

Mothers' Transitions into the Labor Market under Two Political Systems: Comparing East and West Germany before Reunification

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Abstract

Using new longitudinal datasets that cover the work and family life of women in the Federal Republic of Germany (FRG) and the German Democratic Republic (GDR), we analyze women's employment discontinuities following childbirth. We find that in the GDR almost all mothers return to work within 18 months after birth. In the FRG, this proportion is much smaller and at the age when the child starts nursery school or school, women re-enter the labor market at higher rates. An analysis of the determinants of women's labor market transitions after childbirth reveals a strong correlation between mothers' employment status prior to birth and their probability of re-entering the labor market afterwards.

Zusammenfassung

Das vorliegende Papier untersucht die Erwerbsbeteiligung von Müttern nach der Geburt ihres Kindes. Durch die Verwendung von Längsschnittdaten der deutschen Rentenversicherung, die monatsgenaue Informationen über das Erwerbsleben von Frauen in der ehemaligen DDR sowie der BRD enthalten, lassen sich Rückschlüsse auf die Bedeutung institutioneller Rahmenbedingungen für die Arbeitsangebotsentscheidungen von Müttern ziehen. Während in Ostdeutschland nahezu alle Mütter innerhalb von 18 Monaten nach der Geburt ihres Kindes in den Arbeitsmarkt zurückkehren, ist dieser Anteil in Westdeutschland deutlich geringer. Überdies weisen westdeutsche Frauen, deren Kind das Kindergarten- bzw. Schulalter erreicht, eine erhöhte Rückkehrwahrscheinlichkeit auf. In beiden Teilen Deutschlands zeigt sich zudem eine hohe Korrelation zwischen der Erwerbspartizipation vor der Geburt und der Wahrscheinlichkeit der Rückkehr in den Arbeitsmarkt nach der Geburt.

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1. Introduction

During the past few decades, most industrialized countries have experienced a sharp increase in female labor force participation. In particular, maternal employment has risen in almost all European countries (Eurostat, 2012). However, despite the common trend of rising maternal employment rates, their labor market participation is still considerably lower than that of childless women. The incompatibility between child rearing and work in the marketplace is often advocated as the main reason for the low labor market participation of mothers. This pattern is consistent with analyses focusing on the temporal pattern of fertility and female labor force participation, which show a negative cross-country correlation between these variables (cf. Mishra et al., 2010). In recent years, however, some Scandinavian countries – notably Sweden – showed both a high female participation rate and a relatively high fertility rate. Hence, under certain institutional conditions women do seem to be able to reconcile work and motherhood. In addition to regulations regarding parental leave and maternity protection, the availability of public daycare likely affects women's decisions regarding fertility and employment.¹

In Germany, which is characterized by both low fertility and comparatively low labor market attachment of mothers, several policies have been introduced in recent years to counteract that trend (for an overview, see BMFSFJ, 2011). However, whereas child benefits and paid parental leave have been increased, a lack in the supply of public daycare for children up to the age of three still exists. This paper analyzes women's labor market transitions after childbirth. It contributes to the literature by employing a new longitudinal dataset on individuals receiving statutory pension in 2004 or 2005 for the first time. These data effectively cover the work and family situations of German women over the second half of the Twentieth Century. In particular, they allow us to separately analyze the labor market behavior of mothers in the Federal Republic of Germany (FRG) and the German Democratic Republic (GDR). While these women were born during World War II, i.e., before the division of Germany, they grew up under a different cultural and institutional framework, which is expected to be reflected in their labor market behavior.

In the empirical analysis, we first give a comparative overview of mothers' labor market transitions after childbirth in East and West Germany. Then, we analyze the determinants affecting a woman's decision to return to the labor market after child birth. Section 2 presents the existing evidence for Germany and other European countries and provides a brief overview of the institutional background in the former FRG and the former GDR. The data are presented in

¹ Further policies that have been identified to foster the reconciliation of employment and child-rearing are flexible working time arrangements as well as financial allowances paid directly to families with children (Population Council, 2006).

section 3, along with a description of the econometric strategy used in the empirical analysis. Results are discussed in section 4, and section 5 concludes.

2. Empirical Evidence and Institutional Background

2.1 Existing Literature on Maternal Employment

Numerous studies – including Gustafsson et al. (1996), Rösen/Sundström (1996), Dex et al. (1998), Gustafsson et al. (2002), Bratti et al. (2005), Kenjoh (2005), Geyer/Steiner (2007), and Pronzato (2009) – have analyzed the determinants of women's labor market participation after childbirth in different European countries. Almost all of these studies provide evidence that women who were employed before giving birth have the highest probability of returning to the labor market afterwards. An exception is Gustafsson et al. (2002), who, for Sweden, do not find any correlation between women's employment prior to birth and their duration until entering paid work afterwards. For Germany, Gustafsson et al. (1996), Ondrich et al. (1996), Kreyenfeld/Hank (2000), Gustafsson et al. (2002), Büchel/Spieß (2002), Bender et al. (2003), Weber (2004), and Kenjoh (2005) support the findings of the European studies.

In accordance with neoclassical models of household labor supply (Becker, 1965, 1985), almost all studies indicate that those women with the highest potential earnings and opportunity costs of time, respectively, as measured by their market-orientated human capital, show the highest transition rates into the labor market after childbirth. Gustafsson et al. (1996) for Sweden and Gustafsson et al. (2002) for the Netherlands, Sweden, and Germany, however, cannot find any correlation between women's education and their transition rates into employment.

Furthermore, women's employment patterns differ enormously across countries. Recent empirical research has established some important factors contributing to persistent country differences in female labor market behavior. Apps/Rees (2004) as well as Adserà (2004) conclude that countries that support women in combining work and family are able to weaken or even reverse the negative relation between employment and fertility. This is consistent with the findings of Gustafsson et al. (1996), Gustafsson et al. (2002), Geyer/Steiner (2007), Matysiak/Vignoli (2008), Del Boca et al. (2009), and Pronzato (2009), who provide evidence that differences regarding mothers' transitions from taking care of their child to the labor market are due to differences in the countries' institutional settings (especially regarding parental leave regulations, opportunities of part-time employment and public child care).

We contribute to the existing literature by analyzing mothers' transitions into the labor market after childbirth in the GDR and the FRG of the 1960s and

1970s. Both countries originated from one country and due to the different occupying powers developed different political systems, tax systems and child care facilities. These pronounced differences in institutional settings between the FRG and the GDR, along with differences in social norms and attitudes toward maternal employment and child care between the two countries, are likely to be reflected in mothers' labor market behavior.

2.2 Institutional Framework

The institutional framework in the FRG was designed to facilitate the traditional gender roles, i.e., women predominantly acted as mothers and housewives while men were seen as "breadwinners" (Trappe/Rosenfeld, 2000). Prior to a large reform of the marriage and family law in 1977, married women were not allowed to be employed without their husband's permission. Moreover, the tax system of "income splitting"², the coverage of married women by national health insurance as well as their entitlement to a widow's pension created little employment incentives for married women. Returning to work after childbirth was further hampered by the absence of parental leave regulations, which were introduced in 1979 for the first time. Before 1979, maternity protection for mothers only lasted up to eight weeks after childbirth. However, public day care for children aged up to three years almost did not exist in West Germany, so that mothers who wished to return soon had to rely on paternal care or care in social networks. Prior to the German educational reform ("Bildungsreform") in the 1970s, childcare for children aged three to six was only provided for about 30 to 40 percent of all children. Afterwards, the supply of places at nursery schools increased remarkably. In 1996, a constitutional right to a part-time place at a nursery school was introduced. However, still in the 1990s, only 14 percent of the places at nursery schools in West Germany provided full-time care (Kreyenfeld, 2001).

Whereas the aim of social policies in the FRG was to allow women to stay out of the labor force after childbirth, integrating women and mothers into the labor market was the major public policy goal of the GDR. Low income levels and the absence of a widow's pension created incentives for women to stay employed. In contrast to West Germany, where part-time employment played a decisive role for women and especially mothers, East German women were drawn into full-time employment due to a lack of part-time positions (Kreyenfeld, 2001).

² "Income splitting" is the legal concept of fusing a married couple into a single economic entity for purposes of tax filing status. In a jurisdiction with progressive taxation and different tax filing statuses for married and for single filers, income splitting penalizes dual earners and benefits single breadwinning couples.

In the 1960s, the government of the GDR realized that the high labor force participation of women was associated with a decreasing fertility rate and thus introduced various family policies targeted at supporting mothers in their work-life balance (Trappe/Rosenfeld, 2000). One fundamental policy in this context was the establishment of a comprehensive network of public daycare. At the beginning of the 1970s, one third of the children aged up to three had access to full-time daycare. In subsequent years, places at nurseries continued to be expanded considerably, until a provision rate of 80 percent was reached before reunification. The same applies to the provision rate of places at nursery schools, which increased from 65 percent in the early 1970s to full coverage in 1989. Additionally, some structural differences between the public child care system in the FRG and the GDR existed: While public daycare in West Germany was predominantly part-time care, the daycare system in Eastern Germany contained full-time care for all children, flexible opening hours as well as meals at lunchtime (Kreyenfeld, 2001, 2004; Trappe/Rosenfeld, 2000). A further policy aiming at integrating female employment and childrearing in the GDR was the introduction of the "baby year" (Babyjahr) in 1976 which allowed mothers to take one year of paid parental leave after the birth of a second or third child. In 1986, the "baby year" was extended to also cover first births (Kreyenfeld, 2001; Trappe/Rosenfeld, 2000).

