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Working Paper

What makes single mothers expand or reduce employment?

SOEPPapers on Multidisciplinary Panel Data Research, No. 446

Provided in Cooperation with:

German Institute for Economic Research (DIW Berlin)

Suggested Citation: Hancioglu, Mine; Hartmann, Bastian (2012) : What makes single mothers expand or reduce employment?, SOEPPapers on Multidisciplinary Panel Data Research, No. 446, Deutsches Institut für Wirtschaftsforschung (DIW), Berlin

This Version is available at:

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446-2012

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ISSN: 1864-6689 (online)

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Abstract:

To explore single mothers' labor market participation we analyze specific circumstances and dynamics in their life courses. We focus on the question which individual and institutional factors determine both professional advancement and professional descent. Due to dynamics in women's life course identifying and analyzing restrictions and interruptions of employment requires a longitudinal research design. The German Socio-Economic Panel (1984-2009) provides all necessary information identifying episodes of single motherhood and employment during life courses. Since family statuses of single mothers are partially endogenous and can end in multiple ways, we use semi-parametric survival models. Competing risks estimations offer a detailed view by analyzing single mothers' transition from not being employed to full-time or part-time work and vice versa simultaneously. Estimates show that occupational careers of single mothers are influenced by both individual factors and institutional circumstances. Whereas specific problems occur shortly after becoming a single mother, these problems seem to be dealt with over time. Enhancing labor market participation or maintaining full-time employment as a single mother can be achieved when certain challenges are met such as appointed and reliable working hours. Single mothers that do not have to rely on public childcare arrangements, but are capable of finding individual solutions are more likely to balance work and family life. Among institutional determinants welfare benefits have a negative effect on the market labor participation of women in low-paid jobs.

JEL classification: C14, C23, J12, J13, J16, J22

Keywords: Single mothers, labor supply, event history analysis, Cox-regression

April, 2012

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1. 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.

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 and they are solely responsible for childcare as well as gainful employment. 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 (Vandecasteele 2011, Francesconi/Van der Klaauw 2007) while, by contrast, single fathers have average rates of labor participation. Still, men are the minority among single parents (Leininger/Ziol-Guest 2008). That is why in this article we focus on economic stability of households headed by single mothers.

Studies examining the economic position of single motherhood households have concentrated on poverty (Leitzmann 2009, Edin/Lein 1997, Sørensen 1994) and the effects of transfer programs and social policy reforms addressing single mothers (Francesconi/Van der Klaauw 2007, Giddings/Dingeldey/Ulbricht 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. It has been shown that the amount of social welfare and benefits (Wagenhals 1999) affects women's labor supply. Furthermore, other studies point to the importance of childcare and its increasing effect on single mothers' labor participation (Cascio 2009, Blau/Tekin 2007, Kornstadt/Thoresen 2007, Hank/Kreyenfeld 2000). 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 in being on welfare. While the age of children points to the importance of pre-school childcare in this

context, the age of single mothers indicates that the timing of childbirths in women's life also affects their labor supply (Drobnic 2000). This argument is strengthened by the high fraction of less educated women with early births.

In this paper, we examine factors influencing single mothers' labor market participation over their life span. Unlike other studies (Andreß et al. 2006, Drobnic 2000), our analysis contains women regardless of their family status before they became single mothers. We focus on the question which individual factors and institutional circumstances determine both professional advancement and professional descent. 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 use semi-parametric survival models. Since these methods place high demands on the data, we use data from the German Socioeconomic Panel. 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. Section 3 presents descriptive findings and results of multivariate analysis. Concluding remarks are given in section 4.

2. Data & Methods

2.1. Data management

This study is based on data from the German Socioeconomic 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 define single mothers as women who live with their underage child or children in a household without a partner. By this definition, we exclude households of single mothers living with their parents or other adults. Empirically, these are occasional cases, and most of them are identified as three-generation-households. Exclusion from this study is due to the divergence of the life situation of these women from that of single mothers described in our definition, particularly regarding childcare arrangements.

