W.E. UPJOHN INSTITUTE
FOR EMPLOYMENT RESEARCH

Dissertation Awards

2017

Labor Market Adjustment to Globalization, Automation, and Institutional Reform

Brendan Price
Massachusetts Institute of Technology

Labor Market Adjustment to Globalization, Automation, and Institutional Reform

Brendan Price

My dissertation consists of four independent essays analyzing how workers and firms adapt to changes in trade, technology, and labor market institutions. Chapter 1 analyzes the labor market effects of Germany's 2005 Hartz IV reform, which lowered the generosity of long-term unemployment insurance (UI) available after a worker's initial stream of benefits runs out. Using administrative data on over 336,000 German UI claims, I exploit cross-worker heterogeneity in the timing of Hartz IV's effective onset to estimate how long-term benefit cuts affect jobless durations, wages, and job characteristics. Consistent with anticipatory behavior among affected workers, the hazard rate of reemployment starts rising several months before cuts bind, culminating in a much larger "spike at UI exhaustion" under Hartz IV. My estimates imply that the UI reform reduced the probability of a one-year jobless spell by 12.4 percent, with employment gains driven by full-time jobs. Decomposing Hartz IV's effect on post-UI wages into wage losses from lower reservation wages and offsetting wage gains from shorter jobless spells, I find that reservation wages dominate, as workers experiencing benefit cuts accept lower-paying jobs. At the aggregate level, a partial equilibrium calculation suggests that Hartz IV's causal effect on individual job finding lowered Germany's steady-state unemployment rate by 0.9 percentage points.

Chapter 2, coauthored with Daron Acemoglu, David Autor, David Dorn, and Gordon Hanson, argues that rising Chinese import competition was a major force behind both recent reductions in U.S. manufacturing employment and weak overall U.S. job growth. Using an instrumental variables strategy based on Chinese exports to other high-income countries, we show that manufacturing industries directly exposed to Chinese import competition contract sharply relative to less-exposed industries. These direct impacts are augmented by input-output linkages and persist in local general equilibrium. Our central estimates suggest import-induced job losses over 1999–2011 in the range of 2.0–2.4 million.

Chapter 3, also coauthored with Acemoglu, Autor, Dorn, and Hanson, reassesses the conventional wisdom that investments in information technology (IT) have dramatically boosted productivity while making workers redundant. Examining IT usage in U.S. manufacturing, we find only mixed evidence of faster productivity growth in IT-intensive industries. Surprisingly, output in IT-intensive industries falls relative to other manufacturing industries. Increases in productivity, when detectable, reflect even faster declines in employment.

Chapter 4 exploits German high school reforms to estimate how sharp fluctuations in cohort size impact entry-level labor markets. These reforms, which eliminated grade 13 at upper-track high schools, led to an idiosyncratically timed "double cohort" in each reforming state, as students graduated under both old and new rules. Consistent with the small share of upper-track graduates who immediately enter firm-based apprenticeships, new training contracts jump by 2 percent in double-cohort years. I find no clear evidence that lower- and middle-track graduates are crowded out of training positions, but the results are imprecise.

Chapter 1

The Duration and Wage Effects of Long-Term Unemployment Benefits: Evidence from Germany's Hartz IV Reform

Displaced workers often exhaust their unemployment benefits before returning to work. Rather than ceasing benefit payments entirely, many countries—including Germany, France, the United Kingdom, Austria, Sweden, and Spain—rely on two-tiered systems of UI that combine generous time-limited benefits with more modest benefits thereafter (Esser et al. 2013). These long-term benefits loom especially large for workers at the greatest risk of experiencing lengthy jobless spells, which erode employment prospects, deplete savings, and impose fiscal externalities through transfer payments and foregone tax revenue. Yet despite the widespread use of two-tiered benefit schedules, and despite renewed interest in long-term unemployment in the wake of the Great Recession, little is known about how long-term UI benefits affect jobless durations and post-UI wages.[1]