3. Data and Method

3.1 Data

We use a new longitudinal dataset on individuals receiving statutory pension in 2004 or 2005 for the first time. These data contain monthly information about an insurant's employment history from the first appearance in the statutory pension insurance until retirement. Having information on women's completed fertility and employment histories enables us to investigate their employment behavior around childbirth. In addition, we are able to conduct separate analyses for women living and starting a family in East and West Germany under the old regimes. To our knowledge, there is no other large-sample longitudinal data set providing as detailed information on individuals' employment histories in separated Germany.

The sample for the empirical analysis is extracted from the *Scientific Use File Vollendete Versichertenleben 2004 (SUFVVL2004)* and the *Scientific Use File Vollendete Versichertenleben 2005 (SUFVVL2005)*. The *SUFVVL2004 (SUFVVL2005)* contains a 5-percent-sample of all individuals receiving statutory pension in 2004 (2005) for the first time. Merging the two data sets generates monthly information for 77,047 individuals, of which 39,707 are women. An entitlement to a pension implies previous contribution payments to the statutory pension insurance for at least 5 years. While contribution payments

mainly accrue from employment subject to social security contributions and self-employment, periods in which unemployment or sickness benefits are drawn are also counted. Moreover, until 1992 the birth of a child generates contribution payments for a period of one year after birth, while this period was extended to 3 years afterwards. The data do not, however, cover persons who have been employed as civil servants, who have been self-employed in professions not covered by the statutory pension insurance (e.g., agriculturists), or who have been a member of a pension scheme for a professional group all their working life (Kreyenfeld/Mika, 2006).³

Furthermore, women born after 1940, i.e., women who retired early, are underrepresented in the data. In order to receive a pension before reaching the statutory retirement age of 65 years, women had to be employed for at least 15 years and pay contributions to the statutory pension for at least ten years after the age of 40. Thus, they represent a selective population more strongly attached to the labor market and with a smaller number of children, a fact which has to be taken into account in the analysis.

Another data issue that might affect the representativeness of the sample concerns a legal provision that allowed West German women to make use of a reimbursement after marriage (“Heiratserstattung”). Until 1967, female insureds getting married were entitled to receive a pay-out of their so far accumulated insurance contributions. Therefore, women who made use of this entitlement and never returned to employment afterwards are not included in the data. Women who received a pay-out and returned to the labor market later on are included, but show missing values for the period of pay-out. However, until 1972 these women were also entitled to settle repayments for their refunded insurance contributions and that way retrieve their pension claim. Indeed, the proportion of women making use of such repayments is not known, but as the conditions for repayments have been particularly favorable (see subsequent comments), a high usage can be assumed.

Kreyenfeld/Mika (2006) compare the *SUFVVL2004* with the population statistics and find that 5 percent of the West German and 1 percent of the East German women are not included in the data due to a short period of employment. Thus, the vast majority of the German population is covered by the statutory pension insurance data. However – particularly in West Germany – women

³ While the majority of self-employed persons is compulsorily insured by the German pension insurance, certain professions are exempt from insurance or only insured upon application (cf. §§ 2 et seq. SGB VI). As outlined by Kreyenfeld/Mika (2006), the percentage of persons not covered because of belonging to the above named groups should be higher in West Germany than in East Germany. This is due to the fact that after reunification, individuals who had been employed as civil servants in the former GDR have been integrated into the German pension system. Moreover, parts of the medical scientists and lawyers in the GDR were employed as white collar workers and therefore covered by the statutory pension scheme.

included in the sample might have a higher attachment to the labor market compared to the whole population. The data comprise demographic characteristics of the insured person as well as information about the year and month of birth of his/her children. Information about an individual's marital status and his/her (potential) partner, however, is not included; a fact that causes the problem of unobserved heterogeneity: Both theoretical models of household labor supply and empirical evidence on intra-household time allocation refute that spouses' labor supply decisions are independent of one another.⁴ According to Becker (1965), a couple maximizes (joint) utility when both partners allocate their time according to their comparative productivity advantages.

Hence, women with a high-income partner are more likely to specialize in non-market work (even before childbirth) and not to return to the labor market than those with a low-income partner. However, even if observable, spousal income could not be considered as exogenous to wives' labor supply decisions due to the presence of assortative mating in the marriage market (Pencavel, 1998), i.e., individuals with a common social, cultural, or economic background select to each other. Hence, there exist various channels through which a woman's education and her pre-birth labor supply and earnings might affect her labor supply decisions after childbirth. Besides determining her opportunity costs of childcare and thus directly affecting her labor supply decisions, a woman's education and pre-birth earnings are closely linked to her marriage decision, which in turn will impact her labor supply. As simultaneously modeling the matching process in the marriage market and the labor supply decisions of both husbands and wives goes far beyond the scope of our analysis, the direct and indirect effects of these variables on women's labor market behavior cannot be disentangled. Rather than representing causal effects, they should therefore be thought of as accumulated effects over various channels through which education and earnings impact mothers' labor market behavior. Information about an individual's highest level of education arises from the annual report of the employer and has only been recorded since 2000. Thus, educational information is only available for those who were employed during the last few years before retirement. We consider this – likely selective – group separately in the analysis.

Moreover, the data contain monthly information about an individual's employment history from the first appearance in the statutory pension insurance to retirement, i.e., essentially covering the entire working career on a monthly basis. Not only periods of employment are recorded, but also labor market states such as schooling, vocational training, unemployment, and periods of childcare. In addition to identifying periods of childcare, we use this information to

⁴ The economic theory of time allocation within the family was initiated by Becker (1965) and developed, *int. al.*, by Manser/Brown (1980), McElroy/Horney (1981) and Chiappori (1988).

control for a woman's labor market status prior to childbirth, i.e., 9 months before the respective birth. We differentiate between four employment states, namely (1) education (schooling, university or vocational training), (2) employment, (3) unemployment⁵, and (4) inactivity. "Employment" covers both employment subject to social security contributions and self-employment liable to pension insurance contributions. A distinction between full-time employment and part-time employment, however, cannot be made. "Inactivity" is a residual category covering the remaining employment situations. While it may contain periods of childcare as well, it mainly consists of periods for which no information about the insured is available. Though such periods likely reflect a woman's (temporary) withdrawal from the labor market, we cannot rule out that changes into a non-covered profession may also account for such periods.⁶

Additionally, the data contain information about an individual's monthly "earning points". One earning point per year implies that a person receives the average annual income of all insureds in the statutory pension insurance. The monthly earning points therefore reflect an individual's relative earnings situation within this month.⁷ The earning points are annualized and summarized to six categories that reflect an individual's income in percentage of the average income of all persons insured. Since earning points do not only accrue from employment, but also from other activity states such as unemployment or child care, we only incorporated them for periods in which employment subject to social security contributions or self-employment actually occurs.

A major difficulty regarding the earning points exists for West German women who made use of the above-mentioned repayments for reimbursements. For them, the earning points information does not comply with their actual earnings within this time. Although the data do not contain information on whether a woman made use of such repayments, the way the conditions for repayments were settled enables us to identify at least the vast majority of these women.

Repayments for reimbursements could be made for a part or the whole period of pay-out, so that only these times could then be refilled. Due to deflation and a valuation of the repayments with the then average pay, it was profitable to settle repayments in the maximum amount of the social security contribution

⁵ As unemployment virtually did not exist in the former GDR, it is only included for West Germany.

⁶ In particular, women who have been gainfully employed at the beginning of their working life and either became civil servants or a member of a pension scheme for a professional group, or changed into self-employment not liable to pension insurance contribution, might erroneously be considered as inactive though having been employed during the respective period.

⁷ Note that wages are censored above the social security contribution ceiling. Women's wages at young ages, however, will hardly be affected by censoring.

ceiling for times in the distant past. Hence, we assume that under these particularly favorable conditions all women concerned settled a repayment in the maximum amount and that only a marginal proportion of women below the age of thirty actually realized such a high income. Under this assumption, women setting repayments can be identified in the data by showing earning points on or above the social security contribution ceiling. In West Germany, 3,785 women with earning points in the amount of the social security contribution ceiling for at least one month between 1953 and 1967 can be found, which corresponds to 11.4 percent of all women. According to Stegmann (2006), the actual proportion of women making use of repayments amounts to 12 percent, thus the vast majority of these women can be identified. This allows us to include the earning points of women who did not make use of repayments (in the maximum amount) in the analysis. The analysis is restricted to women born between 1939 and 1945 in Germany who are German citizens and residents. Women giving birth under the age of 14 are excluded. A classification of East and West Germans is based on a variable indicating an individual's share of contribution periods spent in East Germany. A woman is allocated to East Germany if she has spent at least 40 percent of her contribution time (a maximum of 50 years) there.⁸

We investigate women's transitions into the labor market after first, second and third childbirth. Moreover, we conduct our analysis for women who get their last child (for which we exclude women with more than three children⁹) in order to shed light on the labor supply decisions of women who have completed their fertility history. Table 1 contains a descriptive analysis of women's employment behavior around the time of childbirth in East and West Germany. The bottom panel of the table shows the analysis for the subsample with information about the level of education. East and West German women differ sharply in their labor market participation, and this difference increases with the number of children: Whereas 85 percent of the East German and 67 percent of the West German women are employed prior to their first birth, this relation turns out to be 64 percent (East) to 15 percent (West) before the birth of the third child. In West Germany, a much higher percentage of women receives an above-average income before the birth of their first child. It can be assumed

⁸ In doing so, we assume that migration from East to West Germany was impossible during the existence of the Berlin Wall (1961 to 1989) and that migration from West to East Germany hardly existed prior to German reunification. However, to check the robustness of our assignment rule, we conducted the same analysis excluding women being at risk of migrating between East and West Germany (i.e., we excluded 795 women (3.5 percent of our sample) who spent less than 90 percent of their contribution time in East and West Germany, respectively). The results are quite similar to those reported here.

