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TITLE

Where do industrial workers go after plant closure? Survey evidence two years after job displacement

Research Paper

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Abstract

This paper analyzes the re-employment prospects of displaced industrial workers. While scholars in political economy are pessimistic about the job prospects of displaced blue collar workers, the literature on labour market flows expects relatively smooth transitions into new jobs. We empirically examine these diverging views based on an individual-level survey on mass redundancy from five plants in Switzerland. Our analysis produces three main results. First, a surprisingly large share of displaced workers was back in employment about two years after being laid-off. 69 per cent were re-employed at the moment of the survey, 17 per cent remained unemployed and 11 per cent had gone into (early) retirement. Interestingly, a majority of workers did not transit to a service job, but returned to manufacturing. Second, our analysis shows smaller differences by education than expected. While having a tertiary degree improves the job prospects, re-employment rates vary little between highly and low educated workers. Third, we find a strong age barrier in re-employment. Among workers above 55 years, over 30 per cent were still unemployed about two years after plant closure. Re-employment rates thus vary much more between age cohorts than between educational levels, men and women or blue and white collar employees.

Keywords

Plant closure | Labour Market | Unemployment | Older workers

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1. Introduction

Few economic trends preoccupy observers of social change as much as deindustrialization and the steady loss of jobs in manufacturing. Scholars of political economy are particularly pessimistic about the job prospects of displaced industrial workers: early retirement in the best case, long term unemployment in the worst case (Bonoli, 2007: 498). Their pessimism is rooted in the view that "most skills acquired in manufacturing travel very poorly to services occupations" (Cusack & Iversen, 2000: 326). As a consequence, low-skilled blue collar workers should find it exceedingly hard to adjust to similarly low-skilled service jobs (Cusack & Iversen, 2000: 326). And since job growth takes place in services, this seriously curtails their re-employment chances.

These gloomy expectations have found a large echo within academia and the wider public. Yet they clearly are at odds with the growing literature on labour market flows. Recent evidence suggests that each year more than 20 per cent of all jobs in affluent countries are created or destroyed – and around one third of all workers are either hired or separate from their employers annually (OECD, 2009: 119). Moreover, a substantial share of these worker flows are not from declining to expanding sectors, but take place within narrowly defined industries (Greenaway et al., 2000: 61). This finding is in line with the established fact that many workers are recruited by firms that are contracting, just as workers often exit firms that are expanding (Lane et al., 1996: 111).

The dead-end view of displaced industrial workers held in political economy is thus difficult to reconcile with constant labour market churning as described by the job flow literature. At the same time, both research strands focus on aggregate changes in sectoral employment and not on unemployed workers. It is thus an open question whether displaced industrial workers are ejected permanently from the labour market or whether job flows carry them back into work again.

An ideal setting to address this question is the closure of a manufacturing plant, when an exogenous event leads to the dismissal of the entire labour force and obliges workers to find a new source of income – from work or welfare. Our paper uses this setting to analyze the labour market transitions of displaced industrial workers. Based on an individual-level survey on mass redundancy from five industrial plants in Switzerland, we examine where workers went after their plant closed down: did they find a job, remain unemployed, go into retirement or exit the labour force? Our objective is to shed light on industrial workers' post-displacement destinations and to identify the worker characteristics that explain the successful transition to a new job.

Different worker categories are likely to be affected differently by mass redundancy in manufacturing. The political economy view expects displaced women and white collar workers to fare better than displaced men and blue collar workers. The reason is that these categories are considered to be better employable in services: labour demand seems to have shifted towards skills typically associated with female tasks and capabilities, as exemplified by the growth in social and personal services (Faggio & Nickell, 2003). In a similar vein, displaced white collar workers appear better prepared in the aftermath of a plant closure than blue collar workers because their occupational skills enable them to transit more easily to service jobs. Job prospects are thus held to be truly bleak for male blue collar workers only – yet they make up a large share of the workforce in industrial plants.

Two other characteristics may be more consequential for re-employment chances of displaced workers than gender and occupation. First, labour economists adhering to the thesis of skill-biased technological change consider education to be paramount for re-employment (Berman et al., 1998). Displaced workers with low levels of education should find it much harder to re-integrate the labour market than highly educated workers. Second, life course sociologists highlight the job difficulties of older workers and point to the paradox that many firms employ older workers, but *do not hire* older workers. When an industrial plant closes down, the most vulnerable group may thus not be the low educated, but the workers older than 50 years (Knuth & Kalina, 2002).

Our paper addresses these issues along the following steps: Section 2 reviews the literature on the link between aggregate structural change and workers' labour market transitions. Section 3 shows our survey data and discusses our measures. Section 4 presents descriptive evidence on workers' employment situation two years after displacement. Section 5 analyzes the determinants of re-employment in a multivariate context. Section 6 discusses the results and section 7 concludes by highlighting the policy implications of our findings.

2. The literature on displaced workers' job prospects

Over the last four decades, employment in manufacturing has decreased constantly under the influence of automation and international trade. While there is abundant macro-level evidence documenting this trend in the employment structure (e.g. Oesch & Rodriguez, 2012; Tåhlin, 2007), much less is known about how structural change from manufacturing to services comes about at the micro-level of individual workers. Cohort renewal certainly plays a role, as older birth cohorts leave the workforce and retire, while younger generations enter the labour market and take on different

occupations (Blossfeld, 1986: 212). However, this process alone is probably not sufficient to ensure structural change. Accordingly, workers also need to switch between occupations and sectors over their career (Korpi & Mertens, 2004: 91). The thorny question is whether the main category hit by structural change, production and craft workers, are able to participate in this adjustment process – or whether de-industrialization means for them downward mobility and labour market exclusion. On this subject, opinions in the social sciences strongly diverge.

The bleakest view is held by scholars studying welfare states and production regimes. Two of the field's prominent representatives maintain that "for many, loss of employment in the traditional sectors [manufacturing] entails complete removal from the active labor force" (Cusack & Iversen, 2000: 313). Their pessimism rests on the idea that industrial workers lack transferable skills, as services and manufacturing are separated by "a particularly thick skill boundary" (Iversen, 2001: 53). This expectation of an insurmountable skill barrier has clear policy implications. In order to bring industrial workers back into jobs, governments must turn to low-end services for employment opportunities. However, since industrial workers' productivity in service tasks is expected to be very low, these workers will only be hired if there is an expanding low-paid service sector. For this sector to expand, wages in low-end services must be allowed to trail behind the rest of the economy. Accordingly, the bitter medicine against industrial unemployment is an increase in wage inequality (Iversen & Wren, 1998: 512).