This paper analyzes the employment and wage effects of Germany's 2005 Hartz IV reform, a prominent and controversial measure that reduced long-term benefit levels for both new and incumbent UI claimants. Germany historically has had one of the most generous UI systems in the OECD, including long-term benefits that may last indefinitely. By the early 2000s, increasing UI caseloads—together with a widespread sentiment that the safety net had become too generous—created political pressure for a series of labor market reforms, whose centerpiece was Hartz IV. On January 1, 2005, existing long-term UI recipients—who numbered 2.2 million and comprised 5.3 percent of the civilian labor force on the eve of reform—were switched overnight to the new, typically lower, postreform benefit level.[2] Subsequent inflows into long-term UI were subject to the new rules upon exhausting their initial stream of short-term benefits. The lack of grandfathering for incumbent claimants, together with concurrent changes in labor market conditions and institutions, poses difficulties for some of the standard quasi-experimental methods that are used to evaluate UI reforms.[3]

To overcome these challenges, I exploit cross-worker and cross-cohort variation in the timing of Hartz IV's effective onset—based on individual heterogeneity in the potential duration of short-term benefits—to identify the causal effects of policy-induced benefit cuts. Short-term benefit duration is determined by age and work history, and it ranges from mere weeks to 22 months for the claimants in my sample. The basic intuition behind my research design is that the longer this initial stream of benefits lasts, the more insulated a claimant is from cuts to long-term benefits, because those cuts occur later in her jobless spell.[4]

My research design can be understood as a generalization of difference-in-differences. To fix ideas, consider a group of workers entitled to 12 months of short-term benefits, who enter UI in either 2001 or 2005. All else equal, the 2005 entrants should find jobs faster, since they face steeper benefit cuts if they exhaust short-term benefits. Of course, many other factors—such as labor demand, credit supply, or claimant characteristics—might have changed in these years. To difference these out, now consider workers entitled to only 6 months of short-term benefits. As before, we would expect the 2005 cohort to find jobs faster, but this tendency should (and does) manifest more quickly for the 6-month group because they face the Hartz IV treatment earlier in their jobless spells. As such, the difference-in-differences captures the relative effect of Hartz IV on the more-exposed group. I generalize beyond this 2 x 2 example by including workers with any possible short-term benefit duration, as well as intermediate cohorts that were in effect partly exposed to Hartz IV.[5]

I implement my research design using administrative social security and UI records provided by Germany's Institute for Employment Research (IAB). Starting from a 4.7 percent sample of newly unemployed workers, I construct an estimation sample of over 336,000 new UI claims made by prime-age displaced workers during 2001–2005. Formally, I estimate flexible discrete-time proportional hazard models (Prentice and Gloeckler 1978), which allow me to track changes in job-finding behavior as workers approach up to two distinct step-downs in benefit level: the exhaustion of short-term benefits, plus the incremental benefit cuts induced by Hartz IV. These events coincide for workers who exhaust short-term benefits after January 1, 2005, but they differ for the many claimants who are "caught in midstream," so that I am able to separately identify their effects.

Even before Hartz IV, the job-finding hazard exhibited a "spike at UI exhaustion"—a classic result dating back to Meyer (1990) and Katz and Meyer (1990). Above and beyond this "main effect" of benefit exhaustion, however, job finding rises markedly in the months leading up to reform-induced benefit cuts. The rising hazard rate—indicative of forward-looking behavior on the part of job seekers—culminates in a much larger exhaustion spike than was evident before the reform. Mapping from hazard rates to survival functions, my preferred estimates imply that a worker

subject to the postreform benefit schedule is 12.4 percent less likely to experience a one-year jobless spell.[6]

Perhaps surprisingly, these employment gains are primarily driven by full-time jobs. Critics of Hartz IV allege that draconian benefit cuts have compelled job seekers to accept low-paying "minijobs," a class of marginal, part-time positions that grew markedly during the 2000s. But estimates from a competing-risks version of my benchmark specification show that, if anything, fewer workers transition into minijobs under Hartz IV.

