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What Makes Single Mothers Expand or Reduce Employment?

Mine Hancioglu · Bastian Hartmann

Abstract To explore single mothers' labor market participation we analyzed specific circumstances and dynamics in their life courses. We focused on the question which individual and institutional factors determine both professional advancement and professional descent. The German Socio-Economic Panel (1984–2010) provides all necessary information identifying episodes of single motherhood and analyzing restrictions and interruptions of employment during life courses. Since family statuses of single mothers are partially endogenous and can end in multiple ways, we used semi-parametric survival models. Competing risks estimations showed that occupational careers of single mothers are influenced by individual factors such as appointed and reliable working hours, and further by the institutional determinants childcare or welfare benefits.

Keywords Single mothers · Labor supply · Event history analysis · Cox-regression

JEL Classification C14 · C23 · J12 · J13 · J16 · J22

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Introduction

In all industrialized countries female labor supply has increased in past decades. This partly came along with more economic independence and material welfare for women as well as increased divorce rates and pluralized family forms (Blossfeld 1995). One result of these trends is the increasing number of households headed by single parents.

In this paper, we examined factors influencing single mothers' labor market participation over their life span. Unlike other studies (Andreß et al. 2006; Drobnič 2000), our analysis contained women regardless of their family status before they became single mothers. We focused on the question of which individual factors and institutional circumstances influence single mothers expanding or reducing their labor supply. Due to dynamics in women's life-course identifying and analyzing restrictions and interruptions of employment requires a longitudinal research design. To deal with partial endogeneity of single motherhood we used semi-parametric survival models. Since these methods place high demands on the data, we used data from the German Socioeconomic Panel.

The special situation of single parents is both theoretically explicable and empirically evident. According to the economic approach to the family, nurturing children absorbs parents' time and thereby reduces their possibilities to work (Becker 1965). In the special case of single parents, time allocation is apparently more challenging because they cannot rely on intra-household division of labor (Minotte 2012). However, impeded compatibility of work and family life appears to be a gender specific phenomenon. There is broad-based empirical evidence for low incomes and an above-average fraction of households relying on welfare among single mothers (Francesconi and

van der Klaauw 2007; Vandecasteele 2011) while, by contrast, single fathers have average rates of labor participation (Minotte 2012). Still, men are the minority among single parents (Leininger and Ziol-Guest 2008). That is why in this article we focused on economic stability of households headed by single mothers.

Studies examining the economic position of single motherhood households concentrated on poverty (Edin and Lein 1997; Lietzmann 2009; Sørensen 1994) and the effects of transfer programs and social policy reforms addressing single mothers (Francesconi and van der Klaauw 2007; Giddings et al. 2004). Doing so, Sørensen (1994) explained low incomes of single mothers by women's general disadvantages in labor markets and the loss of economies of scale as a consequence of family disruption. Other studies explained the economic position of single mothers by finding more specific reasons for their labor supply and showed that the amount of social welfare and benefits affects women's labor supply (Wagenhals et al. 1999). Furthermore, other studies pointed to the importance of childcare and its increasing effect on single mothers' labor participation (Blau and Tekin 2007; Cascio 2009; Hank and Kreyenfeld 2000; Kornstadt and Thoresen 2007; Van Gameren 2012). Kanji (2011) analyzed how single mothers in Russia can participate in economic growth periods and identified job quality as key factor for their employment behavior. Besides institutional aspects, socio-demographic factors play a decisive role in illustrating and explaining single mothers' labor participation. Lietzmann (2009) found especially among very young single mothers with children under the age of 4 a high proportion of poverty and long durations of being on welfare. While the age of children points to the importance of pre-school childcare (kindergarten) in this context, the age of single mothers indicates that the timing of childbirths in women's life also affects their labor supply. This argument was strengthened by the high fraction of less educated women with early births (Drobnič 2000).

The article is structured as follows. The following section describes the data and our methodical approach as well as potential determinants of single mother's labor supply. Afterwards we present descriptive findings and results of multivariate analysis. The last section discusses our results and gives some policy advice.

Data and Methods

Data Management

This study is based on data from the German Socio-Economic Panel (SOEP), a representative longitudinal dataset for the population of Germany. The SOEP was initiated in 1984. Since then it has been conducted annually and includes, among other things, detailed personal, social and economic information for all household members above the age of 16 (Wagner et al. 2007).

The SOEP contains all information necessary to identify single mothers. Retrospective data on family, education and employment status complements the information useful for analyzing the life course of single mothers. We defined single mothers as women who live with their underage child or children (in Germany children are underage until they are 18 years old) in a household without a partner. By this definition, we excluded households of single mothers living with their parents or other adults. Empirically, these are occasional cases, and most of them were identified as three-generation-households. Exclusion was due to the divergence of the life situation of these women particularly regarding childcare arrangements. As a last group we excluded women who already were single when the child was born. These women were excluded to avoid mixing up specific stresses that arise from either getting a child or becoming single mother.

Our sample consists of women aged younger than 60 years who were in single motherhood at some time during the panel period between 1984 and 2010 (N = 1,698). The length of these episodes of single motherhood is predominantly short, which generally results from temporary cohabitation with new partners. It should be noted that, in this analysis, not all observed episodes are complete. We did not have information about the length of left-censored episodes, where the single mother episode starts prior to the observation window, nor did we have information about right-censored episodes, in which the episode occurs at the time of our last panel wave or when women left the panel. No censoring applies to 721 of a total of 1,862 episodes. The other episodes are left- or right-censored or both.