A more serene prediction about displaced workers' job prospects emerges from the growing literature on job flows. In affluent countries, new recruitments and separations represent together each year close to one third of dependent employment. This means that annually about 15 per cent of all matches between employers and workers are destroyed and simultaneously offset by a similar number of new matches between different employers and workers (OECD, 2009: 123). Interestingly, a substantial share of these worker flows are not from manufacturing to services, but take place within manufacturing (Greenaway et al., 2000: 61). In effect, although structural change comes about because there are small net flows from declining towards growing sectors, worker flows are far larger *within* than across sectors (OECD, 2009: 151). Moreover, worker flows are by no means solely directed away from manufacturing towards services, but go both ways. A study of West Germany suggests that 18 per cent of all job moves lead workers from manufacturing to private services. But at the same time, 14 per cent of moves go the opposite way, leading workers from private services to manufacturing jobs (Korpi & Mertens, 2004: 96).

Modern labour markets are thus subject to an impressive amount of creation and destruction of worker-job matches each year. Yet workers who leave declining sectors are not necessarily the same workers as those who take on jobs in expanding sectors. Indeed, job-to-job flows seem to play only a minor role for net changes in sectoral employment. More important for sectoral change are flows into and out of *non-employment*. These flows comprise the entry of new cohorts into the labour market on the one hand and the exit of older cohorts to unemployment or retirement on the other (Bachmann & Burda, 2009: 56; Greenaway et al., 2000: 65).

It is in this context that the analytical leverage provided by plant closure and worker displacement proves useful. Of course, displacement is a phenomenon worth studying in its own right: It disrupts lives, disappoints hard-earned expectations, wastes human resources and possibly adds to long-term unemployment (Fallick, 1996: 5). But beyond that, it presents a laboratory for how industrial workers respond to structural change. Manufacturing is the sector where workers are most likely to experience plant closure and displacement (Cha & Morgan, 2010: 1141). And since plant closure leads to the dismissal of all workers independently of job performance, it avoids the threat of selectivity bias which arises when firms let go their least productive workers only.

The two views of "constant" job flows and "thick" skill boundaries imply very different job prospects for displaced workers. From the perspective of constant job turn-over, high re-employment rates after displacement seem normal – at least under ordinary macro-economic conditions: Evidence from Finland shows that re-employment rates varied strongly depending on whether plant closures took place in the depression of 1992 or in the cyclical upswing of 1997 (Appelqvist, 2007). Likewise, the large variation in the reported wage loss of displaced workers between American studies seems partly due to differences in the business cycle (Couch & Placzek, 2010: 572).

In contrast, the view of a "thick skill boundary" focuses on structural change stemming from deindustrialization and holds employability in the service sector to be key for displaced workers' job prospects (Cusack & Iversen, 2000). These prospects should be determined by two characteristics: gender and type of occupation. With respect to gender, recent technological change is seen as being biased much more against low-skilled men than low-skilled women. The reason is that firms' labour demand has increased for tasks typically associated with female socialization such as dealing with people, training and teaching, counselling and caring (Black & Spitz-Oener, 2010: 129; Nickell, 2001: 622). In contrast, demand has fallen for tasks requiring arm-hand steadiness, manual dexterity or operation monitoring. These tasks, typically done by men in production jobs, have proven much easier

to automate (Autor et al., 2003). Women thus have the advantage over men of greater employability in the expanding social services – and should face better job prospects after plant closure.

The growth of job opportunities in services may not only favour displaced women, but white collar workers more generally. The literature on mass redundancy suggests that displaced workers succeed in limiting earnings losses as long as they take on a job in the same sector (Ong & Mar, 1992: 372; Neal, 1995: 658; Cha & Morgan, 2010: 1137). Thereby, workers continue to benefit from the returns of their sector-specific skills. On the contrary, if displaced workers have to accept a job outside of their contracting sector, they likely face wage losses – except if they move sector, but stay in the *same occupation*. Remaining in the same occupation is at least as important as staying in the same sector. In effect, British panel data suggest that returns to occupational tenure are more important than returns to tenure within a sector (Haynes et al., 2002: 249). Accordingly, workers employed in occupations that enable them to move between sectors without changing occupation should be advantaged over workers whose occupations are closely tied to manufacturing. Managers, bookkeepers and secretaries are examples of the former, electricians, welders and assemblers of the latter. More generally, white collar workers seem more likely than blue collar workers to be able to transit from manufacturing to services *without changing occupation*.

While gender and occupation may matter, two other characteristics are held to be at least as decisive for re-employment chances: education and age. The influential thesis of skill-biased technological change implies that the value of education has risen in the labour market. In the context of mass redundancy, it has thus been argued that education improves job prospects more in a new sector than in the old sector (Fallick, 1993: 317). In the old sector, indicators such as work history and employer recommendations are of great relevance. In contrast, educational attainment is a decisive signal in the new sector both for current productivity and the future ability to learn. This expectation is in line with the finding from the U.S. that low-skilled workers are hardest hit by industrial restructuring (DiPrete & Nonnemaker, 1997: 402). Differential re-employment chances of white collar and blue collar workers may then simply be rooted in different levels of education.

Finally, a last explanation argues that the biggest impediment to re-employment for displaced workers is not the lack of education, but age (Chan & Huff Stevens, 2001; Knuth & Kalina, 2002). Older workers should find it particularly hard to become re-employed for two reasons (Daniel & Heywood, 2007: 36-7). First, they often possess great experience and knowledge, but these capabilities are seen as coming largely with increased firm-tenure and cannot be transferred easily to another firm.

When separated from their firm, older workers loose their productivity advantage and thus constitute expensive job candidates relative to their productivity. Secondly, the hiring of older workers blocks internal career ladders and renders firms' internal labour market less efficient. More fundamentally, it runs contrary to the logic of long-term employment relationships where firms use delayed compensation schemes based on seniority to motivate younger workers. Displaced older workers may thus face the choice between long spells of unemployment, large wage losses or "involuntary" early retirement (Knuth & Kalina, 2002).

In sum, our study examines four hypotheses about the job prospects of displaced industrial workers. Table 1 gives a schematic overview. Hypothesis 1 based on jobs flows highlights the constant turn-over of workers and predicts smooth re-employment for displaced workers under normal macro-economic conditions (that is, outside of large recessions). Hypothesis 2 focuses on deindustrialization and expects smooth re-employment patterns only for women in white collar occupations, whereas persistent unemployment should be the more likely outcome for male blue collar workers. Hypothesis 3 builds on the thesis of skill-biased technological change and expects education to be the prime determinant of workers' re-employment chances. Finally, hypothesis 4 predicts much greater disparity in re-employment rates between age cohorts than between educational levels, occupational groups or gender.