Table I: Duration of single motherhood

Time Span	Complete Episodes		All Episodes	
	Cases	%	Cases	%
< 2 years	313	38,6	544	28,4
2 years	143	17,6	334	17,4
3 years	94	11,6	230	12,0
4 years	73	9,0	207	10,8
5 years	51	6,3	147	7,7
6 years	45	5,5	109	5,7
7 – 9 years	48	5,9	199	10,3
≥ 10 years	44	5,5	146	7,7
Total	811	100,0	1916	100,0

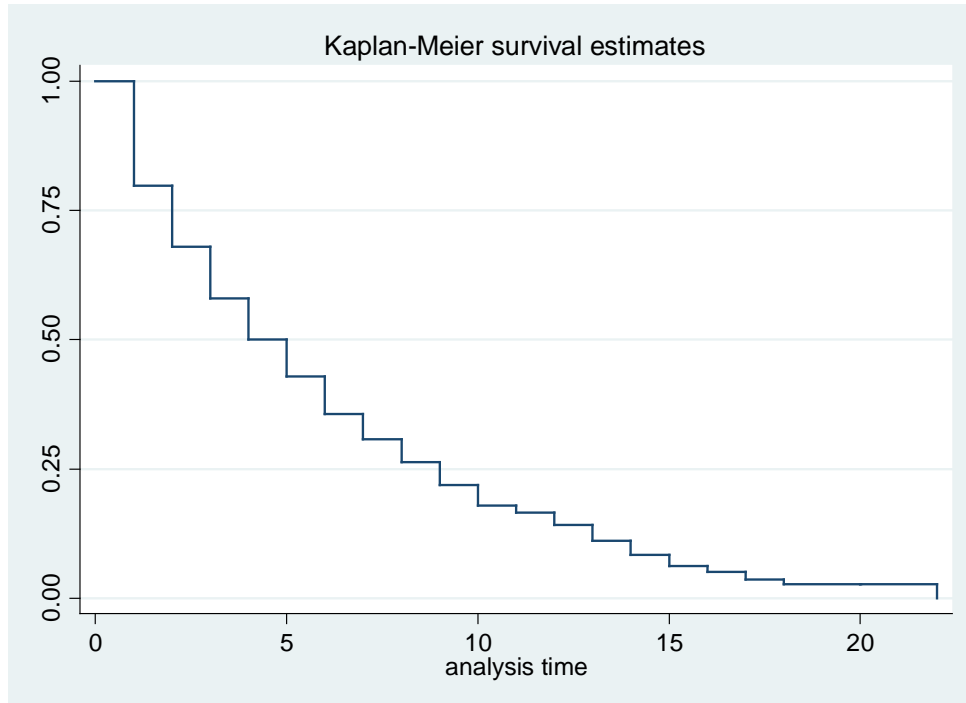
Source: SOEP 1984 – 2009, unweighted.

Our sample consists of women aged < 60 years who were in single motherhood at some time during the panel period between 1984 and 2009 ($N=1.703$). 155 of these women were single mothers at several different times. The length of these single mother episodes 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 do not have information about the length of left-censored episodes, where the single mother episode starts prior to the observation window, nor do 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 811 of a total of 1916 episodes. The other episodes are left- or right-censored or both.

Table I 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 55 per cent of women spend up to 2 years as single mothers, whereas just 11 per cent spend more than 7 years as single mothers. However, we find considerable differences for weighted data. Because of the limited observation period (25 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 assume that long episodes are underrepresented among all episodes, because we only can 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 can make use of survival analysis to

consider and calculate these episodes (Cleves/Gould/Gutierrez 2004, p. 96). Survival estimates indicate the portion of all episodes surviving after a specific time.

Figure I: Duration of single motherhood



Source: SOEP 1984 – 2009, unweighted.

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 per cent of single mothers have a short episode of ≤ 2 years and 15 per cent live for more than 10 years as single mothers.

2.2. 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. For this reason analyzing the professional perspectives of single mothers requires a longitudinal approach. Further, living as a single parent is usually not part of the individual's original life plan. Usually, single mothers are looking for a new partnership either following their earlier partner's death or as the result of a failed relationship (BMFSFJ, 2008, 16). Therefore, when single mothers not only try to improve or stabilize their professional and 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 (Blossfeld/Rohwer 2001). The dependent variable is the propensity of changing one's status at

a certain time. Semi-parametric models do not estimate propensity directly, but, rather, how it is influenced by a set of co-variables. Since we assume this influence to be proportional over time, we provide semi-parametric Proportional Hazard Models (Cox-model). The model considers competing risks, since both professional and familial changes may occur, thus ending the episode of interest. Whereas a single mother exits the status of single motherhood once her children come of age, leave their parental home and/or a new partner moves in, professional changes relate to her initial status. For instance, non-employment can be ended by part-time or full-time employment and vice versa.