⁹ In our data, 11 percent of the West German and 8 percent of the East German women have more than three children.

Table 1
Descriptive Statistics

	West Germany			East Germany				
	1 st birth	2 nd birth	3 rd birth	Last birth	1 st birth	2 nd birth	3 rd birth	Last birth
All Women								
Employment state prior to birth								
Education	2.42	0.14	0.05	0.50	11.33	1.82	0.27	2.44
Employment	66.62	21.97	14.86	31.59	84.87	73.05	64.10	77.65
Unemployment	0.27	0.31	0.34	0.37	0.00	0.00	0.00	0.00
Inactivity	30.69	77.58	84.75	67.55	3.80	25.13	35.62	19.91
Earnings points prior to birth (as(% of average income)								
0 to 20 percent	1.71	3.42	6.03	2.47	1.08	3.30	5.31	2.66
20 to 40 percent	7.49	20.91	27.71	13.31	4.27	10.68	15.52	8.11
40 to 60 percent	19.44	29.23	29.81	22.52	11.73	21.50	25.72	17.20
60 to 80 percent	26.54	22.65	18.36	25.21	32.93	28.54	26.78	28.26
80 to 100 percent	20.51	12.75	10.31	19.23	33.41	21.09	15.83	26.57
100 to 140 percent	12.89	8.73	6.29	13.00	14.53	12.03	8.93	14.34
140 percent and more	11.42	2.31	1.49	4.27	2.05	2.86	1.91	2.86
Number of women	20,844	17,562	7,698	19,820	5,437	4,063	1,468	5,121
Women with information on educational attainment								
Employment state prior to birth								
Education	3.39	0.31	0.00	0.84	13.24	2.63	0.48	2.96
Employment	75.39	28.57	21.46	40.60	83.66	75.13	68.04	80.28
Unemployment	0.24	0.37	0.39	0.38	0.00	0.00	0.00	0.00
Inactivity	20.98	70.75	78.15	58.17	3.09	22.68	31.47	16.76

Earnings points prior to birth (as% of average income)										
0 to 20 percent	1.30	2.53	6.02	2.03	0.66	2.56	3.04	1.89		
20 to 40 percent	4.98	17.27	18.32	9, 38	2.84	7.75	11.45	6.17		
40 to 60 percent	16.16	28.33	28.01	20.11	9.29	17.87	23.36	14.54		
60 to 80 percent	27.47	22.80	21.47	24.51	29.03	27.17	26.87	26.07		
80 to 100 percent	25.21	14.81	12.83	22.61	37.13	23.40	19.63	28.47		
100 to 140 percent	16.39	12.22	11.52	17.40	18.42	17.67	13.08	19.47		
140 percent and more	8.49	2.05	1.83	3.96	2.63	3.57	2.57	3.39		
Highest educational attainment										
Sec. school level, no vocational degree	21.02	26.37	34.89	24.45	12.42	13.37	17.97	12.63		
Sec. school level, vocational degree	74.01	69.42	61.07	71.57	69.14	69.45	68.04	69.09		
High school diploma, no vocational degree	0.50	0.57	0.62	0.44	0.34	0.41	0.32	0.34		
High school diploma, vocational degree	1.72	1.40	1.07	1.36	4.51	3.75	2.38	4.51		
University (of applied science) degree	2.75	2.24	2.36	2.17	13.59	13.02	11.29	13.43		
Number of women	6,749	5,127	1,780	6,336	2,724	1,974	629	2,627		

Source: FDZ-RV-SUFVVL2004/2005. Notes: – Percentage of women being in a particular state 9 months before the respective birth.

that, for the most part, these women made use of repayments for reimbursements. Thus, when analyzing the employment behavior of West German women around first childbirth, only women who did not set repayments (in the maximum amount) are included. For an analysis of second and third birth, however, the whole population is included.¹⁰

Looking at the bottom panel, as expected, West German women with educational information show a considerably higher labor market attachment than West German women overall. In contrast, East German women with educational information differ hardly from the whole population.

3.2 Method

We are interested in mothers' labor market transitions after childbirth, i.e., their transition from childcare into the labor market. A woman is considered to be returning to the labor force if she moves into any active labor market status (namely education, employment, or unemployment) for the first time after childbirth. In the data, periods of childcare are measured for a maximum of ten years after the respective childbirth. Thus, for women who return to the labor market at a later date the observation period is right-censored at ten years.¹¹ In order to address this issue and adequately model mothers' transitions into the labor market after childbirth, we follow previous literature (e.g., Gustafsson et al., 1996; Rösen/Sundström, 1996; Dex et al., 1998; Gustafsson et al., 2002; Pronzato, 2009) and make use of duration analysis.¹²

In doing so, let T denote a nonnegative random variable describing the duration of a childcare spell. If no change in the labor market status occurs within the observation period and the exact duration of the spell is unobserved, the spell is right-censored. The probability distribution of duration can be specified by the cumulative distribution function which expresses the probability that a mother changes from childcare to the labor market up to time t , where t is an arbitrary failure time of the spell

¹⁰ Comparing the subgroup of women not making use of repayments with the whole West German population at the time of second and third pregnancy hardly shows any differences in the employment behavior of these groups. Furthermore, it can be assumed that only a small percentage of women got married after the birth of their first child.

¹¹ In the German pension insurance, childcare times are considered for a period of ten years, which starts with the month of birth of the respective child. While the first year after childbirth is considered as a contributory period ("Kindererziehungszeit"), the remaining years are considered as non-contributory periods ("Kinderberücksichtigungszeit"). However, in generating the individual's monthly activity status, childcare times are handled subordinately to all other activities, i.e., they only appear in the data if at the same time no other activity occurs.

¹² For more details on this approach, see, e.g., Kiefer (1988) and van den Berg (2001).

$$(1) \quad F(t) = \Pr(T \leq t) .$$

The corresponding density function is $f(t) = dF(t)/d(t)$. Additionally, the probability distribution of T can be described by the survivor function

$$(2) \quad S(t) = 1 - F(t) = \Pr(T > t) ,$$

which describes the probability of a childcare spell to exceed T . While the distribution and survivor functions express the unconditional probability of an event taking place, the hazard rate depicts its conditional probability

$$(3) \quad \lambda(t) = f(t)/S(t) = \lim_{h \rightarrow 0} \left(\frac{\Pr(t \leq T < t+h | T \geq t)}{h} \right) ,$$

where h describes a small instant of time.¹³ The hazard rate describes the probability that a mother enters the labor market at time t , given that no change in the labor market status has occurred before.

A special feature concerning women's childcare durations comprises the fact that the status of childcare for one child does not only end with a transition into the labor market, but also with the birth of a further child. I.e., getting a further child and returning to the labor market comprise two competing risks. In order to define risk-specific hazard rates, we let T_j , with $j \in \{1 = \text{labor market}, 2 = \text{birth}\}$, be a random variable describing the time to a transition into the j -th state. An indicator variable δ specifies which of the two risks had occurred: $\delta = j$ if $T = T_j$. Thus, the hazard rate for the j -th risk is equal to

$$(4) \quad \lambda_j(t) = \lim_{h \rightarrow 0} \left(\frac{\Pr(t \leq T < t+h, \delta = j | T \geq t)}{h} \right) .$$

The main identification problem associated with competing risks analysis is that for each individual only one of the two durations, the one with the shortest duration $T = \min(T_1, T_2)$, can be observed. Thus, the hazard rates $\lambda_1(t)$ and $\lambda_2(t)$ are not observable quantities, but latent variables. Whether this fact imposes an identification problem depends on the assumption regarding the dependency between both risks.

To keep it simple, we start by assuming that the competing risks, entering the labor market and getting a further child, are independent of one another. In this case, we can perform regressions on $\lambda_1(t)$, the conditional probability that a mother returns to the labor market, by treating failures resulting from childbirth as right-censored.

¹³ As we have monthly information on childcare spells, we treat time to be continuous though drawing from discrete time units.

For the estimation, we use a piecewise-constant exponential model, which allows for flexibility in the shape of the hazard function. Specifically, the piecewise-constant model comprises a division of the baseline hazard into several predefined intervals with breakpoints $0 = \tau_1, \tau_2, \dots, \tau_k = \infty$.¹⁴ The baseline hazard rate (λ_{10}) is constant within each of the intervals, but it can differ between intervals

$$(5) \quad \lambda_1(t|\mathbf{x}) = \lambda_{10k} \exp(\mathbf{x}'\beta), \quad \text{for } t \in [\tau_{k-1}, \tau_k),$$

where $\lambda_1(t, \mathbf{x})$ is the hazard rate conditional on a set of socio-demographic characteristics \mathbf{x} .¹⁵

Indeed, unobserved heterogeneity is still a problem of the analysis. Though controlling for a variety of socio-demographic characteristics, there might still exist some unobserved variables, such as a mother's preferences for market work, that affect her labor supply decision. As, all else equal, mothers with higher preferences for market work will return to the labor market earlier as compared to those with lower preferences for market work, neglecting this sort of unobserved heterogeneity will bias our estimates. In order to address this problem, we estimate a frailty model (e.g., Vaupel et al., 1979; Gutierrez, 2002), which introduces an unobservable multiplicative effect α on the hazard. Conditional on the random parameter α , which is assumed to follow a Gamma distribution with mean one and variance θ , the hazard rate becomes

$$(6) \quad \lambda_1(t|\alpha, \mathbf{x}) = \alpha \lambda_1(t, \mathbf{x}).$$

All else equal, those individuals who possess $\alpha > 1$ are said to be more frail for reasons left unexplained by the covariates and will have an increased risk of failure, while those with $\alpha < 1$ are less frail and will tend to survive longer.

