Till mess do us part: Married women's market hours, home production, and divorce*

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Abstract

Part time jobs facilitate the conciliation of work and family life, but they entail reduced returns to experience and translate into lower own income in case of divorce. Given non-trivial divorce risks, why do married women work so little? Using micro data for Germany, we show married women's market hours (hours dedicated to housework) to be positively (negatively) related to separations. We then propose a dynamic life-cycle model of mothers' labor force participation, home production, and endogenous divorce risk which we calibrate to German data. Making divorce exogenous or ruling out divorce leads to an over-estimation of the share of married mothers working full time and an underestimation of their time spent doing housework. Carrying out three policy experiments (subsidizing child care costs, reducing alimony payments, and reducing tax progressivity), we show that quantitatively endogenous divorce decisions matter when analyzing the effects of policies on married mothers' market hours and divorce.

JEL classification: J12, J13, J22, H42

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1 Introduction

Female labor force participation has increased tremendously over the past decades. In Germany, as in many other developed countries, much of this increase can be attributed to a rise in part-time jobs, see left-hand graph of Figure A-1 in the Appendix. Part-time employment facilitates mothers' labor market attachment because it eases the conciliation of work and family life. However, returns to part time employment are significantly lower which becomes particular pertinent in case of divorce when women are left with limited own income.[1] In the face of non-trivial divorce risks, why do married mothers work so little? Findings from the sociology literature show wives' employment and housework (double burden) impose a marital strain which leads to a higher divorce risk. Hence, being better prepared for the event of a divorce by working full time, could, at the same time, lead to an increased likelihood of divorce.

The current paper investigates the quantitative role of this trade-off for married mothers' time allocation and divorce. Looking at data from the German Socio-Economic Panel (SOEP) we find more working hours of wives are associated with a higher risk of separation two years later. On the other hand, couples where wives spend relatively more time on housework and child care have a lower probability of separation. This suggests that above and beyond men's and women's contribution to household income, marriage stability is closely related to how husband and wives allocate their time. Our results are robust to controlling for her employment status, income of both spouses, marriage-specific variables, as well as heterogeneity in couples' frailty. However, given the potential presence of unobservables driving both, separations and women's hours worked, our empirical findings still suffer from endogeneity issues. Hence, they only provide the motivation for our theoretical model.

We propose a dynamic life-cycle model of mothers' labor force participation, home production, and divorce. Depending on the age of their children, married mothers in our model decide each period whether to stay married and how much time to allocate to market work, housework, and leisure. Part time jobs facilitate the conciliation of work and family life, especially when children are young, but they entail lower returns to experience, turning part

[1] Years of part time employment also provide for lower pensions, explaining in part why women in Germany are at a higher risk than men of being poor in old age, see Figure A-2 in the Appendix. In the US, divorced women above 55 are 3-10 percentage points more likely to be poor than divorced men, see Social Security Administration [2014]. In Germany employees who reduce their working hours have no right to return to full time employment. An attempt to change the German labor law accordingly failed in March 2017 - see http://www.faz.net/aktuell/wirtschaft/gesetz-von-nahles-rueckkehrrecht-aus-teilzeit-in-vollzeit-gescheitert-15029585.html.

time employment into a costly strategy in the event of a divorce. On the other hand if mothers dedicate more time to market work (and less time to housework and child care) the value of marriage might be lower, increasing the probability of divorce. We calibrate our model to German data to quantitatively assess the importance of modeling divorce endogenously. In our benchmark model, making divorce exogenous or ruling out divorce leads to an over-estimation of the share of married mothers working full time and an underestimation of their time spent doing housework.

As mentioned before, the notion that spouses' time allocation and the stability of marriage interact both ways is based on findings mainly from the sociology literature. For instance, Bittman et al [2003] show that wives do less housework when they earn more, but once they make more money than their husbands, women start increasing their share in housework. In a similar spirit, Bertrand et al [2015] find couples where wives earn more than their husbands to be unhappier and wives to do more housework to "compensate" for their higher earnings. Cooke [2006] establishes for Germany (but not for the US) that couples who deviate from the "traditional gendered" model face higher divorce risks. Closely related to our empirical analysis is the paper by Kraft and Neimann [2009] who also consider German data and estimate a higher divorce risk for couples in which the wife is the "breadwinner." In contrast, Newman and Olivetti [2015] show that US couples where the wife is a "career woman," – i.e. she has a continuous work history and has worked at least 75% of the time since marriage – are more stable compared to marriages where the wife has taken years off from work.[2]