To make reliable statements weighting and extrapolating data is necessary. However, weighting spells is difficult. In this paper we use the following two types of weights. To describe the situation at the beginning we calculate 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 $t_1, t_2 \dots t_n$ up to the end of the episode.

However, using these weights in the estimates is 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 is 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.

2.3. Variables

Since we want to use data from every single mother observed in SOEP, we can only use variables that were collected continuously during the whole period from 1984 to 2009. 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 divide family status into three categories:

widowed, single and divorced (or still married but separated). We control for the mother's age in three categories: (i) 17 to 25 years, when most individuals end their formal education and start working; (ii) 26 to 40 years, when their lives are characterized by occupational orientation and family foundation; and (iii) 41 to 60 years, which represents the second part of their employment history. In addition, four categories control for the educational level ranging from general elementary to tertiary education. We also control for women's physical condition. The time when the women became single parent is included as a time-invariant variable differentiated into three decades (1980s, 1990s and 2000s). Number and age of the children are both included via a set of mutually exclusive variables indicating how many children are living in the household and how old the youngest child is. Age is 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 is controlled for by a dichotomous variable. Additionally, we include variables indicating whether individuals are living in the eastern regions of Germany, have any kind of migration background, or are receiving welfare benefits. The latter is interacted with the labor market reform which occurred in 2004. Unfortunately, we are not able to control for alimony, since it is not asked for in detail 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 enhance their labor market participation cannot be detached from their income or the specific constraints that go along with their current job.

Hence, we provide additional estimates that include specific variables measuring working conditions, including distance to the work place, appointed working hours, weekly overtime and occupational autonomy. While the first two are included metrically, the latter are dichotomous. Overtime is divided into three categories: no overtime at all, 1 to 3 hours per week or more than 3 hours per week. Finally income is included metrically and calculated in prices from the year 2000.

3. Results

3.1. Descriptive Analysis

When women become single mothers, employment circumstances for these women 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 identify 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 II).

Table II: Employment Status before and in the first year of being Single Mother

Employment status before (%)	Employment Status in the first year					Total	(%)
	full-time	part-time	marginally	education	not employed		
full-time	70,1	5,5	1,8	-	22,7	100	26,8
part-time	18,1	58,9	4,1	3,1	15,8	100	23,5
marginally	10,8	28,2	21,9	-	39,1	100	6
education	0,9	22,9	-	28,1	48	100	1,7
not employed	7,7	7	9,4	0,7	75,2	100	42
Total (n=1160)	26,9	20,3	6,7	1,5	44,6	100	100

Source: SOEP 1984 – 2009, weighted with starting weight.

As is evident in Table II, 42 per cent of mothers were not employed one year before they became a single mother, while 27 per cent were employed full-time, approximately 24 per cent 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 notice that employment participation is mostly unchanged, although we can identify a decreasing rate of part-time employment (20 per cent) and an increasing rate of not employed single mothers (45 per cent). 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 after becoming single mother is higher (16 per cent versus 23 per cent, 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 per cent of women who previously worked full-time decreased their working hours to part-time status after becoming single mothers, and only 30 per cent of the respondents in apprenticeship continued their training

after the entry of single motherhood. In contrast, we notice increasing rates of work participation for more than 20 per cent of women who were not employed prior to becoming single mothers and for approximately 20 per cent of women who were previously employed part-time. Increases in employment are greatest for women who were marginally employed before they became a single mother (40 per cent).

Table III: Employment Status before and in the last year of being Single Mother

Employment status before (%)	Employment Status in the last year (resp. right censored)					Total	(%)
	full-time	part-time	marginally	education	not employed		
full-time	61,7	24,3	(1,7)	(1,4)	9,3	100	26,8
part-time	28,2	49,2	4,1	(0,4)	18,1	100	21,2
marginally	11,4	52,6	6,7	(0,4)	28,9	100	7,4
education	60,7	(7,8)	-	(3,0)	28,5	100	2,3
not employed	15	22	9,7	1,3	52	100	42,3
Total (n=1183)	31,1	30,3	5,9	1,1	31,6	100	100

Source: SOEP 1984 – 2009, weighted with spell weight. Values in bracelets consist of ≤ 5 cases.