I next extend my econometric model to analyze Hartz IV's effects on the wages workers receive upon being reemployed. Prior work has noted that UI generosity has offsetting effects on subsequent wages (Nekoei and Weber 2017). Benefit cuts may lower post-UI wages by depressing reservation wages, as workers accept lower-paying jobs when their outside option is worsened. Conversely, benefit cuts may increase wages by shortening jobless durations, thereby reducing any erosion of earnings capacity associated with time out of work. Economists have found mixed evidence of how changes to short-term UI benefits affect wages, with negative, positive, and many null results abounding in the literature. I know of no prior studies that estimate the wage effects of changes in long-term UI benefit levels.

To explore this question, I jointly estimate my hazard model alongside a wage equation measuring how newly accepted wage offers vary with the time remaining until Hartz IV binds. I show that workers accept lower-paying jobs as they approach reform-induced benefit cuts, consistent with falling reservation wages. To quantify these impacts, I adapt expressions from Schmieder et al. (2016) to decompose the net wage effect of Hartz IV into a reservation wage effect, an offsetting duration effect, and a selection term capturing selection into reemployment along a rich set of observable dimensions. The reservation wage effect dominates: I conclude that UI reform reduced mean reemployment wages by 1.9 percent. As a corroborating piece of evidence, I show that Hartz IV increased recalls to previous employers as well as transitions to brand-new jobs. Insofar as recall offers amount to options that workers choose (or decline) to exercise, the rise in recalls confirms that workers derive lower reservation utility from remaining jobless under the new UI regime.

The Hartz reforms, and Hartz IV in particular, have been identified as possible drivers of an "employment miracle" that saw Germany's unemployment rate fall by 6.6 percentage points between December 2004 and December 2015. I use my causal estimates of Hartz IV's effects on individual job finding to gauge what these partial equilibrium effects imply for aggregate unemployment.[7] Using a steady-state formula that allows for duration dependence in job finding, I calculate that the UI reform reduced Germany's unemployment rate by 0.9 percentage points. Strikingly, almost all this decrease stems from the long-term component of unemployment (spells of over 12 months), echoing Ljungqvist and

Sargent's (1998) claim that long-term UI benefits are a major determinant of the incidence of long-term joblessness.

Chapter 2

Import Competition and the Great U.S. Employment Sag of the 2000s

(coauthored with Daron Acemoglu, David Autor, David Dorn, and Gordon Hanson, published in the *Journal of Labor Economics*, 2016, 34[S1 part 2]: S141–S198)

During the 1990s, the U.S. labor market exhibited a vigor not seen in decades, with rising employment rates alongside rapid wage growth and low inflation. During the early to mid-2000s, however, U.S. employment growth largely stalled before turning sharply negative with the onset of the Great Recession. In this paper, we explore a leading candidate for the post-2000 "sag" in U.S. employment: the dramatic rise in Chinese import penetration that occurred during this period. We argue that surging Chinese imports—driven by rapid Chinese productivity growth and by lower institutional barriers to U.S.–China trade—have been a major contributor to both job losses in U.S. manufacturing and, through input-output linkages and other general equilibrium mechanisms, weak overall U.S. job growth.

The key empirical challenge in gauging these impacts is to isolate the portion of rising Chinese imports attributable to supply-side Chinese factors.[8] Adapting an instrumental variables strategy introduced by Autor, Dorn, and Hanson (2013), we instrument for U.S. imports from China using Chinese exports to a set of eight other high-income countries.[9] We then estimate two-stage-least-squares models of changes in industry-level outcomes on changes in exposure to Chinese imports, over the stacked periods 1991–1999 and 1999–2011. We measure industry-level outcomes using the County Business Patterns and the NBER-CES Manufacturing Industry Database, produced by the National Bureau of Economic Research and the U.S. Census Bureau's Center for Economic Studies (Becker et al. 2013).