Apart from endogenous divorce, alimony payments, joint taxation, and availability of child care could also explain why married women work so little. Empirical findings on the relationship between women's labor supply and alimony payments are inconclusive. Chiappori et al [2017] find Canadian women in couples to reduce their labor supply upon an unexpected increase in the generosity of alimony payments, but they find no effect for newly formed couples. Rangel [2006] estimates negative effects on women's labor supply following a similar policy in Brazil, whereas Bredtmann and Vonnahme [2017] find no labor supply effects for married women in Germany after an important reduction in alimony rights in 2008. In our model, higher alimony payments lower married and divorced women's labor supply and lead to higher divorce rates. However, when divorce is exogenous, the policy only affects divorced

[2]As motivating evidence, the authors show a negative relationship between divorce and female labor force participation rates across US states. Figure A-3 in the Appendix replicates their graph next to one for Europe, which shows a positive relationship. Furthermore, Figure A-4 shows a negative relationship for the US when considering women's part time employment, but a positive one for full time employment.

women's labor supply.

Joint taxation of couples implies that average tax rates for secondary earners, typically wives, are higher than for primary earners, reducing the incentives to work additional hours for the former. Bick and Fuchs-Schündeln [2017] find that much of the cross-country differences in married women's market hours can be explained by differences in non-linear labor income taxes. Alesina, Ichino, and Karabarbounis [2011] propose gender based taxation which would lower tax rates for the more elastic labor supply of women, increasing them for men. In a life-cycle model of education, marriage, divorce and labor force participation, Eckstein, Keane and Lifshitz [2019] show that a shift from joint to individual taxation increases participation of married women but also increases marriage and reduces divorce rates because women become more educated and there is more assortative matching which is regarded as preferable by individuals. A policy experiment in our model which eliminates joint taxation increases female labor force participation along both the extensive and intensive margin. However, when divorce is endogenous these labor force participation effects are larger because they are also partly driven by an increase in divorce rates.

Finally, at the core of the so-called "double burden" lies the imperfect substitutability between spouses' time dedicated to housework and child care and goods and services purchased in the market. Extensive research shows that the ability to substitute mothers' time dedicated to child care by external child care services increases labor force participation of mothers, see Del Boca and Vuri [2007] for a review. One of the very few papers on the availability of external child care services and marriage stability is Cherlin [1977] who points to a stabilizing effect of high child care costs for marriage. In line with both types of findings, subsidizing home production (or child care) in our model increases divorce rates as well as women's labor force participation. However, whereas the share of married mothers working full time increases, there are fewer women working part time. Again, these effects are augmented by a feed back mechanism from increased divorce rates, absent in a no divorce or exogenous divorce scenario where the labor force participation effects of child care subsidies are smaller.

Our paper contributes to the important strand of literature – starting with the seminal paper by Becker, Landes and Michael [1977] – on mechanisms driving marital instability which tend to model the interaction between labor market outcomes and marriage decisions. Stevenson and Wolfers [2007] provide an excellent overview of this literature which mostly attempts to quantify how much of the increase in labor force participation by married women over the

past decades can be accounted for by a higher divorce risk associated with unilateral divorce laws, testing also for the contribution of other competing driving forces such as a narrowing of the gender wage gap, cultural changes, improvements in home production technology, and increasing educational attainment of women.[3]

Different from most of this literature we do not attempt to explain the rise in married women's labor force participation over time but focus on why currently despite non-trivial divorce risks so many married mothers only work part time.[4] Hence, closely related to the current paper are Mazzocco, Ruiz and Yamaguchi [2013] and Chakraborty, Holter and Stepanchuck [2015]. The latter document a positive (negative) cross-country relationship between divorce rates (taxes) and hours worked for women (men), and they set up a life-cycle model to show that differences in taxes and divorce are able to explain almost half of the variation in labor supply between the US and Europe. The authors' focus is hence on the one-way relationship from marriage instability to hours worked, and different from the current paper, they do not model home production and divorce is exogenous. We endogeneize divorce precisely because we want to analyze a two-way relationship between labor force participation and divorce decisions. In Mazzocco, Ruiz and Yamaguchi [2013] – similar to our paper –divorce is endogenous and the value of marriage depends on home production as well as marriage quality shocks. Different from the current paper, these authors, however, do not consider how women's decisions regarding labor force participation, housework and divorce interact with the age of children. We think this is relevant because as children get older the imperfect substitutability between spouses' time dedicated to housework and child care and services purchased in the market becomes less important.

