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Mind the gap!
The amount of German mothers' care bill and its game theoretical issues[*]

Christina Boll

Abstract

This paper aims to quantify West German mothers' foregone earnings that stem from intermittent labor market participation due to first birth. As Random Effects regression results with German Socio-Economic Panel Data (West) indicate, at the closure time of their fecundity window mothers realize gross hourly wage cuts up to 25%, compared to equally educated career women, whereas the total of annualized losses amounts to as far as 201,000 Euro. In the context of a dynamic bargaining model of household decisions, the care bill is suited to delaying first birth or even preventing women from motherhood if divorce seems sufficiently probable.

JEL Classification: *C33, J13, J31*

Keywords: *Cooperative bargaining, wage loss, fertility decision*

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1 Introduction

Everybody knows that children enrich one's life, and – also in a lifetime perspective – cost plenty of money. But: the money of whom? Whereas explicit costs to be related to nurturing, dressing and educating are added up fairly quickly, the calculation of implicit costs, like quantifying the income loss due to birth-related labor market discontinuities, is a far more challenging task. Ample theoretical research on the issue of human capital decisions in a multi-period household model context is accompanied by a profound lack of figures in this area. Furthermore, there is manifold evidence that individuals' behavioral decisions in the household context just take account for those hidden child costs. In Western Germany, the total fertility rate declined between 1997 and 2008 from 1.44 to 1.37, whereas in the same time it continuously rose in the Eastern part of Germany from 1.04 up to 1.40 (the overall German rate 2008 amounted to 1.38)[2]. Furthermore, the postponement of first motherhood is a rather West German phenomenon, and only in the Western part childlessness is positively correlated to mothers' level of education and hence their level of losses[3]. As birth-related labor market withdrawal only emerges in case of lacking reconcilability, income losses are to be considered as a specialization risk of motherhood especially in the Western part of Germany. **The paper is organized as follows:** In chapter 2, the theoretical baseline of the argumentation is outlined. Chapter 3 deals with the empirical results on birth-related income losses. To this end, it first surveys the deployed data before describing the utilized econometric model as well as the achieved regression and simulation results. Chapter 4 addresses the question of how to instrument results of chapter 3 as a specialization risk and further aims to isolate three important determinants of its quantity. A brief conclusion completes the paper (chapter 5).

2 Theoretical baseline of argumentation: The Bargaining approach

The issue of family economics has got a long tradition. Gary S. Becker established with his model of time allocation in the household context the research area of „New Home Economics"[4]. In this model, the single household acts as consumer, production, and insurance community that protects its members against various ‚vicissitudes of life'[5]. Owing to economies of scale in the use of collective goods and comparative advantages in time use, combined with interpersonally transferable goods, the maximization of the single household utility is achieved by maximized specialization of household partners.[6] Pioneer work in family economics has as well been done by Mincer and Polachek (1974) and Mincer and Ofek (1982). For Germany, many studies on this issue have been published in the last 20 years (e. g. Helberger (1984); Galler (1991); Licht and Steiner (1991a; 1991b; 1992); Beblo and Wolf (2000; 2002; 2003); Ziefle (2004); Görlich and de Grip (2007).

[2] See Statistisches Bundesamt (03.03.2010)
[3] See with respect to childlessness: Statistisches Bundesamt (2009).
[4] See Becker, G. (1965).
[5] See Ott, N. (1995), p. 81. The expressions ‚partnership', ‚household', ‚connection' , 'commitment', 'liaison' etc. are used in this paper interchangeably, since the decisive matter of fact is the common housekeeping.
[6] Interestingly, the theory of female endowment advantage with respect to household work relies on the assumption of compatibility of pregnancy and nursing with household tasks (Becker 1981, p. 38).

At least two developments forced the transition of gender roles: The educational level of females caught up with their male counterparts, and due to technical progress in household production specialization gains diminished rapidly. At the same time, maybe as a consequence, divorce rates increased in most western countries, thereby creating asymmetric risks for partners coping with the traditional division of labor. The decision of specialization therefore resembles the classic prisoner's dilemma: In case of cooperation (keeping the connection viable) both partners benefit from specialization in terms of a higher household welfare (win-win situation). However, in case of dissolution as the end of cooperation, the market oriented partner continues to reap the returns of his non-stop market employment career, whereas the care-oriented partner faces an abrupt shortening of options concerning his economic prospects. Efficiency gains from marriage emerge particularly in the first years, when children are small and advantages of specialization are quite high.[7] During that time, the partner who specialized on household related work contributes a big share on household welfare by refraining from investing in his own market oriented human capital. In the cooperative scenario, this input is reimbursed by the market oriented partner in terms of proceeded aliments in times when adult children leave the family. In the non-cooperative scenario, the end of women's fecundity span, likewise the end of non-substitutional parental care, denotes a point of risk-turnaround.

Dynamic bargaining models like the one of Ott (1992) deal with cross-period effects of time allocation decisions in the framework of collective (cooperative or non-cooperative) decision making[8]: The maximum utility of one partner that is obtainable in case of commitment break is as a conflict payment part of the following cooperative Nash solution:

$$\max_x N = [U^{\mathrm{m}}(x) - D^{\mathrm{m}}] * [\, U^{\mathrm{f}}(x) - D^{\mathrm{f}}] \quad (1)$$

In this specification, the parameter *x* denotes a vector of household goods which are produced at a price vector *p* and which are subject to the periodic bargaining activities of partners. Furthermore, partners bargain for time allocation on household and market work (and, if any, leisure).[10] U^{m} denotes the marital utility of the male, U^{f} of the female partner. The conflict payment (threat point) of a partner, $D^{\mathrm{i}}(p, Y^{\mathrm{i}})$, equals his or her maximum single utility that is attainable with Y^{i} as his/ her single income at current prices (p):

$$D^{\mathrm{i}}(p, Y^{\mathrm{i}}) = \max_x U^{\mathrm{i}}(x), \text{ upon condition that } Y^{\mathrm{i}} = x' p. \quad (2)$$

Each partner enters cooperation only if his or her utility from marriage exceeds single utility:

$$(U^{\mathrm{m}}(x) > D^{\mathrm{m}};\ U^{\mathrm{f}}(x) > D^{\mathrm{f}}). \quad (3)$$

Whereas the individual out-of-marriage utility doesn't matter in the unitary model as connections are stable, in order that – by definition – a shift in out-of-marriage options may not alter the intra-marriage distribution rule, the same shift of outside options plays a key role in the bargaining model: The decision to concentrate on household related time allocation today

[7] See Becker (1976), p. 207-214.