Table 1: Overview over the hypotheses

Hypo-thesis	*Theory*	Focus	*Predicted outcome*
H1	Job flows	Constant job turn-over	Smooth re-employment under stable macro-economic conditions
H2	Political economy	Deindustrialization	Re-employment for female white collar, persistent unemployment for male blue collar
H3	Skill-biased technological change	Education	Lowest re-employment rates for low-educated workers
H4	Internal labour markets	Age	Lowest re-employment rates for older workers

3. Data and measures

The empirical analysis of displaced workers runs into a series of problems. To begin with, it is difficult to obtain information on a sufficiently large number of displaced workers. Standard labour

force surveys normally do not distinguish between workers displaced because of restructuring and workers displaced because of other reasons. However, the analysis of displaced workers should focus on mass redundancies where the *entire plant* closed down. Otherwise, selectivity becomes an important issue as firms may dismiss the least productive workers, while holding on to their most valuable employees. The result would be a selective sample of workers. In addition, the notion of displaced workers is ambiguous as many studies adopt the definition of the American Bureau of Labor Statistics and consider as displaced workers only employees with at least three years of tenure. This is notably the case of the Displaced Worker Survey (DWS) supplement to the Current Population Survey (CPS) in the United States. In the context of our study, such a definition seems overly restrictive and not very helpful.

We try to address these empirical difficulties by running our own individual-level survey on industrial workers who were laid-off after their plant closed down. Our survey covers the workforces of manufacturing firms in Switzerland which employed at least 150 employees and either closed down a plant or ceased their activity altogether in 2009 or 2010. Out of ten plants satisfying these conditions, we obtained access to five plants and the valid addresses of 90 per cent of their workforce. This left us with 1203 workers who were dismissed because of plant closure. The five plants were of comparable size – 169 employees for the smallest, 430 employees for the largest – and active in the production of plastics, chemicals, metal products, machinery and printing.

Since we select those units easiest to be surveyed (that is, those companies agreeing to participate), our sampling strategy at the level of companies provides us with a *convenience sample*. Convenience sampling implies that the data are not generated by a known probability mechanism such as random sampling – and hence makes the inferrence from the sample to the whole population problematic (Western & Jackman, 1994: 412). Strictly speaking, our findings thus need to be read as the results of a case study.

We ran our survey in autumn 2011 with the goal to obtain information on displaced workers' employment status 1.5 to 2.5 years after they had lost their job. There is some variation in the month when workers left their plant. On average, workers responded to our survey 24 months after their displacement; for 50 per cent of the respondents (percentile 25 to percentile 75) the survey took place between 19 and 29 months after displacement. Overall, 748 individuals responded to our mixed-mode

survey – 77% on paper, 21% on internet and 2% by phone –, providing us with a net response rate of 62 per cent.

For both respondents and non-respondents, we obtained further information on socio-demographic characteristics and the employment status by adding administrative data stemming from the unemployment insurance register (n=357) and register data from the firms (n=600). Our final data base thus combines information from three different sources: from the survey, the unemployment registry and the firms' internal data. Altogether, this leaves us with a sample of 887 displaced workers (74 per cent of the target population) for which we have at least some information on their post-displacement experience.

Although plant closure seems to be the best instrument to analyze the net effect of job loss on workers' subsequent trajectories, it is not entirely free from selection bias. First, there is probably some selection of workers into plants with a higher propensity to close down. Confronted with a choice, many high-skilled workers may think twice before seeking employment in a debt-ridden plant. Second, some workers may anticipate the shutting down of their plant and leave their job before the closure is officially announced. These two effects imply that the most mobile and best employable workers may already have left these plants at the moment of our survey (or never have entered them to begin with). As a consequence, our study would be more likely to over- than to underestimate the difficulties of re-employment.

The opposite selection effect may arise from non-response bias. If the same socio-demographic characteristics such as language proficiency or education determine both participation in our survey *and* successful reemployment after mass displacement, our estimates produce too optimistic findings. The problem of non-response bias is further heightened if those workers who successfully mastered the post-displacement period are also more willing to respond to a survey enquiring into this period. While we cannot exclude these threats completely, two measures make non-response less of a problem for our study. First, we realized during our field work that individuals whose names suggested a migrant origin from outside the European Union (notably Ex-Yugoslavia and Turkey) were less likely to participate. Accordingly, we drew an additional subsample of these workers and completed 15 phone interviews with them. Second, we were able to access unemployment register data for those workers who did not respond to our survey and who could be located in these data (that is, registered with the unemployment insurance and did not change their address). Since not all displaced workers went through a spell of

unemployment, the register data provided us with information on 139 non-respondents who did not witness a particularly smooth transition after displacement.

Thanks to the register data obtained from the firms, we can compare the composition of the sampled population and the survey respondents in terms of sex, pre-displacement occupation and nationality (see table A.1 in the appendix). These results suggest that women, Swiss nationals, as well as managers, professionals, and technicians are slightly overrepresented. In contrast, men, nationals from Kosovo-Albania and workers employed as machine operators and in elementary occupations are slightly underrepresented. However, differences are small: our target population consists of 82.9 per cent men and 23.6 per cent of non-Swiss nationals, whereas our survey only contains 80.4 per cent of men and 22.2 per cent of non-Swiss nationals. Sensitivity tests ranging from weighting to analyzing only parts of the sample suggest that the substantial conclusions of our study are untainted by non-response bias (see Authors et al., 2013).

The plant closures took place in 2009 and 2010 in a context of rising unemployment. Switzerland's unemployment rates remained low after the financial crisis in international comparison, but they still increased from 3.4 per cent in 2008 to 4.3 and 4.5 per cent in 2009 and 2010 – before falling again to 4.0 per cent in 2011.[1] Four out of five plants were set in a German-speaking region (Berne-Mittelland) with unemployment rates oscillating around the national average. One plant was set in a French-speaking region (Geneva) where unemployment rates reached seven per cent at the beginning of 2010. The labour market context was thus worsening, without being alarming, in the period when the mass redundancies took place.

Our dependent variable is the occupational status 1.5 to 2.5 years after displacement and most of our analyses differentiate between four outcomes: re-employment, unemployment, retirement or economic inactivity (training, disability, housework). The operationalization of our independent variables is straight-forward. Concerning education, we distinguish between three levels of attainment: (i) lower secondary education or less, which includes mandatory schooling up to 10 years; (ii) upper secondary education, which includes both vocational (apprenticeships) and general degrees such as the Maturité (Abitur/A-level); (iii) tertiary education, which includes higher vocational degrees, technical college degrees and university degrees. Moreover, we separate white collar from blue collar workers on the basis of their occupation at the moment of displacement. Based on the International Standard Classification of Occupations (ISCO) at the 3-digit level, we allocate managers, professionals, technicians and clerks to the white collar group, whereas craft workers, machine operators and

elementary jobs are assigned to the blue collar group.[2] In order to get more detailed insight into the re-employment prospects of different occupations, we also use the nine major occupational groups as defined by ISCO at the 1-digit level.

