negotiations tends not only to raise labor's

[8] Such a reform would also have an equality-enhancing effect as it would narrow the rural-urban and regional wage gaps.

share in national income but also to compress the wage distribution. The interest of this insight lies in the possibility for policy makers to alter the role of collective wage bargaining by means of legislation, e.g., about union recognition and the external applicability of collective wage agreements stipulated by unions. The above statement does not imply that policy makers should always strive for granting collective wage bargaining a bigger role in wage formation. Arguably, several outcomes of interest for policy makers entertain a non-monotonic relationship with the extent of collective wage bargaining, implying that extremes (i.e., complete decentralization or centralization in wage bargaining) may sometimes be better than intermediate situations.

With respect to wage distribution, unions tend to decrease wage dispersion among workers covered by a collective agreement. Since unions also tend to raise wages above their competitive level, unions' impact on the overall wage distribution is not necessarily inequality-reducing, e.g., taking into account workers that are not covered by a collective agreement. If only a minority of workers are covered by union wages, strengthening their unions will likely lead to more wage inequality.

Moreover, collective wage bargaining has implications that go beyond wage distribution and that hinge on the details of the bargaining system. When unions raise nominal wages, those wage increases are partially shifted onto consumers through higher product prices and onto taxpayers through higher social expenditure for the unemployed. If coverage is high, those negative spillovers are taken into account by a centralized trade union but less so by sector-specific unions. Firm-level bargaining neglects those negative externalities even more, but in that case the union is aware that higher nominal wages eventually weaken the position of the firm in relation to its competitors and may therefore be detrimental to union members. Hence, firm-level unions are usually more willing to cooperate with employers than industry-level unions. However, in cases where it is difficult to reach a wage agreement, industry-level unions are preferable because they help to keep the class conflict outside the firms.

By and large, both theoretical considerations and empirical evidence suggest that in terms of union centralization and coverage, extreme configurations may bring about better results in terms of equity and efficiency than intermediate ones. Unfortunately, extreme configurations are unlikely outcomes of spontaneous processes of institutional change under freedom of association. Without a clear policy in one direction or the other, it is rather to be expected that the Chinese wage determination system would converge to

a highly fragmented one, with intermediate coverage and a mixture of firm-level bargaining and some industry-level bargaining in some provinces. This would not be too dissimilar from the current wage determination system in Germany. While the decentralization of wage setting in Germany after reunification might have contributed to the reduction of the unemployment rate during the last decade, it has exacerbated the dualism of the German labor market, heavily eroding the impression that wages are fair, and creating a demand for redistribution that the German welfare state finds ever more difficult to meet.

REFERENCES

Antonczyk, Dirk, Bernd Fitzenberger, and Katrin Sommerfeld. 2010. "Rising Wage Inequality, the Decline of Collective Bargaining, and the Gender Wage Gap." *Labour Economics*, 17(5): 835-847.

———. 2011. "Anstieg der Lohnungleichheit, Rückgang der Tarifbindung und Polarisierung" ("Rise of Wage Inequality, Demise of Collective Wages and Polarization"). *Zeitschrift für Arbeitsmarktforschung* (*Journal for Research on the Labor Market*), 44(1-2): 15-27.

Autor, David, Frank Levy, and Richard Murnane. 2003. "The Skill Content of Recent Technological Change: An Empirical Exploration." *Quarterly Journal of Economics*, 118(4): 1279-1333.

Bach, Stefan, Giacomo Corneo, and Viktor Steiner. 2009. "From Bottom to Top: The Entire Income Distribution in Germany, 1992-2003." *Review of Income and Wealth*, 55(2): 303-330.

Baumgarten, Daniel. 2013. "Exporters and the Rise in Wage Inequality: Evidence from German Linked Employer-Employee Data." *Journal of International Economics*, 90(1): 201-217.

Baumgarten, Daniel, Ingo Geishecker, and Holger Görg. 2013. "Offshoring, Tasks, and the Skill-Wage Pattern." *European Economic Review*, 61(1): 132-152.

Becker, Irena. 2006. "Effektive Bruttostundenlöhne in Deutschland. Eine Verteilungsanalyse unter Aspekten der Leistungsgerechtigkeit und besonderer Berücksichtigung des Niedriglohnsegments" ("Effective Gross Wages in Germany: A Distributional Analysis Focused on Justice Taking into Account the Low-wage Paying Sector"). Working Paper Nr. 2, Project on Social Justice, J. W. Goethe Universität Frankfurt a. Main.

Berman, Eli, John Bound, and Stephen Machin. 1998. "Implications of Skill-biased Technological Change: International Evidence." *Quarterly Journal of Economics*, 113(4): 1245-1279.

Blum, Bernardo. 2008. "Trade, Technology, and the Rise of the Service Sector: The

Effects on US Wage Inequality." *Journal of International Economics*, 74(2): 441-458.

Bognetti, Giuseppe and Michele Santoni. 2010. "Can Domestic Unions Gain from Offshoring?" *Journal of Economics*, 100(1): 51-67.

Bönke, Timm, Giacomo Corneo, and Holger Lüthen. 2015. "Lifetime Earnings Inequality in Germany." *Journal of Labor Economics*, 33(1): 171-208.