Table 1 shows the duration of single motherhood distinguishing between complete episodes and all episodes (including censored episodes). We can notice that, within complete episodes, more than 50 % of women spend up to 2 years as single mothers, whereas just 14 % spend more than 7 years as single mothers. However, we found considerable differences for weighted data. Because of the limited observation period (26 waves), long episodes are more likely left- or right-censored than it is the case for short episodes. As a result, long episodes are underrepresented as complete episodes. We also assumed that long episodes are underrepresented among all episodes because we only could take into account the length of censored spells within the observation window. The problem of underrepresented long episodes also exists for weighted data. There is unfortunately no proper method to deal with left-censored spells, but for right-censored episodes, we

Table 1 Duration of single motherhood

| Time span	Complete episodes		All episodes	
	Cases	%	Cases	%
<2 years	219	30.4	467	25.1
2 years	141	19.6	350	18.8
3 years	102	14.1	245	13.2
4 years	70	9.7	152	9.5
5 years	47	6.5	177	8.2
6 years	41	5.7	152	6.4
7–9 years	55	7.6	198	10.6
≥10 years	46	6.4	153	8.2
Total	721	100.0	1,862	100.0

Source: SOEP 1984–2010, unweighted

could make use of Kaplan–Meier survival analysis to consider and calculate these episodes (Cleves et al. 2004, p. 96). Survival estimates indicate the portion of all episodes surviving after a specific time.

Figure 1 shows the annual portion of single mother episodes for unweighted data, but as described before Kaplan–Meier survival estimates takes right-censored episodes into consideration. As is evident in the figure, 35 % of single mothers have a short episode of ≤3 years and 25 % live for at least 10 years as single mothers.

Methods

Being a single parent cannot be interpreted as static situation in which people remain, but rather, must be interpreted as an episode of limited duration. Since both episodes of single motherhood and employment interruptions differ in length and timing analyzing employment perspectives of single mothers required a longitudinal
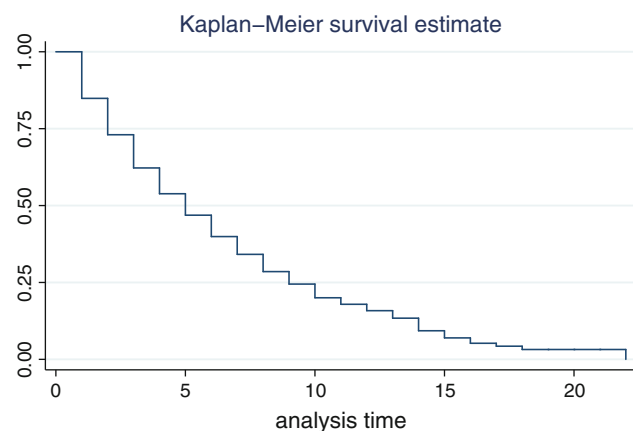
Fig. 1 Kaplan–Meier survival estimate, *source*: SOEP 1984–2010, unweighted

approach. Further, living as a single parent is usually not part of the individual's original life plan, but either due their partner's death or a result of a failed relationship. So, single mothers can be assumed to be looking for a new partnership (BMFSFJ 2008). Therefore, when single mothers not only try to improve or stabilize their economic situation, but also try to change their family status, the episode of interest in this paper–being a single parent–becomes at least partly endogenous. To allow for partial endogeneity we fit semi-parametric survival models (Cox regression, Cox 1972). The Cox model calculates a hazard rate $h_i(t)$

$$h_i(t) = h_0(t) \exp(\beta' x).$$

It indicates the propensity of changing status for individual i at a certain time t and is due to a baseline rate $h_0(t)$ and vectors of covariates (x) and coefficients (β). However, the hazard rate was not estimated directly, but how it was influenced by a set of covariates. A key feature of Cox regression is that the baseline is left unspecified. Therefore covariates cannot change its general form, but only change it proportionally (Blossfeld and Rohwer 2001). It is important to stress that there are different changes that can occur. For instance, those women who have a part-time job can either expand their employment to a full-time job or can reduce it by changing into non-employment. In the estimates we distinguished employment status into three categories (full-time, part-time and non-employment) so that six different employment changes were possible. In addition, single mothers can also change their family status once their children reach adulthood, leave their parental home and/or a new partner moves in. Whereas changes of family status can occur to every woman, specific employment changes only appear in certain subgroups. All these changes of family and employment statuses are mutually exclusive because once a single mother changed her family status, she cannot be observed changing her employment status as a single mother and vice versa. Therefore we used competing risk regression that provides simultaneous analysis of transitions according to employment and family status. Model estimation is based on partial likelihood, which has to be maximized for every possible transition and—according to employment changes—subgroup. Transitions for family change are not present here, though.

To make reliable statements weighting and extrapolating data is necessary. However, weighting longitudinal data is difficult. In this paper, we used the following two types of weights. To describe the situation at the beginning we calculated a weight from the weighting factor for the year prior to entry into single motherhood t_{-1} and the staying probability of the year t (starting weight). The weight for weighting episodes in general (spell weight) was calculated

from the weighting factor for the women's first year as a single mother t and the staying probability from every year t_1, t_2, $t_3...t_n$ up to the end of the episode.