Additionally, we analyze the influence of age by creating 5-year and 10-year age cohorts. Finally, we control for the labour market context by attributing to each worker the official unemployment rate in the plant's district in the last month before displacement. Since not all workers left their plants at the same moment, this provides us with 42 different unemployment rates which range from 1.7 to 7.2 per cent. The properties of our variables are shown in table A.2 in the appendix.

4. Descriptive evidence for workers' post-displacement status

We begin our analysis by examining displaced workers' situation 1.5 to 2.5 years after their plant closed down. Table 2 shows the distribution of workers across different employment statuses. A surprisingly large share of 69 per cent of workers was back in paid employment: 67 per cent work as wage-earners and 2.5 per cent are self-employed. In contrast, 17 per cent of displaced workers were still (or again) unemployed. While most of the jobless were still entitled to unemployment benefits, three per cent of all workers had exhausted their benefit rights at the moment of the survey.[3] After re-employment and unemployment, retirement is the third post-displacement destination. Among the 11 per cent of displaced workers who went into retirement, only 3 per cent reached the legal age of regular retirement, whereas 8 per cent chose to retire early.[4] Finally, only a small share of three per cent of all workers left the labour market for other reasons such as training (mainly among the youngest age cohort), a disability pension (mainly among the age cohorts approaching retirement) or housework.

Table 2: Employment status of workers 1.5 to 2.5 years after displacement (in %)

Employed		*69*	
	Employee		67
	Self-employed or in family business		3
Unemployed		*17*	
	Unemployed with benefits		14
	Unemployed after exhausting benefits		3
Retired		*11*	
	Early retirement		8
	Regular retirement		3
Economically inactive		*3*	
	Disability pension		1
	Other non-participant (training, housework)		2
Total		100	100

N: 887

Table 3 differentiates the employment status of displaced workers for three socio-demographic characteristics: sex, education and occupation. Chi-square tests (not shown) indicate that all three characteristics have a significant effect on workers' post-displacement status. With respect to sex, we find that women were more likely to become re-employed than men. About two years after displacement, 75 per cent of female workers were back in a job as compared to only 68 per cent among men. However, contrary to our hypothesis, this difference does not arise because men are in greater risk of staying unemployed, but because they are more likely to retire early than women. To some extent, this is due to men's higher average age at the moment of displacement: 46.3 years as compared to 42.3 years for women. More decisively, however, men are also prone to have acquired higher pension entitlements over their working careers than women, which makes early retirement a more viable option. In effect, nine per cent among displaced men, but only one per cent among displaced women chose early retirement.

When turning to education, table 3 shows that highly educated workers (with a tertiary degree) were more likely than low-educated workers (with only lower secondary schooling) to be both re-employed and retired. In contrast, they are less likely to be still unemployed or to have left the labour market. While differences are significant, the gap in re-employment rates is small. Even among workers with lower secondary education 66 per cent have returned to a job – only 6 percentage points below the rate of workers with a tertiary degree. The literature on skill-biased technological change led us to expect a much larger divide in re-employment rates. The divide is more marked with respect to unemployment: 22 per cent of the least educated, but only 13 of the most educated are still unemployed about two years after plant closure. The largest group of the mid-educated takes an intermediate stance with an unemployment rate of 18 per cent. The disparity between educational groups further increases if we add the economically inactive to the unemployed: the inactivity rate stands at 26 per cent among the least educated as compared to 21 per cent among the mid-educated and 13 per cent among the highly educated.

Table 3: Employment status of displaced workers 1.5 to 2.5 years after plant closure (in %)

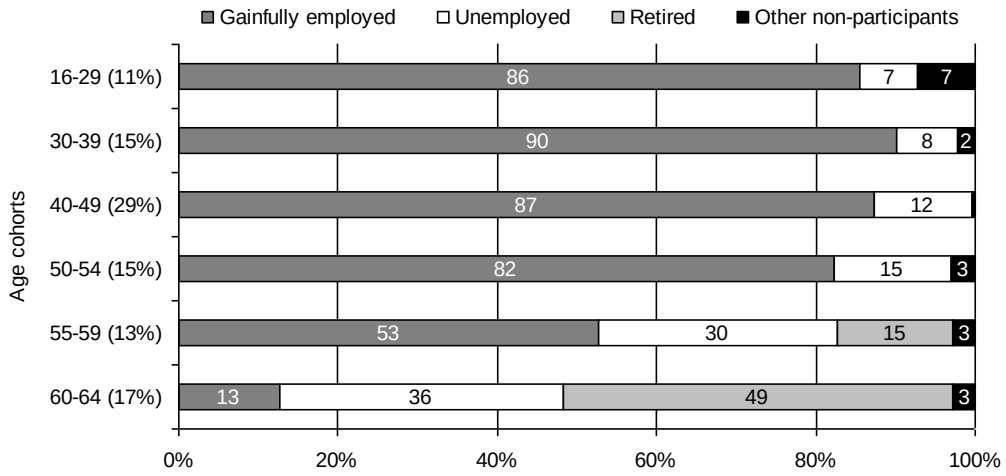
		Employed	Unemployed	Retired	Economically inactive
Sex	Women	75	17	4	5
	Men	68	17	12	2
Education	Lower secondary or less	66	22	7	5
	Upper secondary	70	18	10	3
	Tertiary education	72	13	15	0
Occupation	Blue collar	68	19	9	3
	White collar	71	13	14	2
Total		69	17	11	3

Note: rows add up to 100%. Chi-square tests indicate that there is a significant relationship between the employment status and sex, education, occupation ($p<0.01$).
N: 887 (total), 886 (sex), 853 (education), 872 (occupation).

As with education, we find a smaller gap in the re-employment rates of white collar and blue collar workers than expected. White collar employees are only slightly more likely to have found a job than blue collar workers: 71 per cent of the former did so as compared to 68 per cent among the latter. The

difference between the two categories is somewhat more consequential with respect to unemployment and retirement: blue collar workers were more likely to be unemployed (19 as compared to 13 per cent), whereas white collar workers went more often into retirement (14 as compared to 9 per cent). Again, the difference among the retired is entirely due to *early* retirement: 11 per cent of white collar workers but only 6 per cent of blue collar workers decided to retire early.