As mentioned above, estimating mothers' transitions into the labor market by treating failures resulting from childbirth as right-censored relies on the assumption that the two risks are independent of one another. While this seems to be a quite strong assumption, note that only the baseline risks, i.e., the risks given the observed covariates \mathbf{x} and the frailty parameter α , need to be independent. Though this is not an unreasonable assumption, we check the robustness of our results by also estimating a competing-risks model as proposed by Fine/

¹⁴ The following intervals were chosen: 0–3 months, 4–6 months, 7–12 months, and yearly intervals for the remaining period (1 to 10 years). For a graphical representation of the baseline hazard, see Figure A1 in the Appendix. The results are robust to finer subdivisions of the baseline hazard and alternative distributional assumption such as the Weibull or the Log-logistic distribution.

¹⁵ Please note that in the following description, the piecewise constant model is disregarded.

Gray (1999). They specify a model for the hazard of the subdistribution defined as

$$(7) \quad \bar{\lambda}_1(t|\mathbf{x}) = \lim_{h \rightarrow 0} \left(\frac{\Pr\{t \leq T < t+h, \delta = 1 | T \geq t \cup (T < t \cap \delta \neq 1), \mathbf{x}\}}{h} \right).$$

The subdistribution hazard can be thought of as a woman's probability of failure due to entering the labor market, given that no failure due to this risk has occurred thus far. The main idea behind this approach is therefore to keep women who experience a competing risk, i.e., those who get a further child, "at risk" of entering the labor market, as they are still event-free with respect to the risk of interest. Given that the two risks are mutually exclusive, women who get a further child do not, in fact, have any chance of failing due entering the labor market and thus possess an infinite failure time for the risk of interest.

While the Fine/Gray approach does no longer rely on the assumption of independent competing risks, it still does not permit studying the relationship among the competing risks or even testing for their independence. Rather, it measures the effect of certain covariates on the probability of failure due to a specific cause, and these covariate effects may derive from the direct effect on making the event of interest more (less) likely to occur, or the indirect effect of making the competing event less (more) likely to occur.

Lastly, we therefore try to circumvent the competing-risks problem by conducting an additional analysis for women who get their last child. Under the assumption that there is no difference between actual and intended fertility, these women have decided to not get a further child and are therefore not able to experience a competing risk. Hence, their conditional probability of returning to the labor market is represented by which can be consistently estimated by using a piecewise-constant exponential model with frailty parameter α as outlined above. Under the above-named assumption, the results of this model can be regarded as a mother's labor supply decision, given a certain fertility decision.

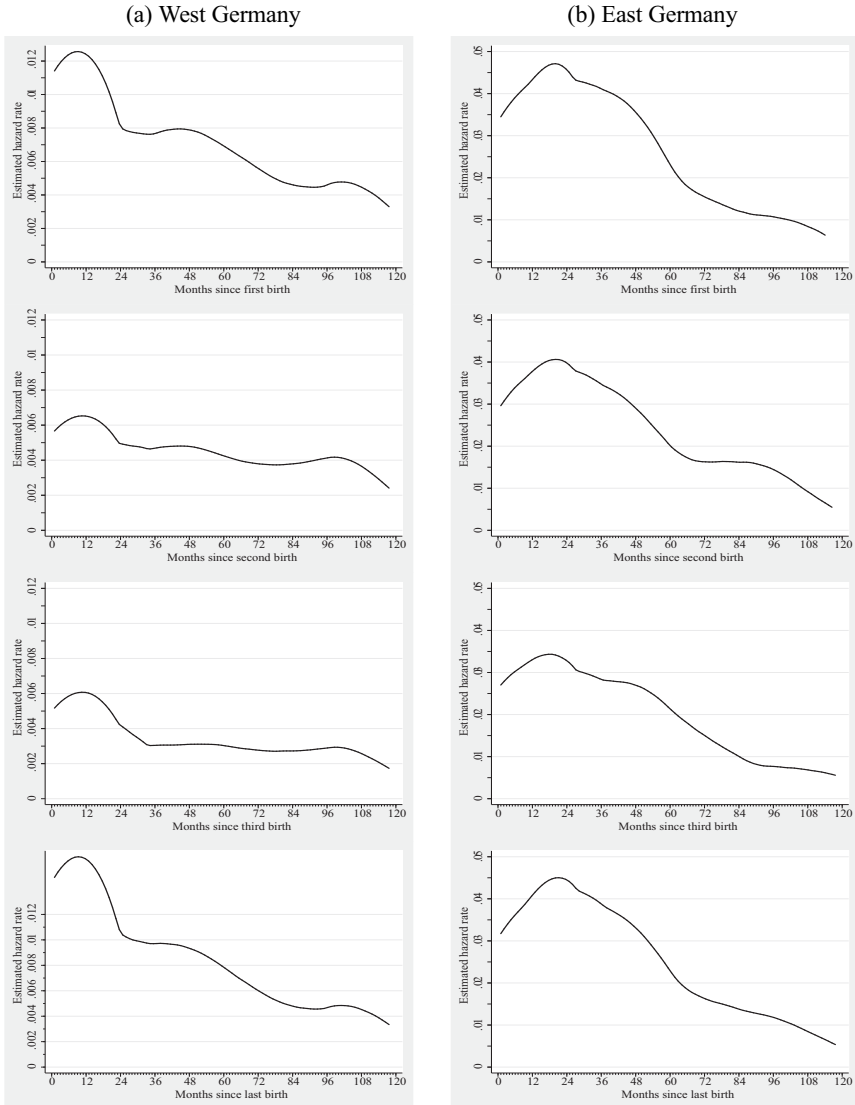
4. Empirical Results

4.1 Patterns of Returning to the Labor Force

In order to analyze the duration of women's withdrawal from the labor force *postpartum*, we estimate hazard rates of labor market transitions after childbirth for East and West Germany.¹⁶ In doing so, we assume that the competing risks,

¹⁶ In calculating the weighted kernel-density estimate required to produce a smoothed hazard-function estimator, the Epanechnikov kernel function with bandwidth 10 is chosen.

entering the labor market and getting a further child, are independent of one another and treat failures resulting from childbirth as right-censored. Figure 1 shows the hazard rates of the transition into employment after the birth of the first, second, third and last child for West and East Germany separately. In the



Note: For the ease of representation, different scales have been used for East and West Germany.
Source: FDZ-RV – SUFVVL2004/2005.

Figure 1: Women's Labor Market Transitions after 1st, 2nd, 3rd, and Last Birth

first months after first birth (top panels), the hazard rate is four times as high in East Germany as in West Germany. Therefore, mothers' transition rates into employment are considerably higher in the GDR than in the FRG. Within ten years after first childbirth, the different rates lead to the fact that 87 percent of the East German women, but only 45 percent of the West German return to the labor market.¹⁷ In addition to the particularly high hazard rates between 6 months and 18 months *postpartum*, there is an apparent increase in transition rates after three years and 7.5 years in West Germany. This pattern would be in line with the fact that, due to lack of childcare facilities for children up to the age of three, a high proportion of West German mothers returns to the labor market only after their first child has reached nursery school age. Additionally, transition rates increase at the time when the child enters school.¹⁸ In East Germany, a high proportion of mothers re-enters the labor market before their first child is aged one and a half years. Afterwards, however, an increase of the hazard rate cannot be detected. Thus, while West German women seem to be affected in their decision about returning to the labor market by the lack of public daycare, for East German women the possibility (perhaps also some pressure) to go back to work directly after childbirth existed.

Looking at the second panel of Figure 1, which shows mothers' transitions into the labor market after the birth of their second child, the increase of the hazard rate after three and seven years, respectively, is more pronounced in the West, which could be explained by the prevalence of the two-child family in West Germany.¹⁹ Also in East Germany having a child of six years leads women to re-enter the labor force at higher rates. Thus, in spite of having access to public daycare, some East German mothers do not return to work until their child enters school. While the hazard rates after the birth of the first and the second child are comparable in the East, hazard rates are significantly lower after second birth in the West. Finally, 40 percent of West German women re-enter the labor market within ten years, relative to 87 percent in the East.

A similar pattern can be observed regarding the transition of mothers into the labor market after third birth (panel 3). However, in both countries the hazard rate is somewhat smaller than after the second child. In West Germany 33 per-

¹⁷ These values are not shown in Figure 1, but are calculated by dividing the number of women who return to the labor market within 10 years after childbirth by the total number of women who are at risk to do so. Hence, they only refer to those women who do not get a further child before returning to the labor market.

¹⁸ In fact, if one considers that the average age at school enrollment in Germany has been six and a half years, an increase of the hazard rate one year later seems to be somewhat late. But as schooling hours, especially during the first year of school, have been rather irregular, it could be argued that mothers postponed their return to work until a stabilization of the situation had occurred.