However, using these weights in the estimates was difficult. If we used weighting and expansion factors, the dataset would be enlarged artificially, so that standard deviations would be underestimated and significance tests would be distorted. Usually, this can be solved by normalizing the weights to the basic population. In our case, this was not possible because the episodes, for which the weights are calculated, differ in duration and timing, and the weights do not add up to the basic population. Therefore we performed estimations with unweighted data.

Variables

For descriptive analysis we distinguished employment status into five different categories: full-time, part-time and marginal employment, education and being not employed. In general, full-time employment comprises approximately 40 and part-time about 20 working hours. Marginal employment was characterized as short-term employment with even less working hours a week. Besides individuals that are unemployed and looking for a job, being not employed covers military and community service, maternal leave as well as women in partial retirement who are not working anymore. However, due to limited cases marginal employment and education could not be used in the estimates. Since we wanted to use data from every single mother observed in SOEP, we could only use explanatory variables that were collected continuously during the whole period from 1984 to 2010. If we ignored early episodes in order to gain more variables, too many episodes, particularly long ones, would be lost, thus causing a bias. To identify factors that let single mothers enter or exit employment or adjust their working time our estimations contain the following variables which can be hypothesized to be relevant in this context (a full list of variables including means and standard deviations can be found in the appendix).

First, single mothers' situations are probably influenced by the reason for which they became single parents in the first place. For this reason we divided family status into three categories: widowed, single and divorced (or still married but separated). We controlled for the mother's age in three categories: (i) 20–30 years, when most individuals end their formal education and start working; (ii) 31–40 years, when their lives are characterized by occupational orientation and family foundation; and (iii) 41–60 years, which represents the second part of their employment history. In addition, four categories controlled for the educational level ranging from general elementary

to tertiary education. We also controlled for the mother's physical condition. The metrical variable is based on self-reported health, a high value indicating a good subjective health. The time when the women became single parent was included as a time-invariant variable differentiated into three decades (1980s, 1990s and 2000s). Number and age of the children were both included via a set of mutually exclusive variables indicating how many children were living in the household and how old the youngest child was. Children's age was distinguished into five brackets following differences in institutional constraints: pre-nursery from 0 to 3, kindergarten from 4 to 6, elementary school from 7 to 10 and two categories for secondary schooling from 11 to 15 and from 16 to 18 years. Utilization of childcare was controlled by a dichotomous variable which is only considered for women whose youngest child is younger than six years old. Additionally, we included variables indicating whether individuals were living in the former German Democratic Republic (GDR) or had any kind of migration background. Unfortunately, we were not able to control for alimony payments or potential support offered by a new partner from outside the household, since these information are not surveyed sufficiently in the SOEP dataset.

Explaining occupational advancement and descent of single mothers by individual factors exclusively is insufficient. The question of whether single mothers maintain, reduce or expand their labor market participation cannot be detached from their income or the specific constraints that go along with their current job.

Hence, we conducted additional estimates that included specific variables measuring working conditions, which can be a predictor for a work-to-family conflict. The working conditions are described as the distance to the work place, and information about how free they are to organize their work (Golden 2008; Son and Bauer 2010). While the first one is included metrically, the latter is dichotomous. We also added weekly overtime which is divided into three categories: no overtime at all, 1–3 h per week or more than 3 h per week. Earnings were included via hourly wages as metrical variable and calculated in prices from the year 2000. Further, we included a variable indicating whether women received social benefits even though they were employed. Since this variable is lagged by one year it showed top-up benefits that are received even though the woman is employed. We assumed such top-up benefits affect the employment in a negative way (Boss et al. 2010). Finally, we added a variable measuring overall job satisfaction. Of course this list was limited and one could think of additional job characteristics, but unfortunately other factors were not available for the whole observation period.

Results

Descriptive Analysis

When women become single mothers, employment circumstances for them may change. On the one hand, single mothers are more dependent on gainful employment and are forced to achieve financial independence. On the other hand, achieving compatibility between work and childcare becomes more difficult. We identified the change of employment participation by comparing the employment status of women in the first year of being a single mother with their employment status before they became a single mother (Table 2).

As is evident in Table 2, 38.7 % of mothers were not employed one year before they became a single mother, while 29.4 % were employed full-time, approximately 24 % were employed part-time, and few mothers were in training or marginally employed. By comparing these results with the totals of the employment status in the first year of being a single mother, we noticed that employment participation seems to be mostly unchanged, although we could identify a decreasing rate of part-time employment (21.7 %) and an increasing rate of not employed single mothers (43.5 %). These results appear to contradict our assumption that the employment rate increases when women become single mothers. However, compared to women who were employed part-time before becoming single mothers, the number of women who were previously employed full-time but gave up their job and were not employed after becoming single mother is higher (12.8 vs. 22.6 %, respectively). This can be taken as evidence for the more difficult conditions faced by single mothers trying to balance work and family life within a full-time employment setting. Furthermore, 6 % of women who previously worked full-time decreased their working hours to part-time status after becoming single mothers, and only 22.6 % of the respondents in education continued their training after the entry of single motherhood. This group mainly consisted of very young women. In contrast, we noticed increasing rates of work participation for more than 22 % of women who were not employed prior to becoming single mothers and for approximately 16 % of women who were previously employed part-time. Increases in employment were greatest for women who were marginally employed before they became a single mother (45 %).