The impact on employment of a fourth socio-demographic characteristic – age – is shown in greater detail in figure 1. For once, the differences are striking. Among workers who were below 55 years at the moment of their displacement, the great majority had found a new job. About two years after plant closure, over 80 per cent of them were working again. Among prime-aged workers between 30 and 49 years, the re-employment rate even rises to over 87 per cent. The contrast with older workers is stark. Only 53 per cent of displaced worker aged 55 to 59 had returned into paid employment. Among workers aged 60 to 64 years, those finding a job represent a mere 13 per cent. While 49 per cent of the oldest and 15 per cent of the second-oldest age category opted for early retirement, unemployment remains widespread. About two years after displacement, 30 per cent among the workers aged 55 to 59 years and 36 per cent among those aged 60 and 64 years remained unemployed. This finding is not trivial: Consistent with the idea that contracting firms and declining occupations have an older age structure (Autor & Dorn 2009), these two older age categories are large and comprise together 30 per cent of the *displaced workers in our sample.*



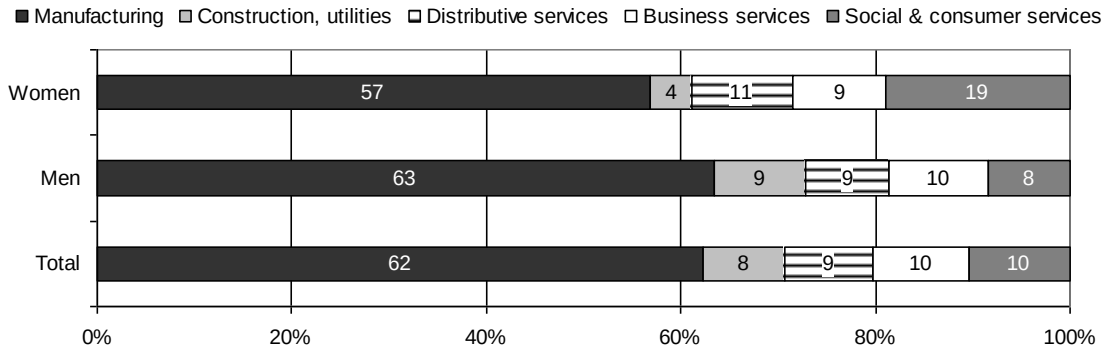
Note: percentages in parentheses indicate the proportion of the sample made up by a given age group (e. g. 11 per cent of workers were aged 16-29 at the moment of plant closure). The Chi-square test indicates that there is a significant relationship between the employment status and the age categories ($p<0.01$).
N: 865

Figure 1. Employment status of displaced workers 1.5 to 2.5 years after plant closure by age at displacement (in %)

Excepting the two oldest age cohorts, we do not find much evidence for the gloomy expectation in political economy that displaced industrial workers are condemned to persistent unemployment. In our view, two factors explain this divergence. First, the labour market context in Switzerland was benign between 2009 and 2011 as unemployment rates remained below five per cent in four out of the five districts in which our plants were set. The pace of de-industrialization was thus slow over this period. While manufacturing jobs decreased in relative terms from 19.3 per cent of total employment in 2008 to 18.2 in 2012, in absolute terms the years after 2009 were marked by stability of manufacturing employment.[5]

Second, the literature in political economy makes the (mistaken) assumption that the service sector has to serve as collecting vessel for redundant industrial workers. In effect, figure 2 shows that 62 per cent of workers in our sample who found a job did so in manufacturing. If we further include construction and public utilities (energy, water, and waste collection), the proportion of displaced workers returning to the industrial sector increases to 70 per cent. While women were more likely than men to shift to a service job – notably to social and consumer services –, also a majority of women went back to a job in manufacturing. The constant turnover of workers and jobs means that even in a

contracting sector such as manufacturing, enough new jobs seem to open up to absorb great numbers of displaced industrial workers – both men and women.



N: 532 (437 men, 95 women). Distributive services include retail trade, transport and postal services. Business services include financial and legal services as well as consulting, research and communication. Social and consumer services include health care, education, social welfare, public administration, restaurants and hotels as well as personal services.

Figure 2. Economic sector to which re-employed workers went after job displacement

5. Multivariate evidence for workers' post-displacement status

Our four hypotheses hold different characteristics to be decisive for the job prospects of displaced workers. The results presented above seem to substantiate the role of age and, to a lesser degree, education as predictors of re-employment. In contrast, evidence for women's and white collar workers' greater ease at finding a job is weak at best. Another possibility to gauge the hypotheses against each other is to look at how much variance in the employment status is explained by each variable. This can be done by running logistic regressions and measuring the pseudo R-squared. As long as the pseudo R-squared is used on the same data predicting the same outcome, it provides a useful indicator for a model's goodness of fit. A higher pseudo R-squared then implies that a model better predicts the outcome. In table 4 we compare the variance explained in post-displacement status by introducing (and then removing) one variable at the time. We use two different measures for education and age (see table A.2 in the appendix for a description). Likewise, we also resort to a more fine-grained measure for occupation than the simple collar divide and allocate the workforce of our industrial plants into nine major occupational groups (as defined by ISCO at the 1-digit level).

Column 1 in table 4 shows the explained variance of multinomial regressions on the post-displacement status: employed, unemployed, retired or economically inactive. The variance explained by sex and collar is minimal. Education and occupation (as measured with ISCO) account for somewhat more variance. Still, these values are dwarfed by the variance explained by age. Regardless of whether age is measured with 10-year or 5-year cohorts, it explains much more variance in workers' post-displacement status than sex, education or occupation. In effect, even when regressing sex, education (5 levels) and occupation (ISCO, 7 groups) together on post-displacement status, we still account for much less variance than with age categories alone (Pseudo r-squared: .042 as compared to .267 for a 5-cohort age variable).

Table 4: Variance in employment status explained by one socio-demographic variable at a time –as measured by the Pseudo r-squared (McFadden)

Single variable entered		Multinomial regressions on status: employed, unemployed, retired, non-active	Binomial regressions on employment: employed or unemployed
Sex		.008	.001
Education	3 levels	.015	.005
	5 levels	.016	.006
Occupation	2 groups (collar)	.007	.007
	9 groups (isco 1-dig)	.023	.025
Age	5 cohorts (10year)	.267	.173
	9 cohorts (5year)	.302	.203

Note: all the regressions under column 1 (N=832) as well as all the regressions under column 2 (N=721) are run on the same sample. Two out of nine occupational groups (ISCO 1-digit) do not contain any observations: those of service and agricultural workers.

One could argue that our post-displacement employment status variable is biased in favour of age as it contains retirement as a possible outcome – and it is evident that age determines retirement. Accordingly, column 2 restricts the sample to economically active people and shows the explained variance of binomial logistic regression on whether workers have been re-employed or continue to be unemployed. Results do not change much. Sex, education and type of collar explain very little variance

in the employment status of displaced workers. Occupation as measured with ISCO explains somewhat more variance, which is mainly due to managers (ISCO-group 1) being very unlikely to be unemployed two years after displacement. Nonetheless, sex, education, collar and occupation account for much less variance than age in whether workers find a job or remain unemployed. Age obviously seems to play a crucial role in whether job displacement is mastered successfully or not.