Table III 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. Overall, the table shows an increase in the employment of these mothers. We observe a decreasing rate of not employed mothers (7 per cent) and an increase in full-time employment. Approximately 30 per cent of women who were previously employed part-time and more than 60 per cent of women who were previously marginally employed extended their working hours during the time period in which they were a single mother. Comparing Tables II and III, we notice that, for those women who were employed full-time in the year before they became single mothers, the rate of part-time employment increases from 6 per cent to 25 per cent once they become single mothers. In contrast, for the same group, the rate of not employed single mothers decreases from 23 per cent to 9 per cent after they have become single mothers. This can also be taken as evidence for the above-mentioned compatibility problems of work and childcare. We assume 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.

3.2. Multivariate Analysis

To identify factors that influence the occupational career of single mothers we estimate semi parametric proportional hazard models (Cox-regression). The failure event of interest is the first change of their employment status. We cannot focus on multiple changes, since the number of long episodes in which multiple changes of employment status are observed is too small. Also, due to small numbers of cases the sub distinction between marginal employment and education cannot be maintained. That is why we divide employment status into full-time, part-time and not employed. Besides the different employment status, the competing risks are different ways of leaving the status of a single mother as discussed in section 2.2. The estimates provided here are performed with unweighted data.¹

Table IV 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 is more complicated for single mothers with a migration background or when they are living in the eastern regions of Germany. 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 her children and their age have no significant effects on her chances of taking up part-time employment, we observe that higher education has a positive impact. Single mothers with tertiary education are taking up part-time jobs more often than women with lower education. Being on welfare benefits has a negative effect only after the labor market reform 2004. The negative impact might be a sign that part-time employment often is not sufficient to overcome the need for social benefits, which makes it less attractive. Concerning the transition from not employed to full-time work different relationships become apparent. Neither migration background, the mother's age, her family status nor living in the eastern regions of Germany have any influence on taking up a full-time job. Physical condition and educational level also have no significant effect. Contrary to the former estimation, women who became single mothers during the 1980s now appear more likely to accept a full-time job. This 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). Being on welfare also has a significant negative effect on the transition to full-time employment before the reform in 2004, but no effect after the 2004 reform.

¹ Results for testing the proportional hazard assumption can be found in the appendix. However, procedures and relevance of such tests are disputed (Therneau/Grambsch 2000, p. 142).

Table IV: Taking up or enhancing employment (Cox-Regression)

Change from Change to	not employed				part-time employed	
	part-time employed Coef.	Std. Err.	full-time employed Coef.	Std. Err.	full-time employed Coef.	Std. Err.
Time of entry into lone motherhood (Reference: 1990)						
1980	-1,121***	(0,317)	0,654**	(0,325)	0,351	(0,350)
2000	0,056	(0,216)	-0,014	(0,302)	-0,305	(0,283)
Mothers age (Reference: 26 - 40 years)						
17 - 25 years	0,225	(0,320)	-0,452	(0,392)	-0,185	(0,581)
41 - 60 years	0,185	(0,236)	-0,268	(0,376)	0,073	(0,256)
Family status (Reference: divorced or married and separated)						
widowed	-0,148	(0,345)	-0,507	(0,534)	-1,754*	(1,055)
single	-0,039	(0,232)	0,298	(0,281)	-0,319	(0,381)
Education (Reference: intermediate general to general maturity)						
general elementary or lower	-0,191	(0,273)	-0,160	(0,328)	0,292	(0,356)
basic vocational	0,356	(0,222)	-0,224	(0,303)	-0,177	(0,289)
tertiary education	0,902***	(0,286)	-0,014	(0,465)	0,566**	(0,280)
Social welfare (Reference: not being on welfare)						
on welfare	-0,232	(0,215)	-0,483*	(0,293)	-1,030	(0,767)
no welfare x reform	-0,121	(0,387)	-0,834	(0,753)	-0,320	(0,290)
on welfare x reform	-0,634**	(0,312)	-0,308	(0,430)	0,819	(0,939)
Age of youngest child (Reference: 11-15)						
0 - 3 years	-0,265	(0,299)	-0,583	(0,357)	0,251	(0,512)
4 - 6 years	-0,478	(0,386)	-1,373***	(0,484)	-0,079	(0,484)
7 - 10 years	-0,123	(0,345)	-0,837**	(0,411)	-0,354	(0,303)
16 - 18 years	-0,735	(0,473)	-0,920*	(0,547)	-0,663**	(0,359)
East	-0,876***	(0,280)	0,243	(0,299)	0,465	(0,327)
Migration background	-0,565**	(0,253)	0,387	(0,278)	-0,024	(0,307)
Health	0,004	(0,036)	0,004	(0,048)	-0,006	(0,052)
Household members	0,020	(0,099)	-0,453***	(0,137)	-0,021	(0,136)
childcare	0,536	(0,282)	0,634*	(0,345)	-0,305	(0,366)
Number of spells		714		714		383
Number of failure		115		76		86
Wald χ^2		56,44		49,09		34,15
Prob > Wald χ^2		0,000		0,001		0,035