Table 3 shows the employment status of women one year before they became single mothers and their labor participation in the last year of being a single mother or in case of right censored spells the last year of the observation window. Overall, the table shows an increase in the employment of these mothers. We observed a decreasing rate of not employed mothers (from 39.1 to 32.4 %) and an increase in full-time employment (from 29.2 to 32.1 %). Approximately 30 % of women who were previously employed part-time and more than 70 % of women who were previously marginally employed extended their working hours during the time period in which they were a single mother. Comparing Tables 2 and 3, we noticed that, for those women who were employed full-time in the year before they became single mothers, the rate of part-time employment increased from 6.1 to 15.8 % once they became single mothers. In contrast, for the same group, the rate of not employed single mothers decreased from 22.6 to 13.3 % after they had become single mothers. This can also be taken as evidence for the above-mentioned compatibility problems of work and childcare. We assumed that problems accumulate particularly with the entry into single motherhood, thus making employment hard to maintain. These problems, however, seem to become more solvable during the time and are also depending on several factors that can only be analyzed by multivariate analysis.

Multivariate Analysis

To identify factors that influence the employment of single mothers we estimated semi-parametric proportional hazard models (Cox-regression). The failure event of interest was

Table 2 Employment status before and in the first year of being single mother

Employment status in the first year							
Employment status before (%)	Full-time	Part-time	Education	Marginally	Not employed	Total	%
Full-time	69.8	6.1	–	(1.5)	22.6	100	29.4
Part-time	16.1	62.9	(2.5)	5.7	12.8	100	23.7
Education	(4.9)	(4.9)	22.6	–	67.6	100	2.4
Marginally	(9.9)	34.5	–	21.7	33.9	100	5.8
Not employed	6.0	7.8	1.3	8.0	76.9	100	38.7
Total ($n = 1{,}135$)	27.0	21.7	1.5	6.3	43.5	100	100

Source: SOEP 1984–2010, weighted with starting weight

Values in brackets consist of ≤5 cases

Table 3 Employment status before and in the last year of being single mother

Employment status in the last year (resp. right censored)

Employment status before (%)	Full-time	Part-time	Education	Marginally	Not employed	Total	%
Full-time	67.7	15.8	(1.6)	(1.6)	13.3	100	29.2
Part-time	29.8	51	(0.7)	3.9	14.6	100	23.5
Education	28.1	(9.7)	(2.5)	(0.7)	59	100	2.4
Marginally	19.2	48.5	(0.7)	9.6	22	100	5.8
Not employed	14.8	22.2	1.7	8.6	52.7	100	39.1
Total (n = 1,147)	32.1	28.5	1.4	5.6	32.4	100	100

Source: SOEP 1984–2010, weighted with spell weight

Values in brackets consist of ≤5 cases

the first change of their employment status after becoming single mothers. We were not able focus on multiple changes, since the number of long episodes in which multiple changes of employment status were observed was too small. As described before distinction between marginal employment and education could not be maintained. That is why we divided employment status into full-time, part-time and not employed. Since most of very young single mothers have not yet finished education, we excluded women who became single mothers before the age of 20 from multivariate analysis. Besides the different employment status, the competing risks were different ways of leaving the status of a single mother as discussed in above. The estimates provided here were performed with unweighted data.[1]

Table 4 provides estimation results for taking up or expanding employment for different initial states. The first two columns show estimation results for the transition from not employed to part-time employed. Finding a part-time job was more complicated for single mothers with a migration background or when they were living in the former GDR. The same is true for women who became single mothers during the 1980s. Whereas the mother's age and health, her family status as well as the number of children and their ages had no significant effects on her chances of taking up part-time employment, we observed that higher education had a positive impact. Single mothers with tertiary education were taking up part-time jobs more often than women with lower education. This pattern—a positive impact of education—could also be observed in additional estimations when education was measured metrically by the number of years of education. This confirms the results of other studies (Moffitt and Roff 2000;

Urban and Olson 2005). Concerning the transition from not employed to full-time work different impacts became apparent. Neither migration background nor the mother's age nor her family status nor living in the former GDR had any influence on taking up a full-time job. Subjective health and educational level also had no significant effect. Contrary to the former estimation, women who became single mothers during the 1980s here appeared more likely to accept full-time jobs.

Furthermore, we found significant negative effects for the number of children in the household. Findings for the children's age indicated that taking up a full-time job was particularly complicated for women whose children were attending kindergarten or elementary school. This is plausible since the fewest of these institutions provide all-day care. The final estimation provided in Table 4 focused on single mothers expanding their labor market participation from part-time to full-time work. There were only four significant effects. For the first time in this study, we observed family status exerting a significant impact. Women that became single mothers because of their partner's death were less likely to enhance their working hours afterwards. The same was true for women with older children. The positive effect of higher education was especially interesting compared to the preceding estimations. While well-educated single mothers were not more likely to work full-time if they had not been employed previously, women who already had a part-time job arrangement when they became single mothers were more likely to expand their working hours.