So far, we have examined the influence of different characteristics on re-employment only in a bivariate context. However, part of the greater probability of women to find a job than men may be linked to their younger average age. Likewise, age cohorts vary in their educational attainment – which may lead to us to overestimate the effect of age. Accordingly, we resort to multivariate analysis in order to identify the influence of sex or age net of other socio-demographic factors such as education and occupation. We estimate a multinomial regression model where the dependent variable is post-displacement employment status: employed, unemployed, retired or economically inactive. We only show the results for the probability of being employed as compared to the probability of being unemployed, leaving the other two outcomes aside. Moreover, since the labour forces of our five companies differ in their re-employment rates – workers in the French-speaking company were more likely to be still unemployed –, we integrate a control for the former company into our models (coefficients not shown).

Table 5 presents the findings of four models where we first introduce sex, before adding stepwise education, occupation and age. Four comments are noteworthy. First, sex does not seem to matter for job prospects of displaced workers. While the coefficient for men is negative and suggests somewhat lower re-employment chances than for women, this effect is not significant. Second, a tertiary degree clearly improves the odds of finding a job. Upper secondary education also seems to be linked with better re-employment chances than lower secondary schooling, but this effect is not significant. Third, two occupational groups stand out as having particularly good job prospects: technicians and, above all, manages. These two categories are significantly more likely to be re-employed than the modal category of machine operators. In contrast, clerks and professionals do not differ significantly from craft workers or machine operators in their re-employment chances. Fourth, two age cohorts have much lower chances of exiting unemployment and finding a job than the modal category of displaced workers aged 45 to 49 years: the two oldest cohorts aged 55 to 59 and 60 to 64 years. Even when taking into account the differences in sex, education, occupation and former company, the two oldest age cohorts stand out as

being particularly likely to remain unemployed. In terms of job prospects, there is a clear cut-off point at the age of 55. Starting from this age, re-employment rates drop considerably.

It is problematic to compare the coefficients of logistic regressions across models with different independent variables (Mood 2010: 68). Accordingly, we gauge the effects of different variables by calculating the predicted probabilities to be re-employed or to remain unemployed for a given worker profile. These predicted probabilities are based on multinomial regressions with the dependent variable "status" (employed/ unemployed/ retired/ inactive) and shown in figures 2a to 2d. We first examine how the probability of re-employment varies according to sex and collar for a person aged 45 to 49 years with upper secondary education.[6] Figure 3a shows that a former position as a white collar employee does much more for women's job prospects than for men's. While men have basically the same re-employment chances regardless of whether they were white or blue collar, women face much better prospects with former experience as white than blue collar employee. In effect, the small group of female white collar workers has the highest probability of re-employment (95%) and the lowest of unemployment (4%), whereas female blue collar workers are more vulnerable than both white and blue collar men in terms of re-employment (83%) and unemployment (19%). There is thus no social skill bonus to women working in production and the crafts.

Figure 3b shows the predicted probabilities for occupations. A man aged 45 to 49 years with upper secondary education has significantly better job prospects if he had been employed as manager. Between all the other occupational groups, differences are small. Contrary to our expectations, the great majority of mid-aged men who had worked as machine operators or in elementary occupations become re-employed (87% and 84% respectively) and only about 14 per cent are still unemployed at the moment of the survey.

If we let predicted probabilities vary according to education (see figure 3c), the result to be emphasized is not so much that men with tertiary education have higher re-employment chances and lower unemployment risks than mid- and low-educated men. This finding is not surprising. Rather, it is noteworthy that 80 per cent of mid-aged male industrial workers with only minimal levels of education have found a job again two years after plant closure. Our data do not provide much evidence for the popular thesis that service economies virtually exclude low-skilled production workers.

Figure 3d indicates that the labour market fate is much more worrisome for older workers than for low-educated workers. If we let the predicted probabilities vary for a man with upper secondary

education on the basis of his age, we find that employment prospects are relatively good and unemployment risks moderate until the age of 55 years when predicted re-employment drops to 52 per cent and the predicted unemployment rate climbs to 31 per cent. Note that this applies to a man with *intermediate* education (normally a vocational degree). The situation further worsens after 59 years when unemployment may primarily be as a transitional stage towards early retirement.

Table 5: Coefficients of multinomial regressions on the post-displacement status – shown for the probability to be re-employed rather than unemployed

		Model 1		Model 2		Model 3		Model 4	
		Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Sex	Men	-0.02	0.27	-0.08	0.28	-0.08	0.29	0.25	0.33
Education	Upper secondary			0.41	0.27	0.24	0.29	*0.56	0.33
(ref: lower secondary)	Tertiary			**0.85	0.33	0.37	0.38	*0.79	0.43
Occupation	Managers					**1.80	0.78	**1.91	0.83
(ref: machine	Professionals					0.53	0.54	0.63	0.63
operators)	Technicians					*0.59	0.35	**0.85	0.39
	Clerks					0.25	0.40	0.64	0.49
	Craft workers					0.14	0.30	0.49	0.35
	Elementary jobs					-0.29	0.53	-0.12	0.61
Age in years	16-24							18.20	4505
(ref: 45-49)	25-29							0.17	0.69
	30-34							0.27	0.61
	35-39							0.62	0.54
	40-44							0.03	0.44
	50-54							-0.12	0.39
	55-59							**-1.54	0.38
	60-64							**-3.27	0.44
Constant		1.92	1.02	1.43	1.05	1.54	1.09	1.81	0.44
Pseudo R-squared		0.11		0.13		0.14		0.45	
N		782		782		782		782	

Note: all four models include (i) a control variable for the unemployment rate of the district in the month of displacement and (b) a dummy variable for former company.

Coefficients are statistically significant at: ** p<0.05, * p<0.1 (note, however, that coefficients are based on a compliance sample).

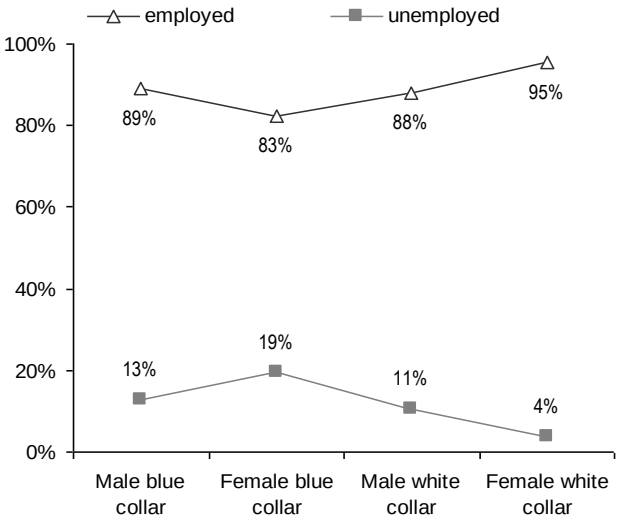


Figure 3a. Predicted probabilities for a person aged 45-49 years with upper secondary education depending on sex and type of collar