The remainder of this paper is organized as follows: the next section presents our empirical analysis. Section 3 presents the model, and Section 4 describes our calibration strategy. In

[3]On the effect of changes in US divorce laws on female employment see Stevenson [2008], Fernández and Wong [2017] or Voena [2015]. Eckstein and Lifshitz [2011] find that divorce risk can only account for a very small increase in female labor force participation while Fernández and Wong [2014] estimate a much more important role. Greenwood et al [2016] link divorce and female labor force participation to rising income inequality, concluding that technological progress in home production can account for the majority of the increase in female labor force participation and that positive assortative mating has amplified the effect of increasing skill premia on inequality. Knowles [2013] attributes the fact that despite higher female wages, non-working time of wives has remained constant to an increase in wives' bargaining power within marriage.

[4]Purely empirical papers on the topic of divorce and female labor force participation are Bargain et al [2012] who find that the introduction of divorce in Ireland led to an increase in female employment, Bremmer and Kesslering [2004] who for the US find that as more married women join the labor market, the divorce rate increases, Johnson and Skinner [1986] who establish that increased divorce risk explains one third of the increase in female labor force participation in the US, and Papps [2006] who estimates married women to increase their labor supply when facing higher risks of divorce.

Section 5 we present the results of the model and perform three counterfactual experiments. Section 6 concludes.

2 Empirical analysis

We consider data from the German Socio-Economic Panel (SOEP), an annual household survey with information on individuals' labor force participation, marital and family status, wages, education, etc. Of particular interest to us, the survey also includes individuals' histories of marriage spells and labor market experiences as well as information about home production, including time spent on housework (washing, cooking, cleaning) and child care.[5]

2.1 Wife's market hours, home production and separation

Couple sample For our analysis on the relationship between wife's market hours, home production, and the probability of separation, we focus on waves 2000-2016, and we restrict our attention to married couples aged 20 to 60 for whom we have information on marriage histories.[6] We only consider couples observed at least two periods before separation and with children aged 18 or younger. Given pronounced differences between East and West Germany regarding mothers' labor force participation, divorce, and child care provision, we exclude women and men who report to have lived in East Germany in 1989.[7] Following Kraft and Neimann [2009], we exclude unemployed individuals because unemployment spells introduce a different couple dynamic. We consider separations or divorces – whichever occurs first (on average, divorces occur 2-3 years after separations) – only if they happen before individuals leave the survey. These restrictions leave us with 18,794 observations for 3,484 couples; i.e. on average we observe couples 5 times.[8] We define a dummy variable "separated" which

[5]We focus on time spent on these activities on "a typical work day." We do not consider time spent on errands (shopping, trips to government agencies) or repairs (on and around the house, car repairs, garden work), because we cannot clearly separate these activities from shopping and gardening as leisure activities.

[6]We only focus on marriages because other registered unions – possible between 2001 and 2017 ("eingetragene Lebenspartnerschaft") – were restricted to same-sex couples. Since 2017, marriage is the only option for any couple to register legally.

[7]In 1990 (1991 for East Germany), there were 542 and 18 slots for every 1000 children under 3 in East and West Germany respectively (see Statistisches Bundesamt [2015]). Labor force participation rates of East German mothers of small children (0-3 years) have traditionally been very high and continue to be around 15 percentage points higher than rates for West German mothers (Bundesministerium für Familie, Senioren, Frauen und Jugend [2005].)

[8]Note that each observation requires information in t, $t-1$, and $t-2$ and hence observing couples on average 5 times implies at least 8 years of observations.

takes on value one in the year of separation. Couples are dropped from the sample after they separate. We observe variables related to employment, hours worked, income, and housework two years before separation, whereas all other time varying variables are observed one year before separation.