Table 5 provides estimations with an identical set of independent variables for giving up or reducing employment. Reduction of working hours from full-time to part-time employment was rare (only 45 cases in the dataset). Having very young children had a positive effect on reducing work participation. The effect was significant for children under the age of 3 and still weakly significant for children between the age of 4 and 10 years. Apparently,

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[1] Numbers of cases in the estimates differ from the number of episodes mentioned before because transition into different employment states can only be observed for individuals in specific subgroups. Results for testing the proportional hazard assumption can be found in the appendix.

Table 4 Taking up or enhancing employment (Cox-regression)

| Change from | Not employed | | | | Part-time employed | |
| Change to | Part-time employed | | Full-time employed | | Full-time employed | |
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Time of entry into single motherhood (reference: 1990s)						
1980s	−0.964**	(0.328)	0.733*	(0.335)	0.484	(0.354)
2000s	−0.053	(0.328)	−0.281	(0.274)	−0.321	(0.262)
Mothers age (reference: 31–40 years)						
20–30 years	−0.160	(0.328)	−0.100	(0.320)	0.280	(0.408)
41–60 years	0.056	(0.328)	−0.342	(0.368)	−0.030	(0.278)
Family status (reference: divorced or married and separated)						
Widowed	−0.091	(0.328)	−0.819	(0.662)	−2.106*	(1.049)
Single	0.065	(0.328)	0.138	(0.290)	−0.390	(0.390)
Education (reference: intermediate general to general maturity)						
General elementary or lower	−0.237	(0.328)	−0.299	(0.335)	0.064	(0.353)
Basic vocational	0.311	(0.328)	−0.303	(0.310)	−0.146	(0.290)
Tertiary education	1.080***	(0.328)	0.128	(0.426)	0.606*	(0.271)
Age of youngest child (reference: 11–15)						
0–3 years	−0.218	(0.328)	−0.590	(0.396)	−0.231	(0.536)
4–6 years	−0.151	(0.328)	−1.342**	(0.466)	−0.277	(0.482)
7–10 years	−0.130	(0.328)	−0.721†	(0.407)	−0.515†	(0.296)
16–18 years	−0.491	(0.328)	−0.590	(0.519)	−0.612†	(0.344)
Household members	0.006	(0.328)	−0.426**	(0.146)	0.065	(0.125)
Childcare	0.211	(0.328)	0.559†	(0.339)	−0.293	(0.373)
Mother's health	0.024	(0.328)	−0.003	(0.050)	0.001	(0.052)
East	−1.164***	(0.328)	0.310	(0.292)	0.322	(0.340)
Migration background	−0.658*	(0.328)	0.164	(0.312)	−0.090	(0.311)
Number of spells	642		642		398	
Number of failure	107		73		87	
Wald χ^2	59.53		38.29		30.78	
Prob > wald χ^2	0.000		0.004		0.031	

Standard errors are reported in brackets and clustered by spells

Source: SOEP 1984–2010

*** $p < 0.1$; ** $p < 1$ %; * $p < 5$ %; † $p < 10$ %

small children claimed their mother's time budget to an extent that made full-time employment hard to sustain. On the other hand, having older children made reduction less likely. Further, for single mothers in the former GDR changing from full-time to part-time was less common than it was in the western states. While it was not decisive how well a women was educated (regardless whether education was measured categorically or metrically), when she became single mother, nor whether she had a migration background, age plays an important role. Single mothers in the first part of their employment biography were less likely to reduce their full-time employment. However, the family situation defined by family status and number of children had no significant effect on the transition from full-time employed to not employed.

Estimation for transition from full-time to part-time employment only provides three significant impacts. For those women who became single mother during the first decade of 2000s maintaining their full-time job was easier than for the reference group. Having children older than 15 years made reduction from full to part-time employment less likely, this is in line with the previous results. For the first time the women's health becomes significant. The negative sign indicates that a bad physical condition promotes transition from full to part-time employment. As we pointed out in the former estimation specific challenges to balancing work and family life that come along with the family situation seemed to have little influence on the reduction of full-time employment. Probably, women that were full-time employed had made individual arrangements allowing full-

Table 5 Giving up or reducing employment (Cox-regression)

Change from	Full-time employed				Part-time employed	
Change to	Part-time employed		Not employed		Not employed	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Time of entry into single motherhood (reference: 1990s)						
1980s	0.610	(0.535)	−0.308	(0.375)	−0.334	(0.551)
2000s	0.428	(0.411)	−0.588*	(0.289)	0.260	(0.417)
Mothers age(reference: 31–40 years)						
20–30 years	−1.324*	(0.642)	0.460	(0.347)	0.728[†]	(0.415)
41–60 years	0.098	(0.358)	−0.052	(0.296)	−0.331	(0.358)
Family status (reference: divorced or married and separated)						
Widowed	0.165	(0.611)	−0.368	(0.504)	0.790	(0.640)
Single	−0.189	(0.450)	0.135	(0.315)	0.258	(0.445)
Education (reference: intermediate general to general maturity)						
General elementary or lower	0.106	(0.517)	0.026	(0.500)	0.551	(0.362)
Basic vocational	−0.438	(0.495)	−0.007	(0.336)	−0.588	(0.462)
Tertiary education	−0.020	(0.373)	0.124	(0.307)	−1.108	(0.716)
Age of youngest child (reference: 11–15)						
0–3 years	1.336*	(0.564)	0.259	(0.497)	0.418	(0.671)
4–6 years	0.776[†]	(0.442)	−0.237	(0.480)	0.432	(0.641)
7–10 years	0.711[†]	(0.384)	0.173	(0.315)	0.380	(0.436)
16–18 years	−1.679*	(0.762)	−0.986*	(0.446)	0.741	(0.480)
Household members	0.041	(0.202)	0.116	(0.147)	0.423*	(0.189)
Childcare	0.525	(0.342)	0.201	(0.331)	0.304	(0.462)
Mother's health	0.002	(0.068)	−0.142*	(0.062)	−0.234***	(0.056)
East	−0.914*	(0.457)	0.454	(0.324)	−0.071	(0.473)
Migration background	−0.409	(0.411)	0.288	(0.413)	0.477	(0.374)
Number of spells	568		568		398	
Number of failure	45		69		47	
Wald χ^2	53.97		47.56		77.35	
Prob > wald χ^2	0.001		0.000		0.000	