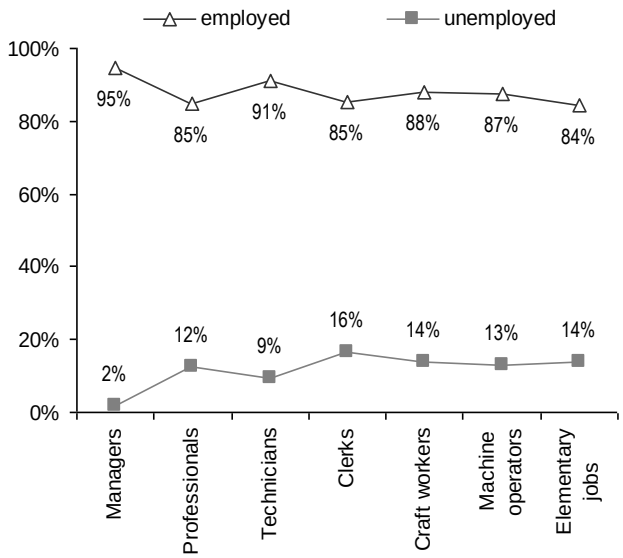


Figure 3b. Predicted probabilities for a man aged 45-49 years depending on occupational group

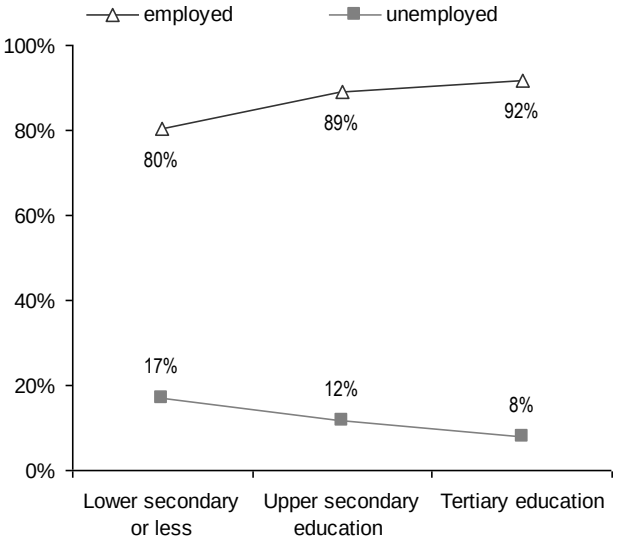


Figure 3c. Predicted probabilities for a man aged 45-49 years depending on educational attainment

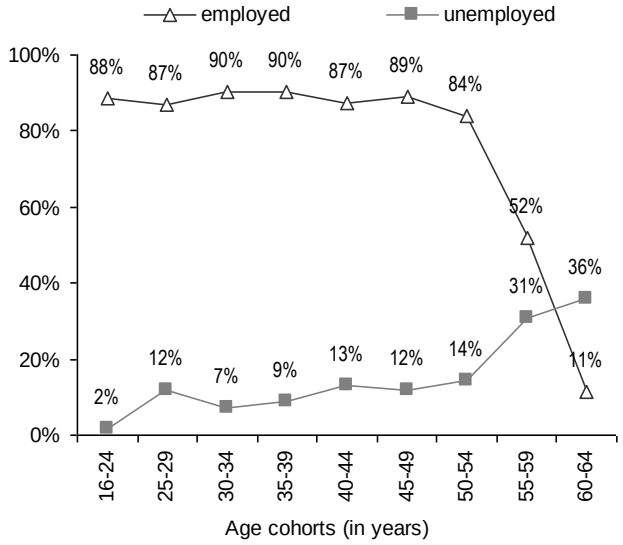


Figure 3d. predicted probabilities for a man with upper secondary education depending on age

Figures 3a-3d. Predicted probabilities for a given profile to become re-employed (rather than being unemployed, retired or inactive) or unemployed (rather than being employed, retired or inactive)

6. Discussion of results

What do our findings imply for the four hypotheses outlined above? Our evidence seems to substantiate two hypotheses, while throwing doubt on two other. Clearly, our result of a re-employment rate of 69 per cent comes much closer to the dynamic labour market model of the job flow literature (hypothesis 1) than to the expectation that structural change leads to persistent unemployment among industrial workers (hypothesis 2). Our data do not support the widespread view held in political economy that the job prospects of manufacturing workers are vanishing. Neither do we find much evidence for the related expectation that women and white collar workers fare substantially better after displacement than men and blue collar workers – because of the formers' better employability in services. Being a woman or a white collar worker *per se* does not much improve the odds of re-employment. Only the combination of the two provides the small group of female white collar workers with an advantage over the rest of displaced workers.

Likewise, our findings run contrary to the assumption that skill-biased technological change strongly penalizes low-educated workers in the aftermath of plant closure (hypothesis 3). Over 80 per cent of low-educated workers below 50 years were back in employment two years after mass displacement. While the unemployment risk is higher for this group than for workers with intermediary and high education, differences are moderate and should not distract us from the principal finding that the large bulk of low-educated blue collar workers returned to a job. In comparison, age appears to be a much greater handicap after plant closure than the lack of education. Re-employment rates drop sharply for workers older than 55 years. Long-term unemployment afflicts a third of workers between 55 and 64 years. Our analysis thus corroborates the expectation that the most vulnerable group after mass redundancies are not low educated workers, but workers older than 55 years (hypothesis 4).

To what extent do our findings from Switzerland, where unemployment has traditionally been low, apply to other countries? Other studies provide us with surprisingly similar results. A detailed analysis of the American Displaced Worker Surveys 1984-2000 finds the re-employment rate for displaced mid-age, mid-educated male manufacturing workers in the United States to be 62 per cent (Kletzer, 2001: 45). A particularly interesting comparison is provided by a Finnish study run in 2008 on workers displaced from a large manufacturing firm that closed down in 2007. Ten months after plant closure, 62 per cent of the respondents were in paid work again, 19 per cent in education or training, 14 per cent unemployed and 5 per cent had left the labour market (Jolkkonen et al., 2012: 88). Age was also singled out as a particularly strong risk factor in Finland: the odds of being unemployed were eleven times

higher for displaced workers over 50 years than for those under 35 years (Jolkkonen et al., 2012: 90). In contrast, once the authors controlled for other socio-demographic characteristics, they did not find a significant impact of education on re-employment chances.