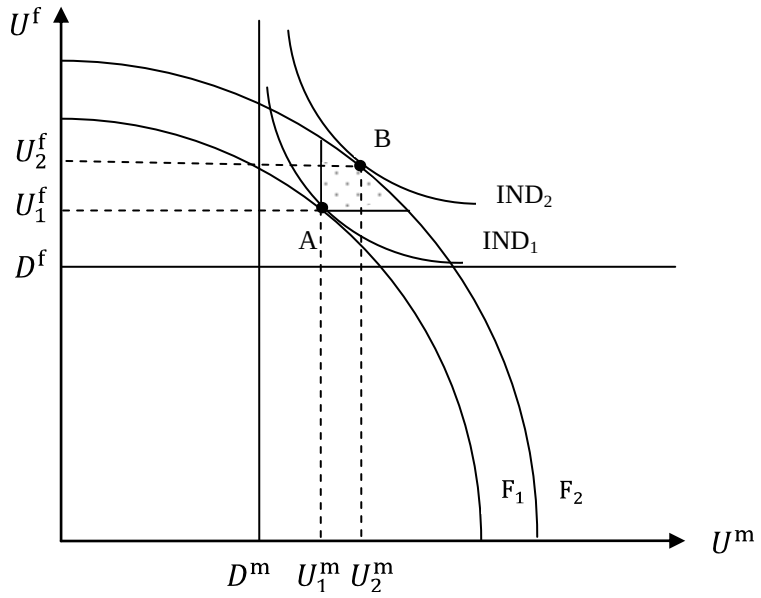
[8] The forthcoming figures follow the model of Ott (1992); e. g. individual utilities are assumed to be intertemporal additive; see Ott (1995), p. 80-91 for a complete formulation of the model.

[9] The multiplicative conjunction of marital gains indicates interdependent individual utilities and works as an incentive of both partners to maximize total household output.

[10] In this context, they face the common restrictions, namely a budget constraint (consumption expenditures may not exceed family income Y ($Y = x' p$), and the time constraint of a 24 hours day.

(hereafter labeled as 'caring') induces a loss of market oriented human capital and thereby, via a reduced income capacity, a shortened intra-marriage bargaining power in the following periods. From the caring spouse's point of view, the deterioration of his/ her bargaining power may pre-dominate the overall gain in household utility via the increase in household production. In a two-period model, as against his or her utility before specialization (in period 1), it might be that the caring spouse is worse off afterwards (in period 2). As a rational individual he or she foresees this constellation and thus, refuses to agree on the deal in period 1. For this reason, in dynamic bargaining models overall household welfare comes out to be sub-optimal because of incomplete specialization of partners. The context is illustrated in figure 1[11]:

Figure 1: Household utility derived from household specialization of the female partner in the unitary model with exogenous preferences



F_1 denotes the household production possibility frontier before specialization (before childbirth) as the sum of utility pairs achievable with given income *Y* at given prices *p*. The household indifference curves IND_1 and IND_2 represent utility pairs that guarantee a constant household utility whereas the utility level of IND_2 exceeds that of IND_1. Before childbirth, point A accrues as the maximum achievable household utility that coincides with the given intra-marital distribution rule. From point A, U_1^{m} as the marital utility of the male and U_1^{f} of the female partner is derived. As can easily be seen, each partner is better off in the alliance than out of it, since U_1^{m} exceeds D^{m} and U_1^{f} exceeds D^{f}.

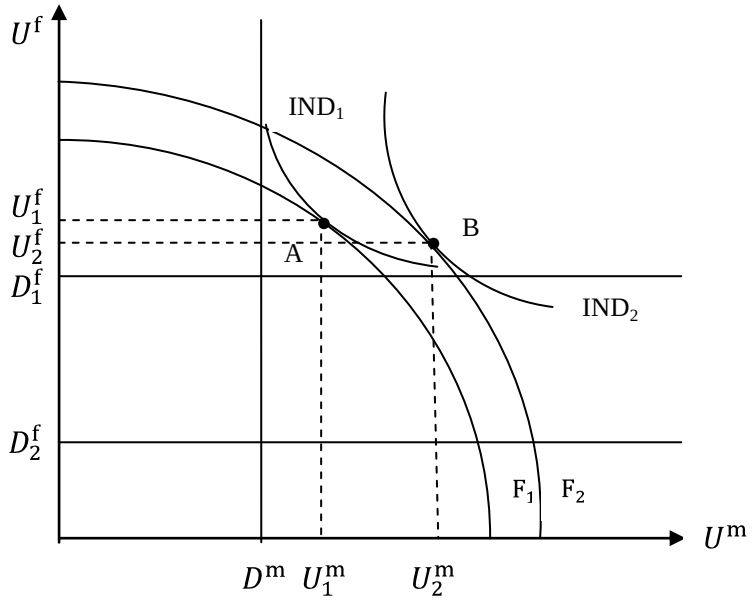
Assumed the birth of the first child would mark up the beginning of a new period (period 2). Assumed further that it required a specialization of the female partner on caring, and that the child induced a net welfare gain of the household that is indicated by an outer-shift of the household production possibility frontier (F_2). In this case, the pointed area in figure 1 denotes all Pareto-improvements that accrued from the imagined new situation. Because of the assumption of exogenous preferences, hence an unchanged distribution rule in the unitary model, point B arrives as the new tangential point of F_2 and IND_2. As the postnatal utility of

[11] The illustrations in figures 1 and 2 follow Ott (1995), p. 90.

each partner exceeds the prenatal one ($U_2^{\mathrm{m}} > U_1^{\mathrm{m}}$; $U_2^{\mathrm{f}} > U_1^{\mathrm{f}}$), both partners would be willing to agree on the specialization deal: The child will be born.