We find that a 1 percentage point increase in Chinese import penetration within a given manufacturing industry reduces domestic industry employment by 1.3 percentage points. Employment losses are pervasive across import-competing sectors and robust to a battery of control strategies.[10] Although our data do not report employment by education groups, steeper job losses among blue-collar production workers than among white-collar nonproduction workers suggest that less-educated workers have been hardest hit by import competition. Quantitatively, our estimates imply that the direct effect of Chinese import competition can explain the loss of 560,000 manufacturing jobs during 1999–2011.

Direct import substitution is only one of several channels by which import exposure may erode employment.

Prior literature has highlighted the potential importance of input-output linkages, whereby firms may be indirectly impacted when their customers or suppliers are exposed to trade shocks (Acemoglu et al. 2012; Long and Plosser 1983). We use the Bureau of Economic Analysis's 1992 input-output tables to trace out how industry employment responds to such indirect import exposure. We find robust evidence that industries—both within and outside of manufacturing—shed employment when their customers are hard-hit by trade competition.[11] Accounting for these "upstream" effects, whereby trade shocks propagate from buyers to suppliers, increases our estimate of trade-induced job losses over 1999–2011 to 985,000 in manufacturing and to 1.98 million in the overall economy.

These effects may be either augmented or dampened by other general equilibrium mechanisms. Earnings losses due to fewer jobs and lower wages may depress aggregate demand, resulting in additional employment declines. At the same time, job losses in trade-exposed sectors may be partly or even entirely offset by reallocation into nonexposed sectors, as reductions in wages and increases in the number of job seekers encourage unscathed firms to post new vacancies and expand their workforces. Refining an analysis pioneered by Autor, Dorn, and Hanson (2013), we gauge the net effect of these several mechanisms by contrasting the evolution of employment in local labor markets ("commuting zones") whose industry structures render them differentially exposed to Chinese import competition. At the local level, we find substantial job losses in trade-exposed industries with no evidence of offsetting job growth in nonexposed industries, suggesting that the job losses detected by our national industry-level analysis persist in local general equilibrium. On net, our local analysis points to trade-induced job losses over 1999–2011 on the order of 2.4 million. In ongoing work, we are using plant-level microdata from the U.S. Census Bureau to shed additional light on these general equilibrium channels.

While these numbers must be interpreted with caution, our results suggest that Chinese import competition has been an important contributor to weak U.S. job growth in the new millennium.

Chapter 3

Return of the Solow Paradox? Information Technology, Productivity, and Employment in U.S. Manufacturing

(coauthored with Daron Acemoglu, David Autor, David Dorn, and Gordon Hanson, published in the *American Economic Review Papers & Proceedings*, 2014, 104[5]: 394–399)

An influential "technological-discontinuity" paradigm, powerfully articulated by Brynjolfsson and McAfee (2011),

argues that U.S. workplaces have been fundamentally transformed by investments in information technology (IT). This argument rests on two claims. First, in a departure from Robert Solow's famous observation that "you can see the computer age everywhere but in the productivity statistics" (Solow 1987), proponents of this view assert that IT has by now had pervasive positive effects on labor productivity. Second, by enabling firms to expand output while shedding employment, automation is giving rise to a smaller role for workers in the modern workplace—as evidenced by recent declines in the labor share of income (Karabarbounis and Neiman 2014).

This paper reassesses these claims in the context of the U.S. manufacturing sector. We make two simple points. First, the evidence that IT investments are associated with rapid productivity gains is weaker than might be supposed, at least in manufacturing. Second, when detectable at all, IT-driven growth in labor productivity appears to stem from declines in output together with even steeper declines in employment. This surprising pattern runs counter to our basic intuitions about cost-reducing technological progress.

We use the NBER-CES Manufacturing Industry Database to track industry-level employment, output, and labor productivity over the period 1980–2009. Following Berman, Bound, and Griliches (1994) and Autor, Katz, and Krueger (1998), we begin by defining each industry's "IT intensity" as the ratio of IT capital investments to all capital investments. We then estimate descriptive, event-study specifications to examine how labor productivity has evolved over time in IT-intensive industries, relative to less-intensive industries.