Standard errors are reported in brackets and clustered by spells.

*** p < 1%, ** p < 5%, * p < 10%.

Source: SOEP 1984 – 2009.

This might support the hypothesis that part-time employment is not sufficient to overcome social welfare, whereas full-time employment is. Furthermore we find significant negative effects for the number of children in the household. Findings for the children's age, however, 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. Becker (1965) pointed this out for parents in general, but the argumentation is especially persuasive for single parents. The fact that mothers who have access to childcare arrangements are more likely to take up full-time employment than others supports this hypothesis. 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. The final estimation provided in table IV focuses on single mothers expanding their labor market participation from part-time to full-time work. There are only three significant effects. For the first time in this study, we observe family status exerting a significant impact. Women that became single mothers because of their partner's death are less likely to enhance their working hours afterwards. The same is true for women with older children. 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 positive effect of higher education is especially interesting compared to the preceding estimations. While well-educated single mothers are not more likely to work full-time employment when they previously not employed, women who already had a part-time job arrangement when they became single mothers are more likely to expand their working hours.

Table V provides estimations with an almost identical set of independent variables for giving up or reducing employment. Since there are no single mothers working full-time between 17 and 25 years in the data, this category is left blank in the first estimation. Reduction of working hours from full-time to part-time is rare (only 40 cases in the dataset), and we only find a few significant determinants. Having very young children under the age of 3 has a positive effect on reducing work participation. The effect is weakly significant, but plausible. Probably, small children claim their mother's time budget to an extent that makes full-time employment hard to sustain. Further, for single mothers in the eastern regions of Germany changing from full-time to part-time is less common than it is in the West. Here again the special needs of children might be decisive. Better availability of childcare or higher employment rates for women in the eastern regions of Germany (Geißler/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 family situation defined by the mother's age, family status and number of children has no significant effect on the transition from full-time employed to not employed. Whereas the same is true for presence of young children, women with older children between 16 and 18 years have to give up their full-time job less often than those with children between 11 and 15. However, the family situation including its specific challenges to balancing work and family life seems to have little influence on the transition from full-time employment to non-employment. Probably, these women have made individual arrangements allowing full-time labor participation, or specific problems occur that are independent from age, number of children or family status. While it is not decisive when a woman became single mother nor how well she is educated, problems seemingly emerge from migration background. Women with migration background change from full-time employment to non-employment more often than those without such a background. In addition, a single mother's physical condition becomes significant in this context. The variable is metric, a high value meaning a woman is healthy, so that the negative sign indicates that a bad physical condition promotes transition from a full-time job to non-employment.

The labor market reform of 2004 has no influence on reducing labor participation. Being on welfare, however, does. Women that cannot overcome poverty 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 (Boss/Christensen/Schrader 2010). The estimation regarding transition from part-time work to non-employment confirms some of these findings. The mother's age, living in East Germany and the decade of becoming a single mother have no influence. Physical condition and relying on welfare have the same impact on the transition to non-employment from either full-time or part-time work. Furthermore, the estimation indicates a highly significant effect of family status. Widows decrease their working hours more often than divorced or separated women which may be caused by widows' benefits that stabilize their economic situation. In addition, factors that determine the mother's time budget are decisive for their work participation. Not surprisingly, the number of children hampers full-time employment of single mothers, although the age of the children does not seem to matter. The (weakly significant) impact of childcare seems to be somehow puzzling, but it becomes quite plausible in association with educational level. Usual childcare facilities appear not to allow retaining a full-time job, but are sufficient for part-time employment. In contrast, well-educated women are able to obtain well-paid positions and, consequently, can organize childcare privately.