Standard errors are reported in brackets and clustered by spells

Source: SOEP 1984–2010

*** $p < 0.1$; ** $p < 1\ \%$; * $p < 5\ \%$; [†] $p < 10\ \%$

time labor participation, or specific problems occurred that were independent from number of children, childcare or family status.

Regarding transition from part-time employment to non-employment bad subjective health as well as a huge number of children apparently hampered maintaining part-time employment. As in previous estimates family status, the youngest child's age and the availability of institutional childcare were not decisive. However, the effect of the mother's age somehow contradicted previous results. Whereas the youngest group of single mothers was less likely to reduce full-time employment, these women were more likely to reduce part-time employment.

The question whether women that were employed enhanced or reduced their working hours after they had

become single mothers could not be answered solely based on individual factors, but also depended on the conditions of their current employment. Therefore the estimations provided in Tables 5 and 6 contained variables describing job characteristics. The variables discussed previously were controlled for as well. All effects remained stable.

Table 6 provides estimations for reducing full-time employment either to a part-time job or non-employment. Seemingly changes from full-time to part-time were only influenced by one additional factor. Even a small amount of overtime made organizing everyday life harder and thus reduction from full-time to part-time employment more likely. However, we found more significant effects regarding transition from full-time employment to non-employment. Whereas limited freedom of action to organize work made

Table 6 Reducing full-time employment (Cox-regression)

Change from	Full-time employed			
Change to	Part-time employed		Not employed	
	Coef.	Std. err.	Coef.	Std. err.
Overtime (reference: no overtime)				
1–3 h	0.681[†]	(0.388)	−0.724	(0.530)
More than 3 h	−0.071	(0.457)	0.248	(0.309)
Distance	−0.017	(0.020)	−0.008	(0.012)
Hardly autonomous	0.447	(0.318)	0.679*	(0.314)
Hourly wage	−0.003	(0.009)	−0.051[†]	(0.027)
Social benefits	0.123	(0.825)	1.834***	(0.357)
Job satisfaction	0.074	(0.088)	−0.060	(0.060)
Control variables	Yes		Yes	
Number of spells	546		546	
Number of failure	42		62	
Wald χ^2	86.19		136.17	
Prob > wald χ^2	0.000		0.000	

Standard errors are reported in brackets and clustered by spells

Source: SOEP 1984–2010

*** $p < 0.1$; ** $p < 1\%$; * $p < 5\%$; [†] $p < 10\%$

full-time employment hard to maintain, women who were paid well were less likely to lose their full-time employment. Apparently these women found specific arrangements that make such participation possible. Finally, being on welfare had a highly significant impact. Women that cannot overcome social welfare level even though they have a full-time job obviously rely on in-work benefits which partly go along with weaker incentives to work through benefit withdrawal.

Estimation for employment changes from part-time to full-time employment provided in Table 7 shows a significant impact for overtime working hours which is contrary to the former. Women that were doing overtime more than three hours a week took up full-time jobs more often than those who were not.

Regarding the estimation for giving up part-time employment we only observed two significant effects. The necessity of top-up benefits made employment less attractive regardless whether women were working full- or part-time. Besides, when women derived huge satisfaction from their jobs they were less likely to give them up.

Discussion

Our descriptive results suggested that many women had to reduce their labor market participation shortly after becoming a single parent. Apparently, entry into single motherhood is characterized by accumulated difficulties regarding the compatibility of work and family life. However, single mothers appear to manage these problems over

time. Compatibility problems still exist, but part-time employment seems to be a chance for re-entry into labor market. In general our analysis showed that even though they have a high poverty risk, single mothers are very heterogeneous. Multivariate analysis confirmed these findings and offered a more differentiated view by analyzing professional advancement and descent simultaneously.