Descriptive Statistics Table A1 in the Appendix provides summary statistics for our sample. On average, 0.7% of couples separate each year. The average marriage in our sample lasts for 16 years.[9] In 12% of couples at least one spouse has been married before. Average age at marriage is 26 (29) years for her (him). More than 82% of spouses were born in Germany, and around 74% live in areas classified as urban. Following Blossfeld and Timm [2003] we define three educational categories (below 11 years, 11-17 years, and more than 17 years of education) which classifies around 25% (32%) and 62% (51%) of wives (husbands) as low and medium educated respectively. Around 75% of wives work, but only 17% do so fulltime, whereas 96% (93%) of husbands work (full time). Husbands who do not work are either in education or early retirees. Average real monthly gross income is 4,156€ (1,289 €) for him (her).[10] Around 32% of couples are home owners. Regarding time use, women's share in housework and child care is around 80%. Considering time spent by both spouses (9.6 hours), on average women spend 7.7 hours on housework and child care. However, as in any time use survey, activities are not necessarily understood as mutually exclusive which implies that the sum could be larger than apparently feasible. In our empirical analysis, we make sure that our results are robust to excluding individuals who violate the 24-hour time constraint. We also control for observations and marriages formed after 2008 given that German alimony law changed considerably after this date.[11]

Methodology To explore the relationship between the time women dedicate to market work, home production, and the probability of a marriage ending in divorce, we run the following probit regression

$$Pr(sep_t = 1|X) = \Phi(X^T\beta),$$

where $X^T = [Z_{t-1}X_{t-2}D_t]'$ and Z_{t-1} are individual controls typically included in regressions

[9] This is only slightly higher than the 14.9 years reported in Geisler et al [2018].

[10] Using the official DM/Euro exchange rate of 1.95583 we convert pre-2002 wage data into euros, and we use data from the Statistische Bundesamt on the German consumer price index to adjust for inflation.

[11] In particular, the generosity of alimony payments especially to ex-spouses was reduced considerably which affected even marriages formed before 2008 (except those divorced before 1977), for details see Bredtmann and Vonnahme [2017].

of divorce probability and measured one year before separation, including her and his age at marriage, spouses' educational attainment, residence in urban areas, his and her country of birth, the marriage not being the first one for at least one of the spouses, the presence of children of different ages, as well as a dummy variable for home ownership. In X_{t-2} we include labor market and time use variables measured two years before separation, such as indicators for full time work of husband and wife, employment status of each spouse, and labor income of husband and wife. In our second set of regressions X_{t-2} also includes total hours spent on housework and child care by the couple as well as her time share in home production, and an indicator for hiring a cleaner. D_t are marriage-duration controls. Our hypothesis is that market work is costly because time spent on home production and child care has to be reduced, potentially lowering the value of marriage.[12] If this is true, we should observe a positive relationship between women's market hours and divorce and a negative relationship between her time dedicated to home production and child care and divorce.

Table 1: Risk of separation and wife's hours worked in the market

	(1)	(2)	(3)	(4)	(5)	(6)
She works fulltime, $t-2$	0.287 (0.08)***	0.296 (0.081)***	0.313 (0.083)***	0.259 (0.09)***	0.261 (0.091)***	0.26 (0.091)***
He works fulltime, $t-2$	0.109 (0.187)	0.124 (0.19)	0.129 (0.19)	0.162 (0.195)	0.174 (0.195)	0.151 (0.196)
She is employed, $t-2$	0.061 (0.086)	0.062 (0.086)	0.072 (0.089)	0.045 (0.091)	0.05 (0.091)	0.076 (0.093)
He is employed, $t-2$	-.163 (0.238)	-.171 (0.241)	-.169 (0.241)	-.153 (0.242)	-.153 (0.242)	-.114 (0.244)
Not first marriage for at least one	0.39 (0.089)***	0.379 (0.092)***	0.377 (0.093)***	0.373 (0.094)***	0.361 (0.094)***	0.345 (0.095)***
Nr. of children: 0-1, $t-1$			-.137 (0.128)	-.140 (0.128)	-.141 (0.129)	-.130 (0.129)
Nr. of children: 2-7, $t-1$			0.044 (0.06)	0.04 (0.06)	0.047 (0.06)	0.068 (0.061)
Nr. of children: 8-15, $t-1$			0.008 (0.048)	0.008 (0.048)	0.011 (0.048)	0.017 (0.048)
Her education (<11 years), $t-1$		0.039 (0.136)	0.046 (0.137)	0.078 (0.142)	0.064 (0.143)	0.052 (0.143)
His education (<11 years), $t-1$		0.061 (0.128)	0.061 (0.129)	0.033 (0.137)	0.033 (0.137)	0.036 (0.138)
Her education ($11-16$ years), $t-1$		0.0003 (0.115)	0.006 (0.116)	0.034 (0.119)	0.034 (0.12)	0.033 (0.12)
His education ($11-16$ years), $t-1$		0.223 (0.112)**	0.224 (0.113)**	0.2 (0.117)*	0.209 (0.117)*	0.212 (0.118)*
Her income (in 2015 €), $t-2$				0.00003 (0.00002)	0.00003 (0.00002)	0.00002 (0.00002)
His income (in 2015 €), $t-2$				-1.00e-05 (0.00002)	-8.63e-06 (0.00002)	-1.00e-05 (0.00002)
Home owners, $t-1$					0.138 (0.073)*	0.144 (0.073)**
Married after 2008						0.049 (0.172)
Observed after 2008						-.175 (0.073)**
Number of observations	18,794	18,794	18,794	18,794	18,794	18,794