Still, our re-employment rate of 69 per cent needs to be corrected downwards for countries and periods with higher aggregate unemployment than Switzerland between 2009 and 2011. This argument is made by Appelqvist (2007) who documents for Finland in the 1990s and 2000s the powerful influence of the business cycle on re-employment rates after plant closure. Likewise, Kletzer (2001: 49) finds large differences in displaced workers' re-employment rates in the United States between the recession 1981-83 and the boom period 1993-99. Since we have in our data some variation in unemployment rates over time and across districts, we can simulate the re-employment rates at different levels of unemployment. Based on a simple binomial regression, we predict for our sample a re-employment rate of 62 per cent when the district unemployment rate is at 6.5 per cent. In contrast, the share of re-employed workers increases to 73 per cent when the district unemployment rate stands at a low of 2.5 per cent. Clearly, manufacturing workers are hampered in their re-employment efforts by a weak economy.

7. Conclusion

This paper has analyzed where workers go after their plant closes down. The objective has been to determine the proportion of workers who are re-employed and to identify the characteristics that account for the successful transition to a new job. In a nutshell, our analysis provides us with three main results.

First, a surprisingly large share of the labour force was back in employment two years after being laid-off. Two out of three displaced workers were re-employed at the moment of the survey. One out of six workers continued to be unemployed and one out of nine workers had gone into retirement – most often into early retirement. Contrary to the dead-end view of displaced industrial workers' job prospects held in political economy, the majority of blue collar workers did not become long-term unemployed, but had returned to a job in manufacturing. This result throws doubt on the expectation that post-industrial economies can only absorb redundant manufacturing workers if they open their wage structure downwards in order to create low-paid service jobs in great numbers (Scharpf, 2000).

Second, our analysis does not produce much evidence for skill-biased or sex-biased technological change. Having a tertiary degree improves the job prospects of displaced workers, but re-employment

rates do not differ dramatically between workers with lower-secondary, upper-secondary and tertiary education. Even among workers with obligatory schooling only, two thirds were back in employment at the moment of our survey. Likewise, we find little evidence for a widening gender divide in service economies. While women are more likely than men to find a service job – notably in social and consumer services –, overall re-employment rates differ little between the sexes.

Third, we find a strong age barrier in employment. Re-employment rates vary much more between age cohorts than between educational levels, sex or type of collar. Displaced workers aged between 55 and 59 years (who make up twelve per cent of our sample) have still between five and ten years to go until they reach the legal retirement age. Yet only half of them were back in paid employment and another third remained unemployed around two years after plant closure.

In sum, our paper produces two insights: one is good news, one bad news. Good news is that de-industrialization does not call for the creation of low-wage service jobs to put laid-off blue collar workers back to work. Bad news is that older workers are very vulnerable to long-term unemployment in the aftermath of a plant closure. This finding suggests that early retirement clauses in post-displacement social plans may not be primarily motivated by the lump-of-labour fallacy (the idea that an economy has a fixed number of jobs that need to be transferred from the old to the young), but by the insight that being dismissed a few years before reaching the retirement age imposes a disproportional cost on the individual. The policy implication of this finding is evident. When large plants close down, policy efforts should target workers on the basis of age rather than education – and active labour market programmes be designed with older workers in mind.

Notes

[1] Rates according to the ILO definition of unemployment and based on the Swiss Labour Market Survey.
[2] In terms of coding, ISCO-codes 100 through 412 and 414 through 430 are defined as white collar occupations, whereas codes 413 and 600 through 940 are defined as blue collar occupations. The lower service occupations (codes 500 through 530) would probably best be defined as "pink collar occupations". However, since our industrial plants did not employ any of these occupations, this third category is of no relevance in this study.
[3] Unemployment benefit duration in Switzerland is 18 months for workers below 55 years and 24 months for workers aged 55 years or older. Unemployment benefit duration is frequently extended by periods of temporary employment.
[4] The legal retirement age in Switzerland is 64 years for women and 65 years for men.
[5] In terms of full time equivalents, manufacturing employment evolved as follows in Switzerland: 661,000 (2008), 629,000 (2009), 626,000 (2010), 633,000 (2011), 636,000 (2012). [Data for third semester; source: Swiss Federal Office of Statistic, BESTA/STATEM statistics).
[6] 45-49 years and upper secondary education are the modal categories and comprise 17 and 57 per cent of the sample respectively.

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Appendix

Table A.1: Difference in socio-demographic characteristics between sample population and respondents

		Sample	Respondents
Sex	Women	17.1%	19.5%
	Men	82.9%	80.4%
	Total	100.0%	99.9%
Occupation	Managers	10.9%	12.2%
	Professionals	5.5%	6.8%
	Technicians	21.7%	22.6%
	Clerks	5.0%	4.7%
	Craft and trade workers	25.0%	24.9%
	Machine operators and elementary occupations	31.9%	28.4%
	Total	100.0%	99.5%
Nationality	Switzerland	76.4%	77.8%
	Germany	6.5%	6.5%
	France	0.6%	0.8%
	Portugal	1.0%	1.0%
	Italy	5.4%	5.5%
	Spain	2.2%	2.0%
	Kosovo and Albania	1.3%	0.5%
	Ex-Yugoslavia	3.7%	3.7%
	Turkey	1.4%	1.0%
	Other European countries	1.0%	0.8%
	Asia	0.6%	0.5%
	Total	100%	100%
	N	1203	748

Table A.2: Descriptive statistics of the variables used in the analysis

Variable	mean	min	max
Post-displacement status: re-employed	0.69	0	1
Post-displacement status: unemployed	0.17	0	1
Post-displacement status: retired	0.11	0	1
Post-displacement status: inactive	0.03	0	1
Sex: male	0.83	0	1
Sex: female	0.17	0	1
Education3: less than upper secondary	0.17	0	1
Education3: upper secondary	0.56	0	1
Education3: tertiary	0.26	0	1
Education5: does not know / tell	0.04	0	1
Education5: less than upper secondary	0.17	0	1
Education5: upper secondary	0.54	0	1
Education5: tertiary vocational	0.15	0	1
Education5: tertiary college / university	0.10	0	1
Blue collar worker	0.62	0	1
White collar worker	0.38	0	1
Age at displacement (in years)	46.5	16	65
Age5: 16 -29	0.11	0	1
Age5: 30-39	0.15	0	1
Age5: 40-49	0.29	0	1
Age5: 50-59	0.28	0	1
Age5: 60-65	0.17	0	1
ISCO1: managers	0.08	0	1
ISCO2: professionals	0.06	0	1
ISCO3: technicians	0.19	0	1
ISCO4: clerks	0.08	0	1
ISCO7: craft workers	0.26	0	1
ISCO8: machine operators	0.28	0	1
ISCO9: elementary jobs	0.04	0	1
District unemployment rate in month before displacement	0.041	0.017	0.072
Company 1	0.12	0	1
Company 2	0.20	0	1
Company 3	0.27	0	1
Company 4	0.25	0	1
Company 5	0.17	0	1