Boockmann, Bernhard and Viktor Steiner. 2006. "Cohort Effects and the Returns to Education in West Germany." *Applied Economics*, 38(10): 1135-1152.

Bundesagentur für Arbeit (Federal Office for Work). 2011. "Der Arbeits- und Ausbildungsmarkt" ("The Labor Market and the Market for Training"). *Monatsbericht Mai 2011* (*Monthly Report May 2011*), Nürnberg.

Card, David, Jörg Heining, and Patrick Kline. 2013. "Workplace Heterogeneity and the Rise of West German Wage Inequality." *Quarterly Journal of Economics*, 128(3): 967-1015.

Corneo, Giacomo. 1993. "Semi-unionized Bargaining with Endogenous Membership and Management Opposition." *Journal of Economics*, 57(2): 169-188.

———. 2015. "Income Inequality from a Lifetime Perspective." *Empirica*, forthcoming.

Corneo, Giacomo, Sonja Zmerli, and Reinhard Pollak. 2014. "Germany: Rising Inequality and the Transformation of Rhine Capitalism." In *Changing Inequalities & Societal Impacts in Rich Countries*, edited by Brian Nolan, Wiemer Salverda, Daniele Checchi, Ive Marx, Abigail McKnight, Istvan Gyorgy Toth, and Herman G. van de Werfhorst, 271-298. Oxford: Oxford University Press.

Dustmann, Christian, Bernd Fitzenberger, Uta Schönberg, and Alexandra Spitz-Oener. 2014. "From Sick Man of Europe to Economic Superstar: Germany's Resurgent Economy." *Journal of Economic Perspectives*, 28(1): 167-188.

Dustmann, Christian, Johannes Ludsteck, and Uta Schönberg. 2009. "Revisiting the German Wage Structure." *Quarterly Journal of Economics*, 142(2): 843-881.

Dyson, Kenneth and Stephen Padgett, eds. 2006. *The Politics of Economic Reform in Germany: Global, Rhineland or Hybrid Capitalism?* London, Routledge.

Ellguth, Peter and Susanne Kohaut. 2014. "Tarifbindung und Betriebliche Interessenvertretung: Aktuelle Ergebnisse aus dem IAB-Betriebspanel 2013" ("Union Coverage and Firm-level Bargaining: Current Results from the IAB-Panel 2013"). *WSI-Mitteilungen* (*WSI-Report*), 4: 204-210.

Feenstra, Robert C. and Gordon H. Hanson. 1999. "The Impact of Outsourcing and High-technology Capital on Wages: Estimates for the United States, 1979-1990." *Quarterly Journal of Economics*, 114(3): 907-940.

Fitzenberger, Bernd. 1999. *Wages and Employment across Skill Groups: An Analysis for West Germany*. Heidelberg: Physica-Verlag.

Fuchs-Schündeln, Nicola, Dirk Krueger, and Mathias Sommer. 2010. "Inequality Trends for Germany in the Last Two Decades: A Tale of Two Countries." *Review of Economic Dynamics*, 13(1): 103-132.

Geishecker, Ingo and Holger Görg. 2008. "Winners and Losers: A Micro-level Analysis of

International Outsourcing and Wages." *Canadian Journal of Economics*, 41(1): 243-270.

Gernandt, Johannes and Friedhelm Pfeiffer. 2007. "Rising Wage Inequality in Germany." *Journal of Economics and Statistics*, 227 (4): 358-380.

Glitz, Albrecht. 2012. "The Labor Market Impact of Immigration: A Quasi-experiment Exploiting Immigrant Location Rules in Germany." *Journal of Labor Economics*, 30(1): 175-213.

Helpman, Elhanan, Oleg Itskhoki, Marc-Andreas Muendler, and Stephen J. Redding. 2014. "Trade and Inequality: From Theory to Estimation." Mimeo, Harvard University.

Henze, Philipp. 2014. "Structural Change and Wage Inequality: Evidence from German Micro Data." Center for European, Governance and Economic Development, Research Working Paper No. 204.

Kopczuk, Wojciech, Emmanuel Saez, and Jae Song. 2010. "Earnings Inequality and Mobility in the United States: Evidence from Social Security Data Since 1937." *Quarterly Journal of Economics*, 125(1): 91-128.

Lommerud, Kjell Erik, Frode Meland, and Odd Rune Straume. 2009. "Can Deunionization Lead to International Outsourcing?" *Journal of International Economics*, 77(1): 109-119.

Prasad, Eswar. 2004. "The Unbearable Stability of the German Wage Structure: Evidence and Interpretation." *IMF Staff Papers*, 51(2): 354-385.

Schulte, David. 2011. "Entwicklung des Öffentlichen Dienstes seit der Wiedervereinigung" ("Development of Public Employment after Reunification"). Thesis, Department of Economics, Freie Universität Berlin.

Spitz-Oener, Alexandra. 2006. "Technical Change, Job Tasks, and Rising Educational Demands: Looking outside the Wage Structure." *Journal of Labor Economics*, 24(2): 235-270.

Steiner, Viktor and Kersten Wagner. 1998. "Has Earnings Inequality in Germany Changed in the 1980's?" *Zeitschrift für Wirtschafts-u. Sozialwissenschaften* (*Journal for Economic and Social Sciences*), 118(1): 29-59.