SOEP data: 2000-2016. The dependent variable is "Separation or divorce in t". The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by probit models and they include a polynomial of degree six for duration of marriage as well as additional controls for: couples resides in urban area, for him and her: born in Germany, currently in education, age at marriage (none of which are significant at the 10% level).

[12]This conjecture ignores the possibility of adjusting leisure time instead. However, conditional on age of youngest child we observe hardly any variation in mother's leisure time independently of her market hours.

Results Results in Table 1 show wives working fulltime is related to a higher probability of divorce, while husbands' hours at work have no significant effect and neither does each spouse's income. Regarding other coefficients, spouses having been married before, being home owners and spouses with medium levels of education relate to a higher probability of separation. Married couples observed after 2008, seem to be less likely to separate which could be due to a change in time trend in divorce rates after the policy change in 2008, as can be observed in Figure A-1 in the Appendix. Our result is robust to different classifications for her hours worked in the market (continuous measure, different intervals), and to including random fixed effects that account for heterogeneity in couples' frailty, see Tables A2 and Table A3 in the Appendix.

Table 2: Risk of separation, wife's hours worked in the market and at home

	(1)	(2)	(3)
She works fulltime, $t-2$	0.26 (0.091)***	0.216 (0.094)**	0.215 (0.094)**
He works fulltime, $t-2$	0.151 (0.196)	0.193 (0.197)	0.194 (0.197)
Her share housework & child care, $t-2$		-.365 (0.185)**	-.365 (0.185)**
Couple's hours housework & child care, $t-2$		-.005 (0.006)	-.005 (0.006)
She is employed, $t-2$	0.076 (0.093)	0.042 (0.095)	0.042 (0.095)
He is employed, $t-2$	-.114 (0.244)	-.100 (0.243)	-.099 (0.243)
Not first marriage for at least one	0.345 (0.095)***	0.349 (0.095)***	0.35 (0.095)***
Nr. of children: 0-1, $t-1$	-.130 (0.129)	-.138 (0.13)	-.138 (0.13)
Nr. of children: 2-7, $t-1$	0.068 (0.061)	0.087 (0.065)	0.086 (0.065)
Nr. of children: 8-15, $t-1$	0.017 (0.048)	0.025 (0.05)	0.025 (0.05)
Her education (<11 years), $t-1$	0.052 (0.143)	0.07 (0.144)	0.072 (0.144)
His education (<11 years), $t-1$	0.036 (0.138)	0.038 (0.138)	0.041 (0.139)
Her education ($11-16$ years), $t-1$	0.033 (0.12)	0.045 (0.121)	0.047 (0.121)
His education ($11-16$ years), $t-1$	0.212 (0.118)*	0.211 (0.118)*	0.214 (0.119)*
Her income (in 2015 €), $t-2$	0.00002 (0.00002)	0.00002 (0.00002)	0.00002 (0.00002)
His income (in 2015 €), $t-2$	-1.00e-05 (0.00002)	-7.67e-06 (0.00002)	-8.47e-06 (0.00002)
Home owners, $t-1$	0.144 (0.073)**	0.145 (0.073)**	0.145 (0.073)**
Married after 2008	0.049 (0.172)	0.051 (0.172)	0.05 (0.172)
Observed after 2008	-.175 (0.073)**	-.184 (0.074)**	-.184 (0.074)**
Cleaning help, $t-2$			0.026 (0.124)
Number of observations	18,794	18,794	18,794

SOEP data: 2000-2016. The dependent variable is "Separation or divorce in t". The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by probit and they include a polynomial of degree six for duration of marriage as well as additional controls for: couples resides in urban area, for him and her: born in Germany, currently in education, age at marriage (none of which are significant at the 10% level).