Things look quite different if a stranding of the alliance is considered (see figure 2):

Figure 2: Household utility derived from household specialization of the female partner in the dynamic bargaining model with endogenous preferences



Like in figure 1, marital utility levels of both partners exceed their single utility level in period 1. Correspondingly, the birth of a child causes the household production possibility frontier to shift from F_1 to F_2, so a higher household utility level is attainable. But, the deterioration of female out-of-marriage options in period 2 that accrues from her specialization-decision in period 1 (as indicated by a sharply reduced single utility D_2^{f}) alters the intra-marital distribution rule in period 2 to the detriment of the woman (demonstrated by the shift of the slope of IND_2). Compared to her utility level in period 1, the woman comes out to be worse off in period 2. Whereas the male spouse is better off in a double sense (both increased earnings and distributional power) the female spouse will refuse to agree on the deal. The partners' utility levels freeze in point A, the child will not be born, and possible welfare gains will not be realized.

3 The quantity of birth-related wage losses

3.1 Data

To quantify birth related income losses, respective data and panel data of the German Socio-Economic-Panel (GSOEP), waves 1984-2005, have been exploited. The German Socio-Economic Panel Study (SOEP) was started in 1984 and is a wide-ranging representative longitudinal study of private households, located at the German Institute for Economic Research, DIW Berlin. Every year, there were nearly 11,000 households, and more than 20,000 persons

sampled, consisting of Germans living in the Old and New German States, Foreigners, and recent Immigrants to Germany. The employment sample of the empirical investigation outlined in this paper consists of 1,610 West German women aged 16-55 with 6,276 observations in total. The data of East German or foreign women are excluded since their income contexts don't fit the Western German ones. The wage sample (as part of the employment sample) consists of 1,038 women with 3,255 observations and is furthermore restricted to dependent-employed women who are not in education at the time of the interview.

3.2 The econometric model and regression results

As to the wage regression, a comprehensive set of human capital related variables has been implemented, endorsed by various workplace and work setting variables. As to the model specification, Ordinary Least-Squares-, Fixed Effects- and Random Effects-estimations have been employed. With respect to the challenge of unobserved heterogeneity and the fact that there is far more cross-sectional than longitudinal information in the underlying data set[12], the Random Effects specification suits the data best.[13] The linear multiple regression has been specified in the following form:[14]

$$\ln w_{it} = \alpha_0 + \alpha_i + \beta_0 \lambda_{it} + \sum_{j=1}^{m} \beta_j SCH_{ji} + \sum_{j=m+1}^{m+n} \beta_j EXP_{jit} + \sum_{j=m+n+1}^{m+n+k} \beta_j CONTR_{jit} + \varepsilon_{it} \quad (4)$$

(i=1, 2,…, N; t=1, 2,…, T)

whereat

w_{it}	= real gross hourly wage rate of person i at time t,
α_0	= constant ('Grand Mean'),
α_i	= unobserved individual effects,
λ_{it}	= inverse of Mill's Ratio,
SCH_{ji}	= set of m schooling and vocational training variables,
EXP_{jit}	= set of n professional experience variables,
$CONTR_{jit}$	= set of k control variables,
ε_{it}	= disturbance term,
β_0, β_j	= parameters to be estimated.

The real gross hourly wage rate of individual i at time t, w_{it}, is a function of his time-variant level of schooling (SCH_{ji}), his professional experience (EXP_{jit}) and the magnitude of several control variables at time t ($CONTR_{jit}$). α_i denotes unobservable wage-relevant characteristics which are possibly correlated with the explaining variables (e. g. labor market affiliation). λ_{it}

[12] (this is because the wage information is restricted to the calendar data of waves 2001-2005)

[13] Due to the merely five-year time horizon of wage information in association with the property of the within estimator to solely exploiting intrapersonal information, the Fixed Effects model failed to properly predict the wage impact of long-lasting employment spells. Thus, calculations based on Fixed Effects tend to overestimate resulting wage losses, whereas simulations based on Random Effects estimation are to be considered as conservative evaluations at the lower end of loss range.

[14] The forthcoming notation follows Licht/Steiner (1991b), p. 4.

terms the inverse of the Mill's Ratio that has been gained by a Probit estimation[15], and – so as to control for sample selection –, imputed into the wage equation (Two-step Heckman). The employment equation has the following form:

$$d_{it}^{*} = z_{it}\gamma + u_{it};\ d_{it} = \begin{cases} 1 \text{ if } d_{it}^{*} > 0 \\ 0 \text{ if } d_{it}^{*} \leq 0 \end{cases} \quad (5)$$

d_{it}^{*} labels a latent variable and measures the inclination of individual i at time t to be (dependently) employed. d_{it} denotes an observable dichotomous variable that amounts to 1 in case of dependent employment and to null otherwise. Vector z_{it} consists of various reservation wage-relevant socio-economic variables. u_{it} denominates the disturbance term, and γ names the parameter vector in demand, indicating the impact of a distinct explaining variable on the likelihood of (dependent) employment.[16] Table 1 illustrates sample's descriptive statistics[17]:

Table 1: Descriptive Statistics[i]

Variable (Reference in brackets; ^{D}=Dummy)	**Number of observations**	**Mean**	**Standard-deviation**	**Min**	**Max**
Explained variable in employment equation					
Dependently employed^{D}	6276	.5188018	.4996862	0	1
Explained variable in wage equation (in €)[ii]					
Log of real gross hourly wage with fringe benefits	3254	2.544895	.4352205	.1945588	4.39
Log of real gross hourly wage without fringe benefits	3254	2.480366	.4135072	.1100355	4.28
Schooling and Vocational Training					
Low level of schooling: No degree/ compulsory school^{D}	6276	.3355641	.4722249	0	1
(Medium level of schooling: Realschule^{D})	6276	.3961122	.4891272	0	1
Higher education entrance qualification^{D}	6276	.2683238	.4431223	0	1
No vocational degree^{D}	6276	.2178139	.4127931	0	1
(Medium vocational degree: Apprenticeship, Professional School^{D})	6276	.6698534	.4703032	0	1
University degree^{D}	6276	.1123327	.3158005	0	1
Professional Experience (in years)					
Tenure	6276	3.392447	5.326808	0	37
Current full-time	6276	2.664914	5.58918	0	37
Current non-stop full-time	6276	1.646112	4.818772	0	35
Former full-time before time-out	6276	3.746176	4.935741	0	39
Former full-time before part-time	6276	.8231358	3.145747	0	30
Current part-time	6276	1.639579	3.812555	0	34
Former part-time	6276	1.898662	3.650848	0	25
Time-out (current or former type)	6276	4.581899	6.280722	0	36
Current time-out	6276	1.533461	4.32968	0	36
Current birth-related time-out	6276	.4362651	1.479286	0	10

[15] See for example Greene (2000), pp. 813ff.