At first blush, IT-intensive industries have notched impressive growth in labor productivity: a one-standard-deviation increase in IT intensity is associated with a 10-log-point boost in productivity growth per decade. But this IT-productivity nexus is driven almost entirely by the industries that produce IT. Excluding the computer and semiconductor sectors, and focusing instead on IT-using industries, we find scant signs that greater IT intensity is associated with faster growth in labor productivity.[12] The IT-productivity relationship is sensitive to the choice of IT measure, and regardless of measure we find no evidence of differential productivity growth after 2000.[13]

Furthermore, if IT has indeed reduced production costs, basic producer theory would predict that firms should respond by expanding output (with ambiguous effects on employment due to offsetting scale and substitution effects). Empirically, however, IT-intensive industries have exhibited relative declines in both output and employment since the early 1990s. This fact pattern is difficult to square with a simple, neoclassical story in which technological advances are making workers redundant.

Taken together, our findings serve as a cautionary note that—at least within U.S. manufacturing—prior resolutions of the "Solow paradox" may be incomplete.

Chapter 4

Can Local Labor Markets Absorb Crowded Cohorts? Evidence from German High School Reforms

Every year, local labor markets must absorb new entering cohorts whose size and composition fluctuate over time. An increase in cohort size (say, due to a baby boom) heightens competition for jobs, university slots, and other scarce resources (Bound and Turner 2007; Welch 1979), but downward wage pressure and the ease of cherry-picking good candidates in a buyer's market gives firms incentives to create new jobs. Analyzing how workers and firms adjust to oversized cohorts can shed light on a host of questions about job search and job creation. But studying the equilibrium impact of labor supply shifts is difficult because many such shifts occur gradually over long periods of time, during which technology, tastes, and institutions are unlikely to remain constant.[14]

I overcome this challenge by exploiting sharp fluctuations in local labor supply induced by German state-level high school reforms. These reforms compressed the curriculum at upper-track high schools ("gymnasia"), so that students graduate after grade 12 instead of grade 13.[15] Between 2007 and 2016, each reforming state experienced one idiosyncratically timed year in which two cohorts of gymnasium students graduated simultaneously: the last thirteenth graders subject to the old rules, plus the first twelfth graders subject to the new ones. Although most upper-track graduates proceed immediately to university, some instead enter Germany's famed firm-based apprenticeship system. As such, these "double cohorts" should increase the supply of workers to local apprentice markets.[16]

Using state-level aggregates published by Germany's Federal Statistical Office and other sources, I estimate event-study specifications showing how education and labor markets adapt to the double cohorts. I find that the number of gymnasium graduates rises by roughly two-thirds in the year of a double cohort. Total high school graduates rise by 22 percent.[17] Next, I show that the number of newly signed apprenticeship contracts increases by about 2 percent in a double-cohort year. Though modest, this increase is precisely estimated, and I can easily reject the null hypothesis that short-run firm demand for new apprentices is perfectly inelastic: local employers absorb at least some of the increase in labor supply by hiring more trainees than usual.[18] Decomposing the increase in apprenticeships by high school degree type reveals that the increase is driven by upper-track graduates. I find no clear evidence that lower- and middle-track students not subject to the curricular reform are crowded out of the apprenticeship market, but the effects are imprecise.

In ongoing work with Simon Janssen and Markus Nagler, I am exploring how the double cohorts affected job posting, the skill content of new jobs, employer screening practices, and worker-firm matching. Future work will also exploit within-state variation in treatment intensity to more precisely identify crowd-out effects and to study the spatial propagation of cohort shocks.

Notes

1. An important exception is Kolsrud et al. (2017), who use a regression-kink design to show that Swedish workers are more responsive to changes in short-term UI benefit levels than to comparable changes in long-term levels. I complement their study by using a different design applied to a different policy change in a different institutional setting and by analyzing effects on a broader array of labor market outcomes.