Employment of single mothers is influenced by both individual factors and institutional circumstances. One interesting finding among individual characteristics is the role of education. Whereas academics are both more likely to find and to enhance a part-time job, higher educational level does not prevent single mothers from reducing their employment. In addition single mothers' labor supply appears to be influenced by specific dynamics of their life course and their career perspectives. Especially in the first years of one's career full-time employment provides better opportunities than part-time employment which makes the latter less attractive. On the other hand widows are more likely to reduce part-time employment. This might be a sign that these women have reached a relatively stable economic position and do not seek to improve it, even when they have the opportunity for doing so. The children's ages seem to be somehow ambivalent. It seems logical that the younger children are, the more time they require from their parents. As a consequence children absorb their parents' time budget and their possibilities to work. This is especially persuasive for single parents, which explains the positive impact of having young children on reducing full-time employment. Otherwise, financial needs may decrease once the children become older and more independent. This could in turn explain the negative impact of having children between 16 and 18 years of age on enhancing part-time employment. The special needs of children might also explain significant differences between eastern and western states in Germany. Better availability of childcare or higher employment rates for women in the eastern states (Geisler and Kreyenfeld 2005; Statistische Ämter des Bundes und der Länder 2011) probably make it easier for women to stay employed full-time once they become single mothers. The limited influence of institutional childcare seems to be puzzling. It may suggest the assumption that single mothers have to find arrangements that go beyond public provision of childcare in order to balance work and family life. Eventually they do so by either relying on friends and family or hiring nannies on their own. Other important contextual factors are clearer. The effect of time of entry into single motherhood might be related to different economic restrictions, since part-time job arrangements were less common during the 1980s and became more popular during the following decades (Vogel 2009). Further, we found some clue indicating that organizing work and family alleviated generally over the decades, since giving up full-time employment is less likely for women who became single mothers after the year 2000.

Table 7 Reducing or Enhancing Part-time Employment (Cox-regression)

Change from	Part-time employed			
Change to	Full-time employed		Not employed	
	Coef.	Std. err.	Coef.	Std. err.
Overtime (reference: no overtime)				
1–3 h	0.027	(0.305)	0.499	(0.408)
More than 3 h	0.589*	(0.272)	−0.595	(0.769)
Distance	−0.003	(0.008)	0.006	(0.004)
Hardly autonomous	−0.280	(0.273)	0.299	(0.430)
Hourly wage	−0.006	(0.015)	0.002	(0.033)
Social benefits	−1.020	(0.731)	1.527***	(0.390)
Job satisfaction	0.049	(0.061)	−0.211**	(0.067)
Control variables	Yes		Yes	
Number of spells	371		371	
Number of failure	83		39	
Wald χ^2	48.79		228.42	
Prob > wald χ^2	0.003		0.000	

Standard errors are reported in brackets and clustered by spells

Source: SOEP 1984–2010

*** $p < 0.1$; ** $p < 1\%$; * $p < 5\%$; † $p < 10\%$

Results of job characteristics let us assume that the women's position within their company is crucial. Well-paid jobs with some degree of freedom to organize work are more likely to be maintained. This view was supported by effects of overtime—even though they seem to be ambivalent at first glance. Whereas a small amount of overtime may confuse daily routine and hampers compatibly of work and family life, women with more than 3 h of overtime are even more likely to enhance part-time employment. This might be explained by two factors. Firstly, women whose specific situation allows for high amounts of overtime are likely capable of finding the time to work full-time. Secondly, provided these women stay with the same employer, their overtime might indicate their high importance within the company, and, consequently, a degree of bargaining power which allows them to achieve flexible working hours overall.

Welfare benefits also appear to matter, suggesting that top-up social benefits provide weak incentives to maintain employment especially when it is paid badly. The assumption is confirmed as high earnings decrease the probability of a transition to non-employment. Social benefits in Germany provide only little incentives to maintaining low paid jobs and our results showed that this is especially influential for single mothers.

However, some factors remain unclear. Due to limited observation windows multiple episodes were rarely observed. Even though, being able to focus on repeated changes of employment states might help analyzing

heterogeneity among single mothers. Concerning the mother's time budget and in order to identify individual childcare arrangements more detailed information about contact with the children's father, the mother's use of social support and networks as well as potential assistance offered by new partners is crucial. Alimony payments are another factor that has not yet been addressed sufficiently, mainly because of data limitations. The same is true for further job characteristics. Especially, the role of company kindergartens might be important.

All in all our analysis provided three major findings. Firstly, it became clear that labor supply of single mothers is a result from both individual and institutional circumstances. In general, we found institutional circumstances to be more influential than individual characteristics. Especially a limited supply of considerable and reliable childcare arrangements as well as weak incentives to maintaining low-paid jobs are problems that have to be overcome. Secondly, regarding compatibility problems our results ascribed importance to employers. Problems of balancing work and family life cannot be solved without rethinking and job requirements and making them more flexible. Finally, our results indicated that female labor supply cannot be detached from women's life courses. Although our analysis focused on single mothers, a life course perspective is worthwhile for female labor supply in general.

Appendix

See Tables 8, 9, 10 and 11.