[16] The estimated employment propensity refers solely to the domestic background, not to actual workplace conditions; neither there is an estimation of re-employment propensity being responsive to former job biography.

[17] (as some of employment sample women are not employed in the interval 2001-2005, some job related variables of those persons may not be meaningfully interpreted, although all values are different from missing)

Table 1 (contd.): Descriptive Statistics[i]

Variable (Reference in brackets; [D]=Dummy)	**Number of observations**	**Mean**	**Standard-deviation**	**Min**	**Max**
Former time-out	6276	3.048438	5.049133	0	32
Unemployment (current or former type)	6276	.4141173	1.223066	0	16
Current (registered) unemployment	6276	.0482792	.406005	0	9
Former (registered) unemployment	6276	.3658381	1.097192	0	15
Workplace and work setting related control variables					
Agriculture and forestry[D]	6276	.0071702	.0843795	0	1
Mining and energy[D]	6276	.0035054	.0591074	0	1
Construction[D]	6276	.0116316	.1072294	0	1
Trade[D]	6276	.1159975	.3202474	0	1
Transportation[D]	6276	.0160931	.1258435	0	1
Banking, insurance, other private services[D]	6276	.4115679	.4921568	0	1
(Manufacturing)	6276	.1089866	.3116473	0	1
Civil Service[D]	6276	-.4520395 1	.137591	•	1
Occupational prestige[#]	6276	43.0854	37.40649	•	216
Civil servant[D]	6276	.0470045	.2116653	0	1
White collar worker[D]	6276	.4507648	.4976096	0	1
(Blue collar worker[D])	6276	.1073932	.3096372	0	1
Firmsize 20-199 employees[D]	6276	-.7267368 1	.277719	•	1
Firmsize 200-1999 employees[D]	6276	-.8608987 1	.133732	•	1
Firmsize 2000 minimum[D]	6276	-.8368388 1	.16201	•	1
(Firmsize 19 employees maximum)[D]	6276	-.9063098 1	.076878	•	1
Weekly working hours[##]	6276	21.05296	18.25826	0	80
Regional Job crush ratio[###]	6276	9.80	5.54	3.20	44
Baden-Württemberg[D]	6276	.1383047	.345247	0	1
Socio-economic control variables					
Age	6276	37.25032	9.338553	17	55
Number of children in household[D]	6276	.7123964	.9338158	0	6
Youngest child in household age 0-1[D]	6276	.0495539	.2170387	0	1
Youngest child in household age 2-4 [D]	6276	.1188655	.323656	0	1
Youngest child in household age 5-7 [D]	6276	.0876354	.2827865	0	1
Youngest child in household age 8-10 [D]	6276	.0768005	.2662959	0	1
Youngest child in household age 11-18 [D]	6276	.1826004	.3863693	0	1
Health deficiency [D]	6276	.0581581	.2340607	0	1
Help requiring person in household [D]	6276	.0226259	.1487194	0	1
Married/ cohabiting with partner [D]	6276	.6011791	.4896948	0	1
Monthly net non-wage household income per capita, per 100 €	6276	2.966601	3.85996	0	51.75
Monthly net labor income of partner per capita, per 100 €	6276	4.641409	4.523627	0	43.46

[i] as far as not indicated differently, results refer to Employment sample; [ii] results refer to Wage sample; • not applicable ;
Data Source: GSOEP (West) 1984-2005, own calculations; see text for sample selection information.

The average log of hourly wages including fringe benefits corresponds to an average hourly wage rate of 12.74 €, with a standard deviation of 1.55 € and minimum (maximum) wages of 1.21 € (80.45 €). Without fringe benefits, the average wage rate amounts to 11.95 € with a standard deviation of 1.51 € and minimum (maximum) wages of 1.12 € (71.27 €).

Table 2 outlines regression results. Because of nonlinear relationships between the observation of being employed and the explaining variables of the employment equation, the strength of effects is indicated by marginal effects instead of regression coefficients.[18]

[18] The Marginal effect of the explaining variable j, $\delta Pr(y = 1|x) / \delta x_j$, illustrates the impact of an infinitesimal variation (metric variables) respectively of a switch from value "0" to value "1" (dummy variables) on employment propensity.

Table 2: Regression results

Explained variable:	**Wage equation** Real gross hourly wage rate with proportional fringe benefits (log)		**Employment equation** Employment status[i]	
Explaining variable (in years, if not labeled as [D]=Dummy or otherwise; references: see Table 1)	**GLS Random Effects** Coefficient[+]	Std. dev.	**Maximum Likelihood** Marginal effect (dF/dx)[+]	Std. dev.
Schooling and Vocational Training				
Low level of schooling[D]	-0.089	(0.028)***	-.0161146	(.0187383)
Higher education entrance qualification[D]	0.121	(0.033)***	-.1324789	(.0222846)
No vocational degree[D]	-0.062	(0.034)*	-.1786794	(.0200796)
University degree[D]	0.163	(0.043)***	.1722132	(.0265177)
Professional Experience				
Tenure			.0487871	(.0024544)
Current fulltime	0.028	(0.006)***		
Current fulltime squared/100	-0.046	(0.000)*		
Current non-stop fulltime	0.015	(0.007)**		
Current non-stop fulltime squared/100	-0.048	(0.000)		
Former fulltime before time-out	0.008	(0.002)***		
Former fulltime before part-time	0.016	(0.003)***		
Current part-time	-0.003	(0.003)		
Former part-time	0.010	(0.003)***		
Time-out (current or former type)			-.0234816	(.0017915)
Current time-out	-0.047	(0.016)***		
Current time-out squared	0.002	(0.001)**		
Current birth-related time-out	-0.076	(0.038)**		
Current birth-related time-out squared	0.018	(0.006)***		
Former time-out	-0.004	(0.003)		
Unemployment (current or former type)			-.0397241	(.0065424)
Current (registered) unemployment	-0.045	(0.024)*		
Former (registered) unemployment	-0.016	(0.012)		
Workplace and work setting related co***ntrol variables***				
Agriculture and forestry[D]	-0.108	(0.098)		
Mining and energy[D]	0.054	(0.096)		
Construction[D]	-0.064	(0.055)		
Trade[D]	-0.127	(0.028)***		
Transportation[D]	-0.108	(0.055)**		
Banking, insurance, other private services[D]	-0.021	(0.025)		
Civil Service[D]	0.053	(0.021)**		
Occupational prestige[#]	0.002	(0.000)***		
Civil servant[D]	0.121	(0.047)**		
White collar worker[D]	0.149	(0.023)***		
Firmsize 20-199 employees[D]	0.110	(0.023)***		
Firmsize 200-1999 employees[D]	0.172	(0.028)***		
Firmsize 2000 minimum[D]	0.186	(0.028)***		
Weekly working hours[##]	-0.014	(0.001)***		
Regional Job crush ratio[###]	0.002	(0.01)	-.0027708	(.0014834)
Baden-Württemberg			-.0543233	(.0227468)
Socio-economic control variables				
Age			.0087143	(.0013135)