2. Data limitations preclude exact calculation of the reform-induced change in household income experienced by each claimant. For this reason, my research design relies on the timing of benefit cuts—which I can compute accurately—rather than their magnitude. For context, however, I adapt the OECD Tax-Benefit Model to simulate Germany's entire tax-and-transfer system, in an effort to gauge how Hartz IV impacted household balance sheets. For my estimation sample of prime-age displaced workers, I estimate that the median claimant would incur a 5 percent decline in postexhaustion household income, with one-quarter of claimants facing declines of over 10 percent and a minority obtaining higher income under the new regime.

3. Existing evaluations of Hartz IV have typically relied on time-series identification (Nagl and Weber 2014) or on calibrated macroeconomic search-and-matching models (e.g., Bradley and Kuegler 2016; Krause and Uhlig 2012; Krebs and Scheffel 2013; Launov and Wälde 2013).

4. Far-off cuts are discounted both because of pure time preference and because many claimants will find work before they ever bind. Using a continuous-time job search model based on Mortensen (1977), I show that cuts to long-term benefits increase job finding and decrease reservation wages at all jobless durations, and that these behavioral responses limit to zero as cuts lie increasingly far in the future. For many common functional forms, these effects dampen monotonically with time remaining until the benefit cut.

5. Because incumbent claimants were not grandfathered in under the old system, all pre-Hartz UI entrants would eventually encounter Hartz IV if they remained unemployed in January 2005. Empirically, I track changes in job-finding hazards for claimants whose Hartz IV benefit cuts bind in nine months or fewer, relative to claimants for whom Hartz IV binds in 10 months or more. If workers begin responding even at such long horizons, my estimates will yield conservative lower bounds on Hartz IV's true effects.

6. This core finding is robust to a host of control strategies, including a falsification exercise in which I alter the assumed date of the Hartz IV reform. Furthermore, among incumbent pre-Hartz IV claimants, responsiveness to Hartz IV is strongly correlated with a proxy for the size of the benefit cut.

7. In general equilibrium, these direct impacts may be either offset by congestion externalities or augmented by job creation. Using both individual and local variation in Austrian UI benefit generosity, Lalive et al. (2015) find that the "macro elasticity" of job finding to changes in UI is about 20 percent smaller than the micro elasticity. If the same is true here, my aggregate impacts should be multiplied by four-fifths.

8. Consider two concerns. On the one hand, if rising import penetration in a U.S. industry reflects booming domestic demand, then regressions of industry employment growth on import penetration will be biased upward. On the other hand, if rising imports reflect adverse shocks to domestic input costs or domestic TFP, then such regressions will be biased downward.

9. In related work, Pierce and Schott (2016) use an alternative instrumental variables strategy based on nominal industry exposure to the U.S. conferral of Permanent Normal Trade Relations to China in 2000–2001.

10. Our results are robust to controlling for differential employment trends within one-digit manufacturing subsectors; industry capital intensity and skill intensity; U.S. exports to China; and other concerns. Reassuringly, a falsification exercise using the periods 1971–1981 and 1981–1991—predating the rapid growth in Chinese import penetration—shows no indication of disemployment effects during this period.

11. Shocks to an industry's suppliers have theoretically ambiguous effects on that industry's employment: firms whose suppliers are subject to intense Chinese competition may benefit from cheap foreign inputs, but they may also suffer from the loss of domestic suppliers that often provide customized inputs. Consistent with these offsetting mechanisms, our estimated "downstream" effects are imprecise and unstable in sign.

12. In related work, Houseman, Bartik, and Sturgeon (2015) find that recent productivity growth in manufacturing as a whole is largely driven by IT-producing industries. Our contribution is to show that, outside of these industries, there is no robust relationship between IT intensity and productivity growth.