Table V: Giving up or reducing employment (Cox-Regression)

	Change from Change to		full-time employed		part-time employed	
	part-time employed Coef.	Std. Err.	not employed Coef.	Std. Err.	not employed Coef.	Std. Err.
Time of entry into lone motherhood (Reference: 1990)						
1980	0,552	(0,533)	-0,425	(0,370)	-1,047	(0,668)
2000	0,245	(0,485)	-0,451	(0,300)	-0,002	(0,427)
Mothers age (Reference: 26 - 40 years)						
17 - 25 years	-	-	0,400	(0,601)	-0,354	(0,641)
41 - 60 years	-0,231	(0,448)	0,091	(0,280)	-0,406	(0,372)
Family status (Reference: divorced or married and separated)						
widowed	0,086	(0,573)	-0,170	(0,416)	1,584**	(0,793)
single	-0,071	(0,451)	0,267	(0,289)	0,232	(0,429)
Education (Reference: intermediate general to general maturity)						
general elementary or lower	0,344	(0,509)	-0,404	(0,415)	0,254	(0,382)
basic vocational	-0,613	(0,517)	-0,134	(0,323)	-0,994**	(0,456)
tertiary education	0,313	(0,410)	0,172	(0,290)	-0,622	(0,706)
Social welfare (Reference: not being on welfare)						
on welfare	-0,395	(1,041)	1,765***	(0,371)	1,135***	(0,405)
no welfare x reform	-0,578	(0,583)	-0,901	(0,582)	-0,371	(0,491)
on welfare x reform	1,747	(1,610)	-0,464	(0,907)	0,732	(0,468)
Age of youngest child (Reference: 11-15)						
0 - 3 years	1,114*	(0,577)	0,319	(0,436)	0,283	(0,712)
4 - 6 years			0,638	(0,515)	-0,194	(0,441)
7 - 10 years	0,691*	(0,438)	0,071	(0,302)	0,327	(0,438)
16 - 18 years	-1,394	(0,755)	-1,004**	(0,433)	0,536	(0,529)
East	-1,586***	(0,547)	0,384	(0,288)	0,361	(0,445)
Migration background	-0,702	(0,444)	0,723**	(0,320)	0,516	(0,366)
Health	0,021	(0,077)	-0,143**	(0,057)	-0,227***	(0,060)
Household members	0,201	(0,223)	-0,001	(0,145)	0,468**	(0,190)
childcare	0,312	(0,385)	0,363	(0,335)	0,754*	(0,437)
Number of spells		555		555		383
Number of failure		40		72		43
Wald χ^2		16,19		59,61		181,55
Prob > Wald χ^2		0,001		0,000		0,000

Standard errors are reported in brackets and clustered by spells.

*** p < 1%, ** p < 5%, * p < 10%.

Source: SOEP 1984 – 2009.

Table VI: Reducing full-time employment (Cox-Regression)

Change from Change to	full-time employed			
	part-time employed		not employed	
	Coef.	Std. Err.	Coef.	Std. Err.
Overtime (Reference: No overtime)				
1 to 3 hours	0,318	(0,463)	-0,922*	(0,544)
more than 3 hours	-0,283	(0,542)	0,184	(0,310)
Appointed working hours	-0,009	(0,010)	0,001	(0,011)
Distance	-0,005	(0,014)	-0,016	(0,014)
Hardly autonomous	0,269	(0,398)	0,857**	(0,308)
Hourly wage	-0,004	(0,009)	-0,009	(0,022)
Control variables	Yes		Yes	
Number of spells	536		536	
Number of failure	38		67	
Wald χ^2	78,10		103,50	
Prob > Wald χ^2	0,000		0,000	
Standard errors are reported in brackets and clustered by spells.				
*** p < 1%, ** p < 5%, * p < 10%.				
Source: SOEP 1984 – 2009.				

The question whether women that are employed enhance or reduce their working hours after they became single mothers cannot be answered solely based on individual factors, but also depends on the conditions of employment. Therefore the estimations provided in table VI and VII include corresponding variables. We add variables indicating income, distance to workplace, appointed working time, overtime and a dichotomous variable controlling whether women can organize their work more or less autonomously. The variables discussed previously are controlled for as well, but are only referred to when important changes occur.