Table 2 (contd.): Regression results

Explained variable:	Real gross hourly wage rate with proportional fringe benefits (log)		Employment status[i]	
Explaining variable (in years, if not labeled as D=Dummy or otherwise; references: see Table 1)	**GLS Random Effects**		**Maximum Likelihood**	
	Coefficient[+]	Std. dev.	Marginal effect (dF/dx)[+]	Std. dev.
Number of children in household[D]			-.0442861	(.0148191)
Youngest child in household age 0-1[D]			-.4916809	(.023042)
Youngest child in household age 2-4[D]			-.3135247	(.0306148)
Youngest child in household age 5-7[D]			-.135933	(.0375388)
Youngest child in household age 8-10[D]			-.1042524	(.038032)
Youngest child in household age 11-18[D]			-.0721226	(.0236426)
Health deficiency[D]			-.155613	(.0354777)
Help requiring person in household[D]			-.0910423	(.056389)
Married/ cohabiting with partner[D]			-.0524218	(.0228794)
Monthly net non-wage household income per capita, per 100 €			-.0636424	(.0048433)
Monthly net non-wage household income, per capita, per 100 €, squared			.0017055	(.000257)
Monthly net labor income of partner per capita, per 100 €			-.0273282	(.0043205)
Monthly net labor income of partner per capita, per 100 €, squared			.0009201	(.0002168)
Select	0.042	(0.013)***		
Constant	2.390	(0.055)***	Coeff.: 0.490	(0.122)***
Number of observations	3255		6276	

[+]Standard deviations in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%; [i]1 = employed, 0 = not employed; [#]Prestige score; [##]in hours; [###]unemployed persons per vacant job; Data Source: GSOEP (West) 1984-2005, own calculations.

Test statistics of wage equation estimation:
R^2 within/between/overall = 0.1394/0.3755/0.3582
Random effects u_i ~ Gaussian
corr (u_i, X) = 0 (assumed)
Wald chi^2 (35) = 982.97; Prob > chi^2 = 0.0000
LM Test statistics (H0: Var(u) = 0): chi^2(1) = 990.29; Prob > chi^2 = 0.0000
Hausman Test statistics (H0: difference in coefficients not systematic): chi^2 (31) = 217.05; Prob > chi^2 = 0.0000

Test statistics of employment equation estimation:
Pseudo R^2 (Mc Fadden, 1973) = 0.3424
Log likelihood = -2857.8323(0 failures and 1 success completely determined)
Wald-Test (chi^2-distributed LR-Value, number of explaining variables in brackets): LR chi^2(23) = 2975.84; Prob > chi^2 = 0.0000

Holding a university degree not only ameliorates employment propensities but also yields considerable remuneration in terms of a roughly 16% wage supplement, compared to a medium vocational degree. The parameters of domestic context variables of the employment equation exhibit the expected shape: Determinants which promote reservation wages restrict the likelihood of employment. As to job biography, the estimates reveal a certain path dependency of occupation and inoccupation, respectively: Former unemployment promotes actual unemployment and vice versa. With respect to professional experience, all variables refer to the end of the preceding year, their parameters indicating actual remuneration of formerly

cumulated human capital.[19] For instance, the job market awards full-time employment in terms of a 2.8% wage premium and even of a 4.3% supplement (2.8+1.5) in case of non-stop activity since employment entrance, both with respect to the first year. The wage premium diminishes as time goes by since former human capital depreciates. Part-time jobs do not render significant wage growth, probably because of scarce promotion and training opportunities of part-time workers. Employment breaks – particularly if they are birth-motivated – induce wage cuts at the time of reentry that amount to 12.3 percent at the maximum for the first time-out year (however, the penalty decreases with increasing time-out duration).[20,21] Birth related time-out is defined as occurring up to ten years after birth.

3.3 Results on simulated wage losses

Wage simulations are supposed to illustrate the wage loss related to a distinct hypothetical employment profile. For this purpose, several intermittent employment patterns have been constructed, differing in timing and duration of time-out (and succeeding part-time) interval, anyway deviating from the continuous full-time employment pattern identifying the reference woman. In detail, a tri-annual time-out spell followed by a tri-annual part-time span is named 'Primary School pattern', since the mother reduces full-time employment until primary school enrolment of her child. A second pattern labeled 'Kindergarten pattern' denotes a one-year time-out succeeding birth, combined with a two-years part-time employment thereafter. The labor market intermittency (due to first birth) starts at 28, 32 or 36 years of mother's age, respectively. Furthermore, three different types of education are composed in order to calculate wage deductions in comparison to equally educated women (with/ without vocational degree, university degree). As to the remaining attributes (e. g. industry, firm size or select variable) I deployed education-specific averages.[22] The simulations abstract from the disturbance term and depict an ideal-typical wage profile that grounds on the estimated regression coefficients. The wage loss is calculated both in terms of an hourly wage gap and in terms of an aggregate wage sum lost. Both the hourly wage gap and the total of lost wages refer to the age of 45. This arises from the frequencies of biographic events in the underlying sample restricting the extrapolation of regression results. On the assumption that the rate of real wage growth (the study refrained from) equals the discount rate the transformation of losses into their present values is dispensable. Figure 3 illustrates potential hourly wages as they occur in case of non-stop full-time employment (reference wages).