¹⁹ In West Germany, two-thirds of the women having one child get a second one within the next six years, whereas this proportion falls to one-third after the second birth.

cent and in East Germany 85 percent of the mothers enter the labor market within a decade after the birth of their third child. Thus, with an increasing number of children the proportion of mothers returning to work remains comparatively constant in the East, while it decreases in the West. In both parts of the country, most mothers enter the labor market before the child reaches the age of two and afterwards an increase of the hazard rate is not observable. Whereas – subject to the availability of childcare facilities – most women try to go back to work after the birth of the first or second child as soon as possible, this is not necessarily the case after the third birth.

Finally, we circumvent the competing-risks problem by analyzing mothers' transitions into the labor market at their last childbirth, after which 51 percent of West German and 97 percent of East German women re-enter the labor market within ten years. The respective hazard rates are shown in the bottom panel of Figure 1. The trend of the hazards is similar to first births: While a slight increase of the hazard after three years and 7.5 years can be observed in the West, this is not the case for the East.

Overall, these results suggest that in West Germany mothers' decision to return to the labor market is considerably affected by the age of the youngest child. Both our findings and those of previous studies (Bender et al., 2003; Weber, 2004) support the hypothesis about the incompatibility of childrearing and employment in West Germany. Due to the lack of childcare facilities, mothers were not able to return to employment until their child entered (nursery) school. However, this pattern might have also been exacerbated by the society's prevailing model of the traditional male breadwinner and corresponding reservations against an employment of mothers, as they were expected to reduce or give up work to take care of their children. In East Germany, on the other hand, comprehensive provision of public daycare, the lack of financial coverage by the partner as well as social expectations regarding a mother's continuous employment (cf. Rosenfeld et al., 2004) probably contributed to mothers re-entering the labor market as soon as possible.

4.2 Determinants of Returning to the Labor Force

In addition to the patterns of mothers' labor market transitions, we analyze the determinants of their decisions to enter the labor market after childbirth. For this purpose, we focus on the births of the first and the last child. As time-constant covariates, a woman's employment status as well as her earning points 9 months before the respective birth are included in the regression. Additionally, the year of birth of the mother and that of her child are included as sets of binary indicators. The analysis is conducted separately for two samples. In the first sample, all mothers are included whereas the second sample is restricted to women with educational information. In the analysis for the latter sample, women's highest educational degree is additionally controlled for.

As outlined above, we start our analysis of mothers' labor market transitions after first childbirth by treating the duration of childcare of those giving birth to a second child before entering the labor market as right-censored at time of second birth. The estimation results of the piecewise-constant exponential/gamma frailty model are shown in Table 2. As expected, a woman's employment status prior to birth is strongly correlated with her rate of entering the labor market *postpartum*. For West German women who are unemployed at the time of their first pregnancy, the transition rate into the labor market is reduced by two-thirds compared to employed women. A similar pattern is observed for women not participating in the labor market prior to first childbirth. Compared to the reference group, their risk of entering the labor market is reduced by 75 percent in the West and 50 percent in the East.

Moreover, East German women who are still in education at time of conception show a 92 percent higher transition rate than those who are employed, while there is no such correlation for West German mothers. This result might be explained by the fact that getting children during education was much more common in East Germany than in West Germany. As can be seen from Table 2, the percentage of women being in education at time of first pregnancy amounts to 11.3 percent in the East as compared to 2.4 percent in the West. The high fertility rate among women participating in education is likely a result of the East German pro-natalistic policies, which were targeted at encouraging an early family formation and supporting mothers in their work-life balance. In the GDR, young couples received financial support when they married and had their first child and had special privileges to obtain a flat of their own. Moreover, mothers in school received special consideration in terms of children's allowances, paid child-illness leaves, and child-care priorities (Trappe/Rosenfeld, 2000).

Regarding women's earnings points, a positive relationship between the previous earnings level and the rate of re-entering the labor market appears in both parts of Germany. In the East, women earning more than 80 percent of the average earnings of all insured persons in the public pension system show significantly higher transition rates compared to the reference group (60 to 80 percent of the average income), while in the West women in these income groups do not differ from the reference group. In West Germany, however, women with the lowest earnings differ significantly from those receiving 60 to 80 percent of the average earnings: Their transition rates are 10 and 31 percent lower, respectively. The differences between the two countries might be due to the different income distributions in the countries (monthly labor income of women is more equally distributed in East Germany). Another possible explanation is the lack of public day care in West Germany, which might have lowered the incentive to return to work especially for mothers with low potential earnings. Lastly, the finding that high potential earnings do not increase the incentive of women to

return to work might be explained by the fact that the tax system in West Germany punishes couples with similar (high) incomes.

Estimation results for the subsample with information on educational attainment are shown in columns 3 to 6 of Table 2. First, as a robustness check, the same specification used for the sample of all women is estimated (columns 3 and 4), while in the second step the model further controls for women's highest educational attainment (columns 5 and 6). Concerning the first specification, hardly any differences to the results for the whole sample become obvious. An exception are West German women being unemployed at time of first pregnancy, who do no longer differ from employed women. However, the lack of significance can probably be attributed to the small proportion of women being unemployed in this subgroup (see Table 1). In regard to the controls for women's educational attainment, women having a university degree as well as those with a high school diploma and a vocational training degree show a significantly higher transition rate compared to those with secondary school level and a vocational training degree in both parts of the country.

Lastly, the bottom of Table 2 shows the estimated variance of the frailty parameter (θ) providing information about the presence of heterogeneity. For West German women, the frailty parameter is significantly different from zero, suggesting the existence of an unobserved individual effect that is correlated with the individual risk of entering the labor market. For East German women, in contrast, the estimated effect is virtually zero and not statistically significant, indicating that the sample of East German women is a much more homogeneous population with respect to their labor market behavior after childbirth.

Besides the determinants of women's decisions to enter the labor market after childbirth, the trend in mothers' labor market behavior over time is also of interest. Figure 2 shows the estimated hazard ratios for the child's birth cohort, which have been omitted from Table 2. The reference category comprises women giving birth to their first child in 1965. In order to assure a sufficient number of observations, hazard ratios for women having their first child between 1959 and 1980 (i.e., women being at least 14 years and at most 40 years old at the time of childbirth, depending on their birth cohort) are shown only. In West Germany, women's probability of entering the labor market decreased from 1959 to 1971 and then stabilized until the mid-1970s. From 1975 to 1978, a sharp increase in the returning rate can be observed. The most obvious explanation for this increase is the selectivity of this group of mothers, which consists of women having their first child at the age of 30 at the earliest. Hence, career-orientated women being highly attached to the labor market, who postpone motherhood due to career reasons, are overrepresented in this group of mothers. The sharp increase in employment rates in 1977 might further be explained by the large reform in the marriage and family law in 1977, which allowed married women to be employed without their husband's permission. After 1978, women's returning rates fall strongly. This finding is consistent with Bender et al.

Table 2
Women's Transitions into the Labor Market after First Childbirth

	All women		Women with educational information			
	West Germany	East Germany	(1)		(2)	
	West Germany	East Germany	West Germany	East Germany	West Germany	East Germany
Employment state prior to birth						
Education	0.983 (0.083)	1.921*** (0.106)	1.193 (0.159)	2.023*** (0.153)	1.105 (0.148)	1.869*** (0.142)
Employment	1.000	1.000	1.000	1.000	1.000	1.000
Unemployment	0.333*** (0.095)	–	0.534 (0.262)	–	0.527 (0.257)	–
Inactivity	0.251*** (0.012)	0.499*** (0.040)	0.215*** (0.017)	0.596*** (0.077)	0.214*** (0.017)	0.588*** (0.076)
Earnings points prior to birth (as % of average income)						
0 to 20 percent	0.657*** (0.079)	0.844 (0.141)	0.651* (0.161)	1.505 (0.425)	0.640* (0.158)	1.451 (0.416)
20 to 40 percent	0.888* (0.055)	1.162* (0.098)	0.755** (0.099)	1.036 (0.151)	0.748** (0.098)	1.069 (0.156)
40 to 60 percent	0.951 (0.042)	0.887** (0.049)	1.024 (0.084)	0.997 (0.086)	1.014 (0.083)	0.991 (0.085)
60 to 80 percent	1.000	1.000	1.000	1.000	1.000	1.000
80 to 100 percent	0.934 (0.041)	1.141*** (0.045)	0.945 (0.069)	1.148** (0.064)	0.956 (0.069)	1.137** (0.064)
100 to 140 percent	0.939 (0.051)	1.498*** (0.075)	1.048 (0.094)	1.552*** (0.105)	1.052 (0.094)	1.377*** (0.096)
more than 140 percent	1.100 (0.196)	1.907*** (0.216)	1.054 (0.300)	1.840*** (0.257)	0.844 (0.244)	1.401** (0.205)

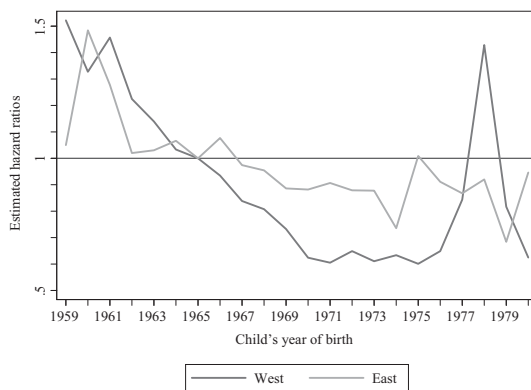
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Table 2 (continued)