13. We also consider alternative measures of IT intensity, including a set of 17 advanced technologies coded in the 1988 and 1993 Surveys of Manufacturing Technologies (Doms, Dunne, and Troske 1997). The SMT measure provides stronger evidence for an IT-productivity nexus, but the relationship again flattens after 2000.

14. Even when sharp cohort shocks can be identified, they may be endogenous to labor market conditions, or they may involve increased labor supply among populations (such as immigrants or welfare recipients) that differ considerably from the typical cohort of new labor market entrants. My study avoids these concerns.

15. The reforms sought to harmonize Germany's education system with the rest of Europe and to buttress public finances by extending working lives. Double cohorts were an unintended but unavoidable side-effect.

16. Several papers have analyzed the impact of these reforms on educational attainment (e.g., Huebener and Marcus 2017; Marcus and Zambre 2016). To my knowledge, however, my paper is the first to identify equilibrium impacts of the high school reforms on the German labor market. Related work by Morin (2015) studies how Ontario's 2003 double cohort—which resulted from a high school reform very similar to those in Germany—impacted labor market outcomes among high school graduates. Ontario's shock decreased both youth employment rates and youth wages, with wages falling by 5–9 percent two years later.

17. About one-third of German secondary school students attend gymnasia. The gymnasium graduation count rises less than one-for-one because of grade repetition, grade-skipping, and track-switching.
18. This result also confirms that local labor supply shocks have disproportionate local effects. If newly minted graduates were perfectly mobile, local supply gluts would simply diffuse nationwide.

References

Acemoglu, Daron, Vasco Carvalho, Asuman Ozdaglar, and Alireza Tahbaz-Salehi. 2012. "The Network Origins of Aggregate Fluctuations." *Econometrica* 80(5): 1977–2016.

Autor, David H., David Dorn, and Gordon H. Hanson. 2013. "The China Syndrome: Local Labor Market Effects of Import Competition in the United States." *American Economic Review* 103(6): 2121–2168.

Autor, David H., Lawrence F. Katz, and Alan B. Krueger. 1998. "Computing Inequality: Have Computers Changed the Labor Market?" *Quarterly Journal of Economics* 113(4): 1169–1213.

Becker, Randy, Wayne Gray, and Jordan Marvakov. 2013. "NBER-CES Manufacturing Industry Database." NBER Technical Notes. Cambridge, MA: National Bureau of Economic Research.

Berman, Eli, John Bound, and Zvi Griliches. 1994. "Changes in the Demand for Skilled Labor within U.S. Manufacturing Industries: Evidence from the Annual Survey of Manufacturing." *Quarterly Journal of Economics* 109(2): 367–397.

Bound, John, and Sarah Turner. 2007. "Cohort Crowding: How Resources Affect Collegiate Attainment." *Journal of Public Economics* 91(5): 877–899.

Bradley, Jake, and Alice Kuegler. 2016. "Labor Market Reforms: An Evaluation of the Hartz Policies in Germany." Working paper. https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=RESPhDConf2017&paper_id=182 (accessed October 27, 2017).

Brynjolfsson, Erik, and Andrew McAfee. 2011. *Race Against the Machine*. Lexington, MA: Digital Frontier Press.

Doms, Mark, Timothy Dunne, and Kenneth R. Troske. 1997. "Workers, Wages, and Technology." *Quarterly Journal of Economics* 112(1): 253–290.

Esser, Ingrid, Tommy Ferrarini, Kenneth Nelson, Joakim Palme, and Ola Sjöberg. 2013. *Unemployment Benefits in EU Member States.* European Commission report. Brussels: European Commission.

Houseman, Susan N., Timothy J. Bartik, and Timothy J. Sturgeon. 2015. "Measuring Manufacturing: How the Computer and Semiconductor Industries Affect the Numbers and Perceptions." In *Measuring Globalization: Better Trade Statistics for Better Policy*. Susan N. Houseman, and Michael Mandel, eds. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, pp. 151–194.