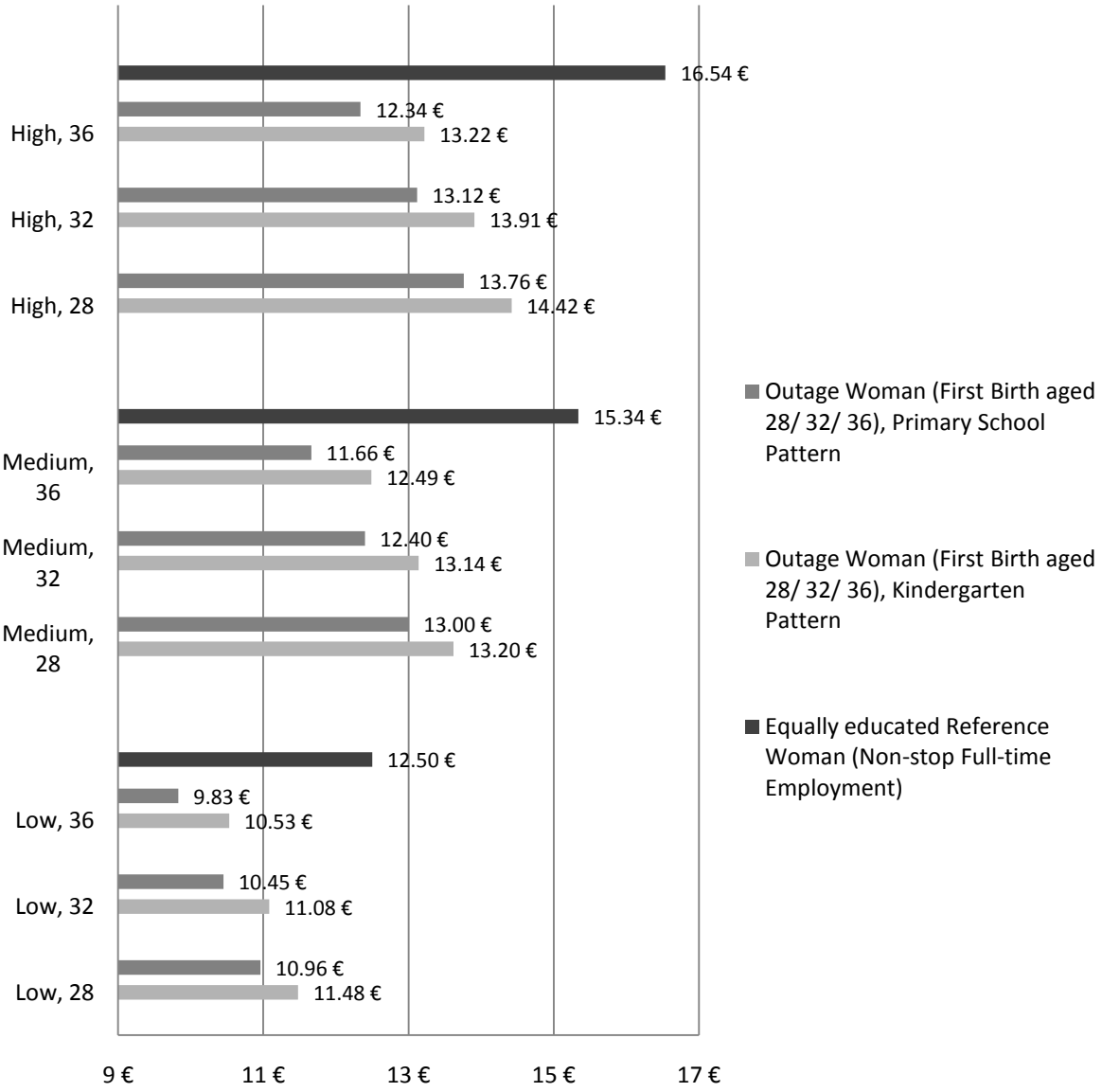
[19] For example, if the preceding year has been the first year of a full-time spell, it is designated as a current full-time year; by contrast, if the full-time spell ended in the last year's preceding year, that year belongs to former full-time employment, whereas the last year is designated as current part-time, time-out or registered joblessness, respectively (to each year one single employment status has been assigned, depending on reported monthly status frequencies).

[20] The wage penalties of joblessness resemble those of an elsewhere (not birth-) motivated time-out, but they are longer-staying. Indeed, the joblessness parameters are not statistically significant.

[21] To shorten analysis, I refrain from outlining the parameters of workplace related variables, most of whom are highly significant.

[22] As aforementioned, since academics are under-represented amongst employment sample mothers, this leads to an overestimation of their postnatal re-employment propensities, by the way underestimating the resulting wage losses of academic women.

Figure 3:
Gross Hourly Wage Rates of Reference and Outage Woman aged 45,
Subject to Education, Timing and Duration of Withdrawal



Primary School Pattern: 3-years out-of-labor-force spell, followed by a 3 years part-time spell;
Kindergarten Pattern: 1-year out-of-labor-force spell, followed by a 2 years part-time spell;
Education: Low = no educational degree/ compulsory school plus no vocational degree (labor market entrance aged 19);
Medium= Intermediate secondary school plus apprenticeship (labour market entrance aged 22);
High= Matriculation standard plus university degree (labor market entrance aged 27);
Job characteristics: Banking/ Insurance/ other private services, white collar worker, firm size 20-199 employees;
Simulations based on regression results as shown in table 2;
Data source: GSOEP 1984-2005, own calculations.

As it can be seen from figure 3, wages in case of intermittent employment are depicted as being considerably lower than reference wages.

First, the wage gap rises with increasing educational level. As in the very first years of professional career, investments in human capital are high and since academics enter labor market late, academic mothers' opportunity costs of childbirth are particularly high during that time – consisting to a large extent of omitted returns of forgone investments. On the other hand, according to their late labor market entrance and their comparatively high basic wage rate, academic mothers refraining from market work suffer merely modest human capital depreciation. As to low educated women, they start their professional career early in life so that at the time of employment break a vast amount of job-related human capital that has been generated in the meantime is subject to negotiation.

Second, the hourly wage loss is the higher the longer the time-out lasts. Although German institutional care arrangements actually ameliorate, even the return to full-time employment when the child reaches school age (Primary School pattern) has to be judged quite ambitiously. The duration-related loss spread reveals considerable scope of action for political agents.

Third, hourly wage gaps rise with increasing age of first birth. Although the spread per time unit decreases over time as wage growth decelerates, the shortening time span to catch up reference wages works in the opposite direction and outweighs the first mentioned effect. This holds for both patterns and all educational levels.

As forthcoming figure 4 illustrates, not only hourly but also aggregate losses decrease when withdrawal spells are compressed (from Primary School to Kindergarten Pattern).