Table VI provides estimations for reducing full-time employment either to a part-time job or non-employment. Changes from full-time to part-time are relatively rare and seemingly not influenced by any of these additional factors. However, we find significant effects regarding transition from full-time employment to non-employment. Whereas limited freedom of action to organize work makes full-time employment hard to maintain, women who do small amounts of overtime are less likely to lose their full-time employment. Apparently these women have found specific arrangements that make such participation possible.

The estimation for occupational changes from full-time to part-time employment provided in table VII shows a significant impact for overtime working hours. Women that are doing

overtime more than three hours a week take up full-time jobs more often than those who are not.

Table VII: Reducing or enhancing part-time employment (Cox-Regression)

Change from Change to	part-time employed			
	full-time employed		not employed	
	Coef.	Std. Err.	Coef.	Std. Err.
Overtime (Reference: No overtime)				
1 to 3 hours	0,132	(0,309)	0,560	(0,472)
more than 3 hours	0,568**	(0,271)	-0,196	(0,772)
Appointed working hours	0,010	(0,016)	-0,045**	(0,018)
Distance	-0,004	(0,007)	0,002	(0,004)
Hardly autonomous	-0,367	(0,273)	0,700	(0,457)
Hourly wage	-0,016	(0,022)	-0,022	(0,027)
Control variables		Yes		Yes
Number of spells		383		365
Number of failure		82		36
Wald χ^2		49,01		197,95
Prob > Wald χ^2		0,006		0,000

Standard errors are reported in brackets and clustered by spells.
 *** p < 1%, ** p < 5%, * p < 10%.
 Source: SOEP 1984 – 2009.

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. In the estimation for giving up part-time employment, working time again becomes crucial. High amounts of appointed working hours reduce the probability of a transition to non-employment as well as high income does. Apparently, extensive work does not automatically lead single mothers to non-employment. If working hours are appointed and reliable, single mothers are very well able to maintain their labor market participation.

4. Concluding remarks

In order to identify factors that make single mothers enhance or reduce their labor supply, we analyzed data from the SOEP. Semi-parametric survival estimates were used to focus on changing life circumstances and specific compatibility problems of single mothers. Our

descriptive results suggest 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. Multivariate analysis confirms these findings and offered a more differentiated view by analyzing professional advancement and descent simultaneously.

Occupational careers of single mothers are influenced by both individual factors and institutional circumstances. Concerning professional descent, we find that institutional factors are more decisive than individual ones, although we found a few obvious individual determinants. While the mother's age does not affect any transition, we find that professional descent is particularly due to educational level and partly to family status. This does not apply for all kinds of employment equally, but is notably true for transitions from part-time employment to non-employment. Consequently, a higher educational level not only prevents from losing employment, but also alleviates advancements. Among institutional determinants welfare benefits appear to matter, suggesting that women in low-paid jobs are more likely to reduce their employment. Further, receiving welfare benefits makes enhancing employment less probable. Additional estimates confirm this assumption as high earnings decrease the probability of a transition to non-employment. Finally, despite specific problems of balancing work and family life enhancing labor market participation or maintaining full-time employment as a single mother can be achieved when certain challenges are met. Especially, women that do not have to rely on public childcare arrangements, but are capable of finding individual solutions are more likely to balance work and family life.

However, some factors remain unclear. Due to limited observation windows multiple episodes are 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 to 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.

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Appendix A.1: List of variables

Table VIII: List of co-variables

Variable	Mean	Std. Dev.
Entry 1980	0,188	0,391
Entry 1990	0,312	0,464
Entry 2000	0,500	0,500
Mother's age 17 to 25	0,077	0,267
Mother's age 26 to 40	0,556	0,497
Mother's age 41 to 60	0,366	0,482
Widowed	0,095	0,293
Single	0,222	0,416
Divorced & separated	0,683	0,465
General elementary or lower education	0,183	0,387
Basic vocational education	0,252	0,434
Intermediate general to general maturity	0,401	0,490
Tertiary education	0,149	0,357
Social welfare	0,273	0,446
not on welfare X reform 2004	0,157	0,364
on welfare X reform 2004	0,096	0,294
youngest child 0 to 3 years	0,172	0,378
youngest child 4 to 6 years	0,164	0,370
youngest child 7 to 10 years	0,202	0,402
youngest child 11 to 15 years	0,267	0,442
youngest child 16 to 18 years	0,195	0,396
East	0,238	0,426
Migration background	0,189	0,391
Health	6,826	2,262
Number of household members	2,685	0,880
Childcare	0,220	0,414
Appointed work time	17,289	17,649
No overtime	0,308	0,462
Overtime 1 to 3 hours	0,093	0,291
Overtime more than 3 hours	0,100	0,300
Distance to work place	5,295	34,518
Hardly autonomous	0,673	0,469
Rather autonomous	0,327	0,469
Hourly wage	11,48	12,53

Source: SOEP 1984 – 2009.