Huebener, Mathias, and Jan Marcus. 2017. "Compressing Instruction Time into Fewer Years of Schooling and the Impact on Student Performance." *Economics of Education Review* 58: 1–14.

Karabarbounis, Loukas, and Brent Neiman. 2014. "The Global Decline of the Labor Share." *Quarterly Journal of Economics* 129(1): 61–103.

Katz, Lawrence F., and Bruce D. Meyer. 1990. "The Impact of the Potential Duration of Unemployment Benefits on the Duration of Unemployment." *Journal of Public Economics* 41(1): 45–72.

Kolsrud, Jonas, Camille Landais, Peter Nilsson, and Johannes Spinnewijn. 2017. "The Optimal Timing of Unemployment Benefits: Theory and Evidence from Sweden." Working paper. http://sticerd.lse.ac.uk/dps/pep/pep25.pdf (accessed October 27, 2017).

Krause, Michael U., and Harald Uhlig. 2012. "Transitions in the German Labor Market: Structure and Crisis." *Journal of Monetary Economics* 59(1): 64–79.

Krebs, Tom, and Martin Scheffel. 2013. "Macroeconomic Evaluation of Labor Market Reform in Germany." *IMF Economic Review* 61(4): 664–701.

Lalive, Rafael, Camille Landais, and Josef Zweimüller. 2015. "Market Externalities of Large Unemployment Insurance Extension Programs." *American Economic Review* 105(12): 3564–3596.

Launov, Andrey, and Klaus Wälde. 2013. "Estimating Incentive and Welfare Effects of Nonstationary Unemployment Benefits." *International Economic Review* 54(4): 1159–1199.

Ljungqvist, Lars, and Thomas J. Sargent. 1998. "The European Unemployment Dilemma." *Journal of Political Economy* 106(3): 514–550.

Long, John B. Jr., and Charles I. Plosser. 1983. "Real Business Cycles." *Journal of Political Economy* 91(1): 39–69.

Marcus, Jan, and Vaishali Zambre. 2016. "The Effect of Increasing Education Efficiency on University Enrollment: Evidence from Administrative Data and an Unusual Schooling Reform in Germany." Working paper. Berlin: DIW.

Meyer, Bruce D. 1990. "Unemployment Insurance and Unemployment Spells." *Econometrica* 58(4): 757–782.

Morin, Louis-Philippe. 2015. "Cohort Size and Youth Earnings: Evidence from a Quasi-Experiment." *Labour Economics* 32: 99–111.

Mortensen, Dale T. 1977. "Unemployment Insurance and Job Search Decisions." *Industrial and Labor Relations Review* 30(4): 505–517.

Nagl, Wolfgang, and Michael Weber. 2014. "Unemployment Compensation and Unemployment Duration Before and After the German Hartz IV Reform." Ifo working paper No. 186. Munich: Institute for Economic Research.

Nekoei, Arash, and Andrea Weber. 2017. "Does Extending Unemployment Benefits Improve Job Quality?" *American Economic Review* 107(2): 527–561.

Pierce, Justin R., and Peter K. Schott. 2016. "The Surprisingly Swift Decline of US Manufacturing Employment." *American Economic Review* 106(7): 1632–1662.

Prentice, Ross L., and Lynn A. Gloeckler. 1978. "Regression Analysis of Grouped Survival Data with Application to Breast Cancer Data." *Biometrics* 34(1): 57–67.

Schmieder, Johannes F., Till von Wachter, and Stefan Bender. 2016. "The Effect of Unemployment Benefits and Non-employment Durations on Wages." *American Economic Review* 106(3): 739–777.

Solow, Robert. 1987. "We'd Better Watch Out." Review of *Manufacturing Matters: The Myth of the Post-Industrial Economy*, by Stephen S. Cohen and John Zysman. *New York Times Book Review*, July 27, p. 36.

Welch, Finis. 1979. "Effects of Cohort Size on Earnings: The Baby Boom Babies' Financial Bust." *Journal of Political Economy* 87(5): S65–S97.