	All women				Women with educational information			
	West Germany	East Germany	West Germany	East Germany	(1) West Germany	(1) East Germany	(2) West Germany	(2) East Germany
Highest educational attainment								
Secondary school level, no vocational degree	–	–	–	–	–	–	1.115** (0.060)	0.913 (0.060)
Secondary school level, vocational degree	–	–	–	–	–	–	1.000	1.000
High school diploma, no vocational degree	–	–	–	–	–	–	1.029 (0.377)	1.599 (0.545)
High school diploma, vocational degree	–	–	–	–	–	–	1.537** (0.276)	1.427*** (0.139)
University (of appl. science) degree	–	–	–	–	–	–	1.967*** (0.303)	1.542*** (0.100)
Frailty parameter $\hat{\theta}$	0.583*** (0.089)	0.001 (0.007)	0.892*** (0.094)	0.003 (0.017)	0.003 (0.017)	0.870*** (0.094)	0.003 (0.012)	0.003 (0.012)
Log-Likelihood	–23,176	–9,030	–8,587	–4,492	–8,587	–4,492	–8,559	–4,465
Number of women	18,711	5,437	6,249	2,724	6,249	2,724	6,249	2,724
Number of failures	8,370	4,765	3,354	2,445	3,354	2,445	3,354	2,445

Source: FDZ-RV-SUFVVL2004/2005. Notes: – Hazard ratios with robust standard errors in parenthesis. Hazard ratios are estimates of exp (β) and can be interpreted as proportional changes relative to the baseline hazard rate. – Significant at ***, 1 % level; **, 5 % level; *, 10 % level. – For West Germany, women not making use of repayments for reimbursement are included only. – Additional controls: Duration of time-out, mother's year of birth, children's year of birth.

(2003), who find that the propensity of first-time mothers re-entering the labor market drops at the beginning of the 1980s. The authors explain this with the introduction of paid parental leave in 1979, which enabled mothers to be absent from work for four months following childbirth while receiving full wage compensation. However, since women giving birth to their first child after 1978 constitute a small and selective group of all West German mothers in our sample, we refrain from interpreting this relationship causally. In East Germany, women's rates of returning to the labor market after first childbirth decreased slightly over time, but this trend is much smaller compared to West Germany.



Source: FDZ-RV – SUFVVL2004/2005. Notes: Reference category: Women having their first child in 1965.

Figure 2: Women's Rates of Returning to the Labor Market after First Childbirth

As outlined above, the consistency of the results presented so far rests on the assumption that a women's risk of entering the labor market after childbirth and her risk of getting a second child are conditionally independent. In order to relax this assumption and check the robustness of our results, we further estimate a competing risk model as proposed by Fine/Gray (1999). The estimation results are displayed in Table A1. Overall, relaxing the assumption of conditional independence does not alter the results substantially. However, mothers in West Germany whose earnings prior to birth exceed the average earnings of all insurants in the public pension system are now significantly less likely to re-enter the labor market after first childbirth than those with a lower income (60 to 80 percent). The difference in results between the two models for this subgroup of women might be explained by the fact that high-income women get a second child more quickly after first childbirth in order to minimize the overall duration of career interruptions in their employment career.

Table 3
Women's Transitions into the Labor Market after Last Childbirth

	All women				Women with educational information			
	(1)		(2)		(1)		(2)	
	West Germany	East Germany	West Germany	East Germany	West Germany	East Germany	West Germany	East Germany
Number of children								
One	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Two	1.047 (0.035)	1.428*** (0.050)	1.044 (0.058)	1.455*** (0.070)	1.040 (0.058)	1.448*** (0.070)	1.040 (0.058)	1.448*** (0.070)
Three	1.116*** (0.047)	1.576*** (0.075)	1.053 (0.079)	1.532*** (0.101)	1.038 (0.078)	1.530*** (0.101)	1.038 (0.078)	1.530*** (0.101)
Employment state prior to birth								
Education	0.907 (0.144)	1.824*** (0.190)	0.759 (0.172)	1.969*** (0.267)	0.674* (0.154)	1.870*** (0.256)	0.674* (0.154)	1.870*** (0.256)
Employment	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Unemployment	0.410*** (0.082)	—	0.266*** (0.097)	—	0.272*** (0.098)	—	0.272*** (0.098)	—
Inactivity	0.207*** (0.011)	0.317*** (0.016)	0.156*** (0.014)	0.319*** (0.024)	0.156*** (0.014)	0.320*** (0.024)	0.156*** (0.014)	0.320*** (0.024)
Earnings points prior to birth (as% of average income)								
0 to 20 percent	0.629*** (0.085)	0.725*** (0.081)	0.713 (0.165)	0.562*** (0.099)	0.697 (0.162)	0.572*** (0.100)	0.697 (0.162)	0.572*** (0.100)
20 to 40 percent	0.897 (0.061)	0.715*** (0.048)	0.938 (0.114)	0.757*** (0.076)	0.940 (0.114)	0.765*** (0.078)	0.940 (0.114)	0.765*** (0.078)
40 to 60 percent	0.930 (0.052)	0.842*** (0.042)	0.877 (0.081)	0.890 (0.065)	0.877 (0.081)	0.893 (0.066)	0.877 (0.081)	0.893 (0.066)
60 to 80 percent	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

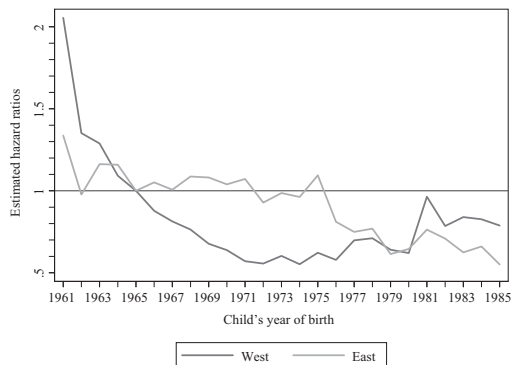
80 to 100 percent	0.999 (0.057)	1.069 (0.045)	0.965 (0.085)	1.136** (0.067)	0.973 (0.086)	1.121* (0.067)
10 to 140 percent	1.188*** (0.078)	1.498*** (0.076)	1.200* (0.116)	1.621*** (0.107)	1.210** (0.117)	1.547*** (0.107)
140 percent and more	1.313 (0.235)	2.114*** (0.211)	1.326 (0.337)	1.866*** (0.246)	1.177 (0.300)	1.741*** (0.240)
Highest educational attainment						
Secondary school level, no vocational degree	—	—	—	—	1.136** (0.060)	0.867** (0.055)
Secondary school level, vocational degree	—	—	—	—	1.000	1.000
High school diploma, no vocational degree	—	—	—	—	1.635 (0.538)	0.727 (0.262)
High school diploma, vocational degree	—	—	—	—	1.446** (0.252)	1.253** (0.120)
University (of appl. science) degree	—	—	—	—	1.970*** (0.285)	1.089 (0.071)
Frailty parameter $\hat{\theta}$	0.719*** (0.053)	0.001 (0.004)	0.859*** (0.054)	0.000 (0.003)	0.857*** (0.054)	0.001 (0.005)
Log-Likelihood	-25,392	-8,464	-10,002	-4,232	-9,988	-4,225
Number of women	19,020	5,121	6,416	2,627	6,416	2,627
Number of failures	9,666	4,970	4,300	2,586	4,300	2,586

Source: FDZ-RV-SUFVVL2004/2005. Notes: — Hazard ratios with robust standard errors in parenthesis. Hazard ratios are estimates of $\exp(\beta)$ and can be interpreted as proportional changes relative to the baseline hazard rate. — Significant at ***: 1 % level; **: 5 % level; *: 10 % level. — For West German with only child, those not making use of repayments for reimbursement are included only. — Additional controls: Duration of time-out, mother's year of birth, children's year of birth.

Lastly, we analyze women's transitions into the labor market after birth of their last child, giving insights into women's labor supply decisions given a certain fertility decision. Thereby, a woman's number of children is additionally controlled for. Estimation results are displayed in Table 3. Overall, the results are similar to those for first births. Again, a woman's employment status and earnings prior to birth are strongly correlated with her labor market behavior after birth, while the latter correlation is much more pronounced in East Germany. The estimation results for women with educational information (columns 3 to 6 of Table 3) again show that women with the highest educational attainment show the highest transition rates into the labor market. An exception are West German women in the lowest educational group (secondary school level, no vocational training), who have a 14 percent higher risk of entering the labor market than those having obtained a vocational degree. This correlation might be explained by the fact that those with the less favorable labor market prospects feel the highest financial pressure to return to the labor market early after childbirth.

With respect to the hazard ratios for the number of children, a puzzling finding emerges: In East Germany, mothers' risk of entering the labor market is positively correlated with the number of children. The transition rate is 43 percent higher for women with two children and 58 percent higher for women with three children, compared to women having only one child. In West Germany, this correlation is much smaller and only significant for those having three children. This finding contradicts the hypothesis that women with more children are less career-oriented and therefore less likely to return to the labor market after childbirth. A positive correlation between the number of children and a mother's probability of re-entering the labor market is also found by Ondrich et al. (1996) and Weber (2004). However, since both do not analyze the birth of the last child but the birth of any child, a low transition rate into employment of women with one child could be explained by their higher probability of having a further child. In our case, a different explanation is required. First, one can argue that some of the women deliberately decide to only have one child and therefore want to spend particularly much time with it, so that they go back to work comparatively late after childbirth. Moreover, since the correlation between a woman's number of children and her returning rate was much more pronounced in East Germany, it might be traced back to the fact that women's employment substantially contributed to the household income there. Thus, as financial strain grows with an increasing number of children, the exigency of mothers to return to employment and support their family financially also increases.