The annualized wage losses have been aggregated to an overall lost wage sum from the time of withdrawal up to the age of 45. It is referred to as the 'care bill' since it equals the total of lost (gross) earnings due to child care. The care bill splits into three components – lost earnings during the out-of-labor-force time spell itself, losses during the succeeding part-time interval and, last but not least, losses during the rebound phase that covers the time span from the outage woman's reentry into full-time employment up to the age of 45. However, medium educated women who get their first child at the age of 28 or 32 realize a higher wage loss than academics. In comparison to the latter, medium educated women's disadvantages in formal qualification are nearly offset by their professional experience advantage, due to their earlier labor market entrance. Hence, the wage level of medium educated non-stop employed women comes very close to that of the academic reference group. Though, returning from a family break, the cut of wages turns out to be sharper related to medium than to highly educated women, with higher losses as a consequence. At the age of 36, preceded deceleration of medium qualified women's' wage growth accounts for comparatively lower wage losses with respect to academic women.

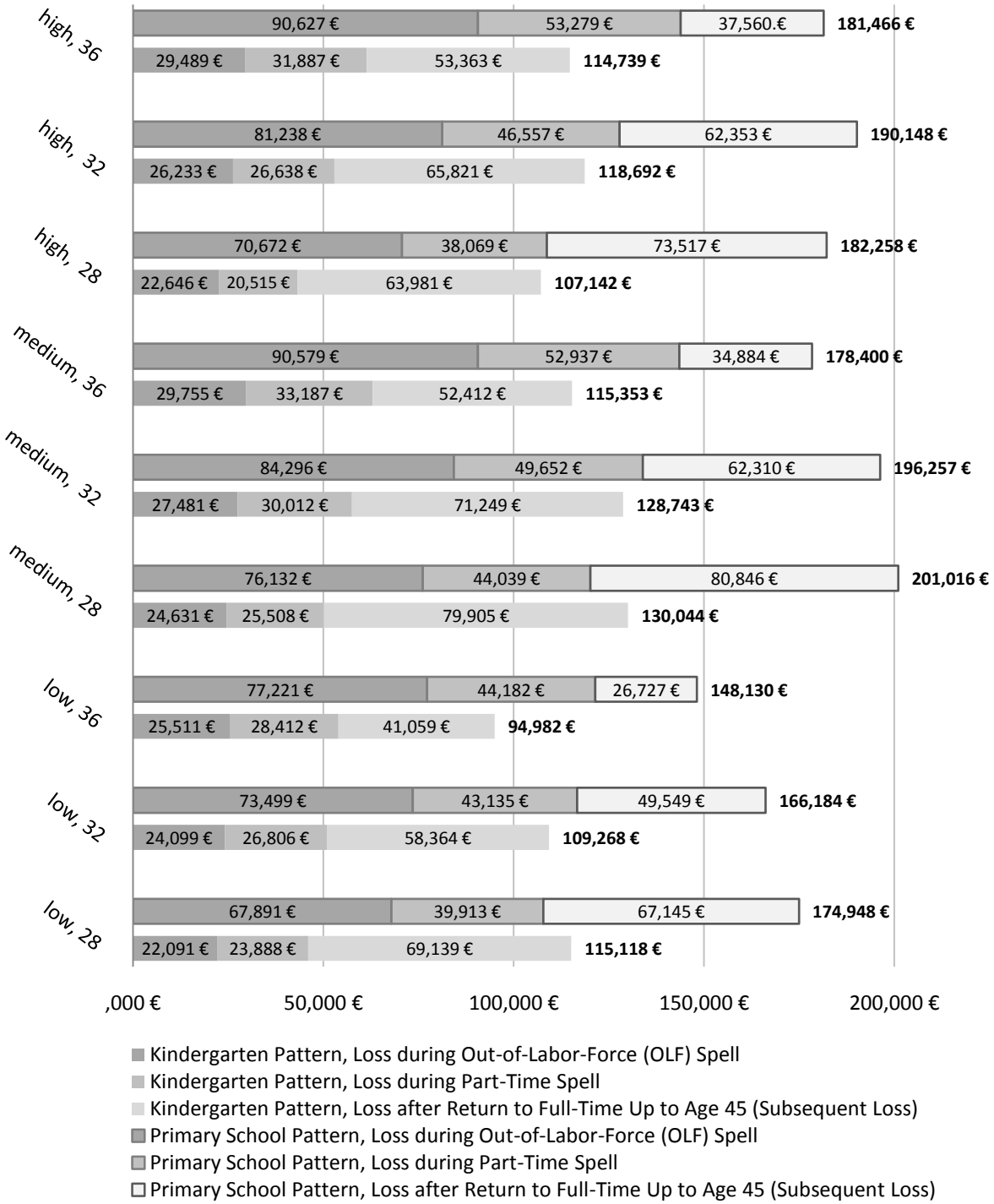
Furthermore, the mentioned loss components are differently responsive to a variation of birth timing: While direct losses during time-outs and during succeeding part-time spells increase by postponing of first birth, the loss after returning to full-time up to the age of 45 – hereafter referred to as consequential costs – decreases. As a result, the overall wage loss decreases with increasing age at first birth – with the single exception of motherhood transition from the age of 28 to the age of 32.

Figure 4:

Gross Wage Sum Lost By the Outage Woman up to Age 45,

Dependent on Education and Age at First Birth*,

Split into OLF-, Part-Time and Subsequent Losses



Note: Potential wage sum per educational level and first birth aged 28/ 32/ 36:
Low: 450,651 €/ 359,113 €/ 260,393 €;
Medium: 528,064 €/ 425,116 €/ 311,569 €;
High: 528,395 € / 432,366 €/ 322,408 €;

Employment patterns, education and age of first birth: see diagram 3;
GSOEP 1984-2005; own calculations.

4 Wage losses as a specialization risk in the bargaining context

This section addresses the question to what extent the calculated wage losses may be considered as a specialization risk in the context of the aforementioned model of Ott (1992). The simple message of the Ott-model is the following one: Anticipated asymmetric specialization risks cause female labor supply to increase and birth inclination to decrease. On first sight, the model thereby simultaneously explains two common phenomena: high employment rates of mothers and a declining number of births. On second sight, some extensions of the model are necessary in order to fit the message of the model.