Table 8 List of co-variables

Variable	Observations	Mean	Std. dev.
Time of entry into single motherhood 1980s	4,376	0.172	0.378
Time of entry into single motherhood 1980s	4,376	0.306	0.461
Time of entry into single motherhood 1980s	4,376	0.511	0.500
Mother's age 20–30	4,376	0.173	0.378
Mother's age 31–40	4,376	0.440	0.496
Mother's age 41–60	4,376	0.387	0.487
Widowed	4,376	0.085	0.279
Single	4,376	0.207	0.405
Divorced & separated	4,376	0.659	0.474
General elementary or lower education	4,376	0.171	0.376
Basic vocational education	4,376	0.245	0.430
Intermediate general to general maturity	4,376	0.401	0.490

Table 8 continued

Variable	Observations	Mean	Std. dev.
Tertiary education	4,376	0.156	0.363
Youngest child 0–3 years	4,376	0.134	0.341
Youngest child 4–6 years	4,376	0.170	0.375
Youngest child 7–10 years	4,376	0.212	0.408
Youngest child 11–15 years	4,376	0.284	0.451
Youngest child 16–18 years	4,376	0.200	0.400
Number of household members	4,316	2.682	0.864
Childcare	4,376	0.215	0.411
Health	4,376	6.845	2.221
East	4,376	0.233	0.423
Migration background	4,376	0.185	0.388
No overtime	4,376	0.319	0.466
Overtime 1–3 h	4,376	0.098	0.298
Overtime more than 3 h	4,376	0.117	0.321
Distance to work place	4,316	5.835	37.639
Hardly autonomous	4,376	0.279	0.448
Hourly wage	2,944	11.680	11.742
Social benefits	4,371	0.253	0.435
Job satisfaction	2,853	7.011	2.330

Source: SOEP 1984–2010

Table 9 Tests of proportional hazard assumptions for estimates provided in Table 5

	Not employed		Part-time employed
	Part-time employed ρ	Full-time employed ρ	Full-time employed ρ
Time of entry into single motherhood: 1980s	0.078	0.035	−0.051
Time of entry into single motherhood: 1980s	0.063	0.025	−0.059
Mother's age 20–30	0.067	−0.027	−0.011
Mother's age 41–60	0.061	−0.085	−0.031
Widowed	0.208[†]	0.063	−0.088
Single	−0.053	0.067	−0.106
General elementary or lower education	0.012	−0.022	0.108
Basic vocational education	−0.059	0.111	0.040
Tertiary education	0.062	0.018	0.034
Youngest child 0–3 years	0.053	0.136	−0.012
Youngest child 4–6 years	0.010	0.263**	0.000
Youngest child 7–10 years	−0.027	0.166	0.021
Youngest child 16–18 years	0.090	0.004	0.037

Table 9 continued

	Not employed		Part-time employed
	Part-time employed ρ	Full-time employed ρ	Full-time employed ρ
Household members	0.007	−0.178[†]	0.016
Childcare	−0.016	−0.025	0.004
Mother's health	−0.043	0.037	0.125
East	−0.005	0.173	−0.040
Migration background	−0.050	0.055	0.018
Global test χ^2	11.910	17.670	8.660

Proportional Hazard assumption is tested by controlling whether Schoenfeld residuals are running horizontally over time. Significant and negative (positive) sign indicates growing (shrinking) impact over time. However, relevance is controversial, since results are vulnerable to outliers (Therneau and Grambsch 2000)

Source: SOEP 1984–2010

*** $p < 0.1$; ** $p < 1\%$; * $p < 5\%$; [†] $p < 10\%$

Table 10 Tests of proportional hazard assumptions for estimates provided in Table 5

	Full-time employed		Part-time employed
	Part-time employed ρ	Not employed ρ	Not employed ρ
Time of entry into single motherhood: 1980s	0.269***	0.026	−0.032
Time of entry into single motherhood: 1980s	0.170[†]	−0.204[†]	0.149
Mother's age 20–30	−0.014	0.063	−0.012
Mother's age 41–60	−0.184	0.175*	−0.227[†]
Widowed	−0.285**	0.108	−0.194*
Single	−0.194[†]	0.046	−0.197[†]
General elementary or lower education	−0.140	−0.146[†]	−0.089
Basic vocational education	−0.168	0.036	0.140
Tertiary education	0.137	−0.044	−0.075
Youngest child 0–3 years	0.258*	0.047	0.017
Youngest child 4–6 years	0.051	0.103	−0.089
Youngest child 7–10 years	0.160	0.324**	−0.056
Youngest child 16–18 years	−0.212*	0.055	−0.093
Household members	0.197[†]	0.119	−0.039
Childcare	−0.150	0.016	0.028
Mother's health	0.190[†]	−0.147[†]	−0.064
East	0.159	0.168[†]	0.130
Migration background	−0.018	0.190**	−0.077
Global test χ^2	30.15*	28.49*	18.36

Source: SOEP 1984–2010

*** $p < 0.1$; ** $p < 1\%$; * $p < 5\%$; [†] $p < 10\%$

Table 11 Tests of proportional hazard assumptions for estimates, provided in Tables 6 and 7

	Full-time employed		Part-time employed	
	Part-time employed ρ	Not employed ρ	Full-time employed ρ	Not employed ρ
Overtime 1–3 h	0.162[†]	−0.099	−0.080	−0.001
Overtime more than 3 h	−0.078	0.151	−0.006	0.087
Distance to work place	0.114	0.252**	0.104	−0.163
Hardly autonomous	−0.215	−0.173[†]	0.145[†]	0.234**
Hourly wage	−0.087	0.077	0.195*	0.010
Social benefits	0.016	0.177	−0.098	−0.097
Job satisfaction	0.045	0.171	−0.040	−0.358***
Global test χ^2	36.79*	35.34*	17.42	30.61

Source: SOEP 1984–2010

*** $p < 0.1$; ** $p < 1\%$; * $p < 5\%$; [†] $p < 10\%$

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