Finally, Figure 3 shows the estimated hazard ratios for the child's year of birth to investigate any cohort dependence in the transition rates. Again, until the early 1970s a significant downward trend in women's probability of returning to employment after the last childbirth becomes obvious in West Germany,



Source: FDT-RV – SUFVVL2004/2005. Notes: Reference category: Women having their last child in 1965.

Figure 3: Women's Rates of Returning to the Labor Market after Last Childbirth

which is similar to the trend found for first births. From the middle of the 1970s on, women's returning rates increased slightly over time. In East Germany, mother's returning rate stayed constant until the mid-1970s and decreased afterwards. The decrease in returning rates for East German women who got their last child after 1975 might be explained by the introduction of the "baby year" in 1976, which allowed mothers to take one year of paid parental leave after the birth of a second or third child.

5. Conclusion

Using duration analysis, this paper analyzes women's transitions into the labor market after childbirth. The analysis is based on the *SUFVVL2004* and the *SUFVVL2005*, two longitudinal data sets covering the entire working career of women born between 1939 and 1945 in Germany. The main feature of the data is that it allows us to distinguish between women who became mothers in the Federal Republic of Germany (FRG) and those who became mothers in the German Democratic Republic (GDR).

Our findings indicate that the patterns of mothers' time spent at home after childbirth differ considerably between East and West Germany. In the East – regardless of the number of children – the majority of mothers returns to work within one and a half years after birth, and, in general, return rates are much higher than in the West. This points to the importance of comprehensive provision of full-time daycare, even for the very young children. Societal expectations regarding mothers' labor force participation might also play a role.

In the West, the proportion of mothers returning is much smaller and decreases with the number of children. Additionally, a mother's risk of entering the labor market is significantly affected by the age of her youngest child. Indeed, West German mothers seem to be most likely to return to a job at the points in time when the youngest child either starts nursery school (age three) or school (age six or seven). This pattern would be in line with institutional circumstances – no public daycare until age three, at best part-time nursery school until school starts – but also with low societal acceptance regarding working mothers with young children.

Our analysis of the determinants of mothers' transitions into the labor market after birth of their first and their last child reveals a strong correlation between a woman's employment status prior to birth and her probability of entering the labor market afterwards. In both parts of Germany, women without employment or with low earnings *prepartum* show the lowest transition rates back into the labor market *postpartum*. In contrast, highly educated women and women with high earnings show the highest probability of returning to employment. The results on employment transitions are very similar for the first and the last child. That is, although in a woman's (working) life having the first child and the last child constitute different points in time (for most women), the determinants that influence the decision to return postpartum seem to be almost the same.

Our data cover women who became mothers mainly in the 1960s and 1970s. The implications of our findings can thus not be fully extrapolated to the present situation, because since then several family policies have been implemented, which might have led to changes in fertility and employment behavior. The most relevant policy in this context was the introduction and continuous extension of paid parental leave, incentivizing women to become mothers and parents to increase child care efforts (Kluge/Tamm, 2013).

However, even though long job-protected maternity leave with high benefit entitlements contributes to a reduction in opportunity costs of childrearing for parents, women intending to return to work after childbirth are still hampered by the incompatibility of childrearing and employment in Germany. This is frequently due to the fact that the sufficiently flexible or part-time working arrangements that the mothers desire – often simply because only part-time daycare is available – are not offered by employers (Kluge/Tamm, 2009). Moreover, still 20 years after reunification, large differences in daycare provision between the former Eastern and Western parts exist. The lack of childcare facilities for young children in West Germany might be one explanation why newer studies still find large differences in the employment probability of young mothers in East and West Germany (see, e.g., Geisler, 2010; Hanel/Riphahn, 2012).

In 2008, the German Government enacted a law aiming at the promotion of children ("Kinderförderungsgesetz"). As a part of this, the government com-

mits to continuously expanding childcare facilities for children up to the age of three until a provision rate of one third is achieved in 2013 (German Bundestag, 2008). In light of our results on pre-unification data, this is clearly a step in the right direction to increase labor market participation of mothers.

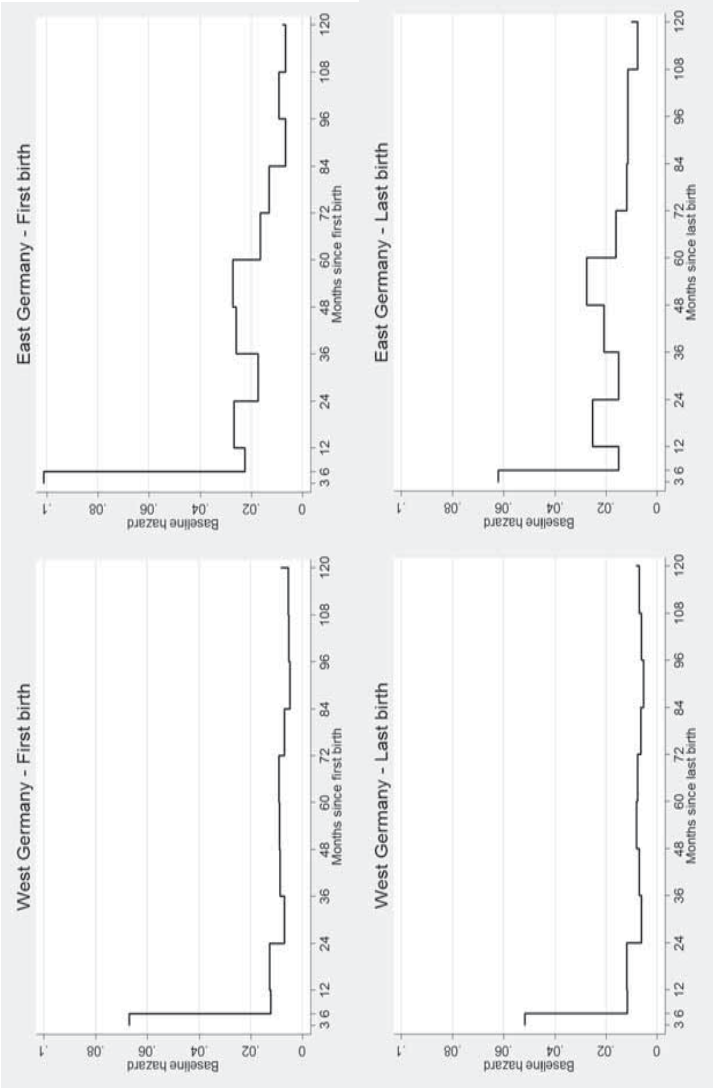
References

- Adserà, A.* (2004): Changing fertility rates in developed countries. The impact of labor market institutions, *Journal of Population Economics* 17, 17–43.
- Apps, P./Rees, R.* (2004): Fertility, Taxation and Family Policy, *Scandinavian Journal of Economics* 106, 745–763.
- Becker, G. S.* (1965): A Theory of the Allocation of Time, *The Economic Journal* 75, 493–517.
- Becker, G. S.* (1985): Human Capital, Effort, and the Sexual Division of Labor, *Journal of Labor Economics* 3, 33–58.
- Bender, S./Kohlmann, A./Lang, S.* (2003): Women, Work, and Motherhood: Changing Employment Penalties for Motherhood in West Germany after 1945 – A Comparative Analysis of Cohorts Born in 1934–1971, MPIDR Working Paper 2003–006.
- Berg, G. J. van den* (2001): Duration models: specification, identification and multiple durations. in: Heckman, J. J./Leamer, E. (eds.), *Handbook of Econometrics*, Vol. 5. Amsterdam/London.
- BMFSFJ* (2011): <http://www.bmfsfj.de/> (accessed 2013/05/30).
- Bratti, M./Del Bono, E./Vuri, D.* (2005): New Mothers' Labour Force Participation in Italy: The Role of Job Characteristics, *LABOUR* 19, 79–121.
- Büchel, F./Spieß, C. K.* (2002): Kindertageseinrichtungen und Müttererwerbstätigkeit – Neue Ergebnisse zu einem bekannten Zusammenhang, *Vierteljahrshefte zur Wirtschaftsforschung* 71, 95–113.
- Chiappori, P.-A.* (1988): Rational Household Labor Supply. *Econometrica* 56, 63–90.
- Del Boca, D./Pasqua, S./Pronzato, C.* (2009): Motherhood and market work decisions in institutional context: a European perspective, *Oxford Economic Papers* 61, 147–171.
- Dex, S./Joshi, H./Macran, S./McCulloch, A.* (1998): Women's Employment Transitions around Child Bearing, *Oxford Bulletin of Economics and Statistics* 60, 79–97.
- Eurostat* (2012): <http://epp.eurostat.ec.europa.eu/> (accessed 2013/04/16).
- Fine, J. P./Gray, R. J.* (1999): A Proportional Hazards Model for the Subdistribution of a Competing Risk, *Journal of the American Statistical Association* 94, 496–509.
- Geisler, E.* (2010): Unterschiede in der Müttererwerbstätigkeit bleiben bestehen: Ostdeutsche Frauen mit Kindern sind häufiger Vollzeit erwerbstätig als westdeutsche, *Demografische Forschung Aus Erster Hand* 7, 4.