Appendix A.2: Tests of Proportional Hazard Assumptions

Table IX: Tests of proportional hazard assumptions for estimates provided in table IV

	not employed		part-time employed
	part-time employed	full-time employed	full-time employed
	ρ	ρ	ρ
Entry 1980	0,132	0,027	-0,097
Entry 1990	0,183**	-0,047	-0,047
Mother's age 17 to 25	0,030	-0,054	0,043
Mother's age 41 to 60	-0,019	-0,113	0,004
Widowed	0,179**	0,013	-0,066
Single	-0,063	0,034	-0,082
General elementary or lower education	0,064	0,012	0,092
Basic vocational education	-0,067	0,084	0,110
Tertiary education	0,127	-0,100	0,099
Social welfare	0,048	-0,188*	-0,089
not on welfare x reform 2004	-0,100	-0,083	-0,134
on welfare x reform 2004	-0,134	0,329**	0,060
youngest child 0 to 3 years	0,056	0,038	0,026
youngest child 4 to 6 years	0,039	0,198*	0,057
youngest child 7 to 10 years	0,029	0,092	0,083
youngest child 16 to 18 years	0,026	-0,020	-0,031
East	0,023	0,092	-0,076
Migration background	-0,045	-0,060	0,078
Health	-0,163*	0,066	0,129
Number of household members	-0,030	-0,057	0,017
Childcare	-0,045	0,041	-0,065
Global Test χ^2	14,67	31,50*	10,81

*** p < 1%, ** p < 5%, * p < 10%.
Source: SOEP 1984 – 2009.

Table X: Tests of proportional hazard assumptions for estimates provided in table V

	full-time employed		part-time employed
	part-time employed	not employed	not employed
	ρ	ρ	ρ
Entry 1980	0,232	0,032	0,113
Entry 1990	0,152	-0,053	0,255*
Mother's age 17 to 25		-0,043	0,038
Mother's age 41 to 60	-0,275*	0,128	-0,252*
Widowed	-0,044	-0,003	-0,149
Single	-0,283*	-0,058	-0,102
General elementary or lower education	-0,080	-0,083	0,007
Basic vocational education	-0,190	0,095	0,255*
Tertiary education	-0,021	0,002	0,004
Social welfare	-0,075	-0,017	0,068
not on welfare x reform 2004	-0,152	-0,048*	0,181
on welfare x reform 2004	0,220	-0,023	-0,020
youngest child 0 to 3 years	0,337	0,146	-0,008
youngest child 4 to 6 years	0,095	0,145	-0,013
youngest child 7 to 10 years	0,384**	0,385**	-0,011
youngest child 16 to 18 years	-0,008	0,160	0,211
East	0,064	0,176	0,118
Migration background	0,041	0,177*	-0,020
Health	0,003	-0,153	0,154
Number of household members	0,062	0,091	0,013
Childcare	-0,092	0,062	-0,063
Global Test χ^2	34,12**	34,47	14,18

*** p < 1%, ** p < 5%, * p < 10%.
Source: SOEP 1984 – 2009.

Table XI: Tests of proportional hazard assumptions for estimates provided in table VI & VII

	part-time employed		full-time employed	
	full-time employed	not employed	part-time employed	not employed
	ρ	ρ	ρ	ρ
Appointed work time	0,023	-0,007	0,016	0,003
Overtime 1 to 3 hours	-0,077	0,076	0,027	-0,029
Overtime more than 3 hours	0,049	-0,011	-0,097	-0,002
Distance to work place	0,170	-0,166	0,119	0,192*
Hardly autonomous	0,131	0,334*	-0,014	-0,209*
Hourly wage	0,113	0,045	-0,177	-0,067
Global Test χ^2	16,67	20,15	31,28	36,04

*** $p < 1\%$, ** $p < 5\%$, * $p < 10\%$.

Source: SOEP 1984 – 2009.