In the Ott-framework, the specialization risk has been conceptualized as an intrapersonal loss of utility that arises from a loss in income between periods 1 and 2. As a consequence, with the underlying catching-up of wages in the Kindergarten pattern, the disadvantage of specialization covers only half a dozen of years, particularly if women get their children early. Furthermore, in the logic of the model, it turns out that academics who in most cases offset foregone income faster than less educated women have the comparatively highest disposition to specialize. This contradicts empirical findings. Therefore, departing from risk-conceptions that exclusively rely on past earnings, this paper focuses on the total of implicit costs as the conductive benchmark. Thus, deviating from the Ott-model, not formerly realized but potential education-specific wages at each point in time define the upper boundary of the specialization risk in question. To define potential wages, simulated non-stop full-time earnings of equally educated women are deployed. Thereby specialization risks are not simply restricted to human capital depreciation but also comprise foregone investments as a notable component of implicit child costs. As a consequence of the assumption that earnings of outage and reference women coincide before birth, the birth related specialization risk outlasts the recovery of former wages and persists as long as there is an income spread relating to reference wages. To this end, the applied risk concept of potential wages allows to immanently illustrating utility losses even in the context of intrapersonal cross-period income balancing. The magnitude of existing wage gaps at age 45 gives rise to the assumption that by enlarging the time horizon until retirement the upward trend of wage losses will continue, the more so as foregone old-age pensions due to omitted pension scheme contributions furthermore deteriorate women's prosperity prospects.

Another crucial point of the Ott-model relates to the male conflict payment: The assumption that it remains unchanged contradicts the fact that the partner who specializes on market employment benefits from a steadily expanding income potential – and thus, threat point – over his life course. Allowing the male conflict payment to increase over time ensures modeling persisting gender asymmetries in income potential distribution and a stronger bargaining position of the market-specialized partner even if the female partner succeeded in surmounting her former exit wage rate.

In the two-period Ott-model, specialization risks become virulent in phase 2. In this phase, around her 45^{th} birthday, the woman usually steps out of her fecundity window. Thus far persisting wage losses have to be considered as being irreversible to a large extent. As the woman already returned to full-time work, the short-run earnings range has been exhausted. At the same time, public compensatory payments like the German 'Elterngeld' come to a stop in the

course of child aging. In times like these, financial support by the domestic partner is at risk to break off because of his diminishing incentives to maintain the domestic deal. To sum up, persisting gross hourly wage differentials at the age of 45 may be accounted as a specialization risk in the narrow sense. In some more comprehensive view, the entire postnatal period, but at least the time after returning to full-time work, may be considered as a specialization risk, if one thinks of the fact that with her reentry decision the mother sets a signal for the substitutability of her support services. So the consequential costs may be seen as a specialization risk in a broader sense.

As aforementioned, mother's education as well as timing and duration of the birth-related employment break affect the magnitude of computed losses differently. As hourly wage differentials as well as consequential costs are higher in case of Primary School pattern compared to Kindergarten pattern, the willingness to specialize – in terms of venturing motherhood – is likely to increase with ameliorating institutional care that enables women to take short leaves. Concerning the timing of withdrawal, results are ambiguous: The hourly wage loss is the higher the later in life first birth occurs. On the contrary, consequential costs decrease with postponing, so an incentive to postpone contrasts a disincentive to do so. How to interpret these contradictory results? The cost-minimizing timing decision relates to the question, which stage of life is regarded as 'stability-crucial' from the individual's point of view. If dissolution is to be expected at the end of fecundity span, both domestic partners have to bear income losses occurring by then. As the hourly wage gap at the time of labor market reentry is minimized with an early birth, in this case bringing first birth forward appears to be target-aimed. Otherwise, if instability of marriage is to be assumed sooner, the woman is at risk to bear the whole burden of total losses herself; in this scenario, a postponing of first birth would be a rational strategy.

As to the educational level, the hourly wage gap increases with increasing schooling and training degree. From this perspective, academic women face the highest specialization risks. This point is aggravated by the fact that, since academic women are frequently married to academics, the prenatal domestic distribution of labor income is quite balanced, so the distribution shift is particularly hurting. With regard to consequential costs, the medium educated women bears the highest burden if first birth takes place at age 28, afterwards she changes place with the academic. Since German average age of first motherhood actually amounts to roughly 30 years, the academic realizes the highest specialization risk even with respect to consequential costs.

Finally, the herein discussed specialization risk solely refers to realized reduced conflict payments at the time of dissolution (D_2^f in diagram 2); the paper refrains from coping with the shadows this (anticipated) event casts on intra-marriage distribution of commodities. Of course, the more pronounced the decrease in conflict payments the more strongly the deterioration of intra-marriage bargaining power turns out to be.

5 Conclusion

This paper argues that after childbirth, meanwhile parents enjoy child related income facilities, women should be capacity- rather than cash oriented, for the sake of circumventing shortages of their medium-term income prospects. The latter harshly comes round at the moment the mother attempts to turn back to the labor market, when immense wage losses in the context of first motherhood become obvious. At the age of 45, the gross hourly wage gap of the outage woman amounts to 4.21 €, roughly one third of the sampled average gross hourly wage rate with fringe benefits (12.74 €); this holds, if an academic woman chooses to take a tri-annual time-out after first birth at the age of 36, succeeded by a tri-annual part-time spell. Furthermore, the overall sum of lost wages up to age 45 amounts to 181,465.50 €; this approximates 34 percent of the gross wage bill West German academic women earn in the course of their professional career until the age of 45. As the regression results and subsequent simulations illustrate, losses increase with rising educational degree as well as with increasing duration of employment interruption. As to the timing of first birth, the hourly wage gap stimulates births early in life, whereas from the perspective of subsequent costs (as a component of the overall lost wage sum) postponing is profitable; optimal timing depends on the individually assumed date of risk-turnaround in marriage.

The findings of the study provide evidence of observable fertility behavior, especially in the Western part of Germany where reconcilability of family concerns and professional career is still in its infancy, concerning the below three and the above six years old children. Beyond this, the results explain why German mothers try to ‚keep the foot in the labor market's door'. Women may decide upon or against a child; however, in the first mentioned case, since patterns of employment disruption depend on local institutional settings and working time constraints on the part of employers, the range of options is restrained to timing decisions. The study gives evidence of rationality of late parenthood, particularly with respect to academics. If one keeps in mind that wages reflect (marginal) productivity, a reduction of asymmetric specialization risks is worthwhile both from a micro- and a macroeconomic perspective.

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