- German Bundestag* (2008): Gesetz zur Förderung von Kindern unter drei Jahren in Tageseinrichtungen und in Kindertagespflege (Kinderförderungsgesetz – KiföG), Bundesgesetzblatt, Part I, No. 57.
- Geyer, J./Steiner, V.* (2007): Short-Run and Long-Term Effects of Childbirth on Mothers' Employment and Working Hours Across Institutional Regimes: An Empirical Analysis Based on the European Community Household Panel, IZA Discussion Paper No. 2693.
- Gustafsson, S. S./Kenjo, E./Wetzels, C. M. M. P.* (2002): The labour force transitions of first-time mothers in Britain, Germany, the Netherlands and Sweden. in: Mosley, H./O'Reilly, J./Schömann, K. (eds.), *Labour Markets, Gender and Institutional Change: Essays in Honour of Günther Schmidt*, Cheltenham.
- Gustafsson, S. S./Wetzels, C. M. M. P./Vlasblom, J. D./Dex, S.* (1996): Women's labor force transition in connection with childbirth: A panel data comparison between Germany, Sweden and Great Britain, *Journal of Population Economics* 9, 223–246.
- Gutierrez, R. G.* (2002): Parametric frailty and shared frailty survival models, *Stata Journal* 2, 22–44.
- Hanel, B./Riphahn, R. T.* (2012): The Employment of Mothers – Recent Developments and their Determinants in East and West Germany, *Jahrbücher für Nationalökonomie und Statistik* 232, 146–176.
- Kenjoh, E.* (2005): New Mothers' Employment and Public Policy in the UK, Germany, the Netherlands, Sweden, and Japan, *LABOUR* 19, 5–49.
- Kiefer, N. M.* (1988): Economic Duration Data and Hazard Functions, *Journal of Economic Literature* 26, 646–679.
- Kluge, J./Tamm, M.* (2009): Evaluation des Gesetzes zum Elterngeld und zur Elternzeit: Studie zu den Auswirkungen des BEEG auf die Erwerbstätigkeit und die Vereinbarkeitsplanung. Project Report for the German Federal Ministry for Family, Seniors, Women, and Youths. Essen/Berlin.
- Kluge, J./Tamm, M.* (2013): Parental leave regulations, mothers' labor force attachment and fathers' childcare involvement: evidence from a natural experiment, *Journal of Population Economics* 26, 983–1005.
- Kreyenfeld, M.* (2001): Employment and fertility: East Germany in the 1990s, Ph.D. thesis University of Rostock, Rostock.
- Kreyenfeld, M.* (2004): Fertility decisions in the FRG and GDR: an analysis with data from the German Fertility and Family Survey, *Demographic Research* S3, 276–311.
- Kreyenfeld, M./Hank, K.* (2000): Does the availability of child care influence the employment of mothers? Findings from western Germany, *Population Research and Policy Review* 19, 317–337.
- Kreyenfeld, M./Mika, T.* (2006): Analysemöglichkeiten des Scientific Use Files "Vollendete Versichertenleben 2004" im Bereich Fertilität und Familie, MPIDR Working Paper 2006–031.
- Manser, M./Brown, M.* (1980): Marriage and Household Decision-Making: A Bargaining Analysis, *International Economic Review* 21, 31–44.

- Matysiak, A./Vignoli, D.* (2008): Fertility and Women's Employment: A Meta-analysis, *European Journal of Population* 24, 363–384.
- McElroy, M. B./Horney, M. J.* (1981): Nash-Bargained Household Decisions: Toward a Generalization of the Theory of Demand, *International Economic Review* 22, 333–349.
- Mishra, V./Nielsen, I./Smyth, R.* (2010): On the relationship between female labour force participation and fertility in G7 countries: evidence from panel cointegration and Granger causality, *European Journal of Population* 38, 361–372.
- Ondrich, J./Spiess, C. K./Yang, Q.* (1996): Barefoot and in a German kitchen: Federal parental leave and benefit policy and the return to work after childbirth in Germany, *Journal of Population Economics* 9, 247–266.
- Pencavel, J.* (1998): Assortative Mating by Schooling and the Work Behavior of Wives and Husbands, *The American Economic Review: Papers and Proceedings* 88, 326–329.
- Population Council* (2006): Policies to Reconcile Labor Force Participation and Childbearing in the European Union, *Population and Development Review* 32, 389–393.
- Pronzato, C.* (2009): Return to work after childbirth: does parental leave matter in Europe? *Review of Economics of the Household* 7, 341–360.
- Rönsen, M./Sundström, M.* (1996): Maternal employment in Scandinavia: A comparison of the afterbirth employment activity of Norwegian and Swedish women, *Journal of Population Economics* 9, 267–285.
- Rosenfeld, R. A./Trappe, H./Gornick, J. C.* (2004): Gender and Work in Germany: Before and after Reunification, *Annual Review of Sociology* 30, 103–124.
- Stegmann, M.* (2006): Aufbereitung der Sondererhebung "Vollendete Versichertenleben 2004" als Scientific Use File für das FDZ-RV. in: *Deutsche Rentenversicherung Bund* (ed.), *Forschungsrelevante Daten der Rentenversicherung*, Berlin.
- Trappe, H./Rosenfeld, R. A.* (2000): How Do Children Matter? A Comparison of Gender Earnings Inequality for Young Adults in the Former East Germany and the Former West Germany, *Journal of Marriage and the Family* 62, 489–507.
- Vaupel, J. W./Manton, K. G./Stallard, E.* (1979): The impact of heterogeneity in individual frailty on the dynamics of mortality, *Demography* 16, 439–454.
- Weber, A. M.* (2004): Wann kehren junge Mütter auf den Arbeitsmarkt zurück? Eine Verweildaueranalyse für Deutschland, *ZEW Discussion Paper* 04–08.

Appendix



Source: FDZ-RV – SUFVV12004 / 2005. *Note:* Baseline hazard rates underlying the results shown in Table 2 and 3 are show.

Figure A1: Baseline Hazard Rates

Table A1

Women's Transitions into the Labor Market after First Childbirth – Competing Risks Model

	All women		Women with educational information			
	West Germany	East Germany	West Germany	East Germany	West Germany	East Germany
Employment state prior to birth						
Education	0.958 (0.070)	1.744*** (0.099)	1.159 (0.118)	1.800*** (0.141)	1.087 (0.112)	1.661*** (0.129)
Employment	1.000	1.000	1.000	1.000	1.000	1.000
Unemployment	0.438*** (0.112)	–	0.765 (0.254)	–	0.763 (0.254)	–
Inactivity	0.311*** (0.010)	0.570*** (0.043)	0.332*** (0.017)	0.612*** (0.076)	0.329*** (0.017)	0.603*** (0.075)
Earnings points prior to birth (as% of average income)						
0 to 20 percent	0.678*** (0.072)	0.805 (0.137)	0.662** (0.136)	1.442 (0.374)	0.654** (0.135)	1.392 (0.330)
20 to 40 percent	0.897** (0.048)	1.088 (0.095)	0.814** (0.083)	0.953 (0.137)	0.812** (0.083)	0.986 (0.141)
40 to 60 percent	0.980 (0.037)	0.919 (0.048)	1.055 (0.065)	1.015 (0.081)	1.053 (0.065)	1.013 (0.082)
60 to 80 percent	1.000	1.000	1.000	1.000	1.000	1.000
80 to 100 percent	0.938* (0.035)	1.129*** (0.040)	0.962 (0.052)	1.118** (0.056)	0.968 (0.053)	1.109** (0.056)
10 to 140 percent	0.893** (0.041)	1.400*** (0.062)	0.974 (0.066)	1.422*** (0.084)	0.973 (0.066)	1.290*** (0.078)
140 percent and more	0.934 (0.140)	1.669*** (0.143)	0.845 (0.189)	1.641*** (0.154)	1.712 (0.163)	1.306*** (0.137)

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Table A1 (continued)

	All women		Women with educational information			
	West Germany	East Germany	(1)		(2)	
	West Germany	East Germany	West Germany	East Germany	West Germany	East Germany
Highest educational attainment						
Secondary school level, no vocational degree	–	–	–	–	1.042 (0.044)	0.898* (0.056)
Secondary school level, vocational degree	–	–	–	–	1.000	1.000
High school diploma, no vocational degree	–	–	–	–	0.889 (0.285)	1.653*** (0.249)
High school diploma, vocational degree	–	–	–	–	1.366** (0.179)	1.340*** (0.101)
University (of appl. science) degree	–	–	–	–	1.614*** (0.186)	1.444*** (0.079)
Log-Likelihood	–78,624	–37,890	–27,755	–17,694	–27,746	–17,672
Number of women	18,711	5,437	6,249	2,724	6,249	2,724
Number of failures	8,370	4,765	3,354	2,445	3,354	2,445
Number competing	8,723	633	2,486	271	2,486	271

Source: FDZ-RV-SUFVVL2004/2005. Notes: – Hazard ratios with robust standard errors in parenthesis. Hazard ratios are estimates of $\exp(\beta)$ and can be interpreted as proportional changes relative to the baseline hazard rate. – Significant at ***: 1 % level; **: 5 % level; *: 10 % level. – For West Germany, women not making use of repayments for reimbursement are included only. – Additional controls: Duration of time-out, mother's year of birth, children's year of birth.