Table 2 displays the results for our second set of regressions. Wives' share in time dedicated to housework and child care has a negative and significant relationship with the probability of separation. Absolute time dedicated by the couple does not seem to matter much, and neither does hiring a cleaner. Again our results are robust to alternative classifications of

hours dedicated to home production, as well as to including random fixed effects, see Tables A4 and A6 in the Appendix. We also make sure that excluding individuals who violate the 24-hour time constraint does not affect our results (Table A5 in the Appendix).

To obtain a sense of magnitude, in Table 3 we report the marginal effects of housework and market hours on separation. For working mothers, increasing hours from part to full time increases the probability of divorce by 0.3-0.4%, around half the baseline probability. Increasing her share in housework and child care from 0 to 100% decrease divorce probabilities by around 0.56%, a reduction of 80%. Marginal effects for couples where the wife does not work are slightly lower but very similar. Table A7 in the Appendix shows marginal effects for couples by education. Results are particularly strong for couples where both spouses have a medium level of education. In these couples which have a higher rate of separation (0.8%), women are more likely to work, to work fulltime and to work more hours compared to couples where both have low education. On the other hand, in couples where both spouses have high levels of education, women are also more likely to work full time, but household income is almost twice as large compared to that of medium educated couples. This allows highly educated couples to outsource part of home production and/or child care; almost 40% of higher educated couples hire a cleaner compared to 7% of medium educated couples.

Table 3: Marginal effects of wife's hours worked in the market and at home on divorce

All couples (both spouses work)	(1)	(2)
She works fulltime$_{t-2}$	0.0039 (0.0014)***	0.0031 (0.0014)**
Her share hwk and child care, $_{t-2}$	-	-0.0053 (0.0027)**
All couples (she does not work)	(1)	(2)
She works fulltime, $_{t-2}$	0.0032 (0.0014)**	0.0028 (0.0014)**
She is employed $_{t-2}$	0.0009 (0.001)	0.0005 (0.0011
Her share hwk and child care, $_{t-2}$	-	-0.0047 (0.0027)*

Marginal effects evaluated at means. Mean failure rate is 0.007.

In Appendix A.3 we present our results for women's returns to full and part time employment. Robust across different specifications, returns to experience for fulltime jobs are 3.5% higher hourly wages per year, whereas each year spent not working is associated with 0.6% lower hourly wages, which is considerable given that on average women in our sample take more than 7 years off from work. Returns to part time experience, vary between -0.3% when using hourly wages and controlling for selection and 1.2% when using log monthly wages. This suggests that women who decide not to work, would actually face wage penalties for their

years of part time experience.

We find evidence that couples where wives do more housework and child care are less likely to divorce, whereas wives' additional hours in the market are related to a higher probability of separation. This might explain why so many married women only work part time, even though it is costly in terms of future earnings and particularly harmful in case of divorce. Given strong interdependencies of decisions regarding female labor force participation, market hours, home production, child care and divorce, our empirical analysis faces endogeneity issues. Although, we observe individuals two years before separation and thus four to five years before divorce, we cannot rule out that unobservable factors jointly determine decisions on hours worked, home production, child care, and divorce. Nevertheless, the empirical relationships between market hours, time dedicated to home production and child care, and divorce together with lower returns to working less than full time give rise to a set of interesting questions: Why in the face of non-trivial divorce risks do married women work so little? How are decisions regarding market hours and home production conditioned on divorce? What role does the joint taxation of couples play for married women's decisions to work fewer hours? In order to answer these questions and to thus disentangle women's decisions on market hours, home production, and divorce, we build a model economy.

3 Model

Our model economy is populated by men and women who live for 6 periods, each lasting 3 years. At the beginning of adulthood, women and men live in couples, and they have one child (children make no decisions). Periods are indexed by the age of the youngest child, a. Hence rather than distinguishing between younger and older couples, we differentiate households by their child's age. Households receive utility from consumption of a market good and a home-produced good which requires time inputs t and purchased market goods m. If women work, they have to pay for child care which may be subsidized by the government. Every period, adult men spend a fixed fraction of their time at work whereas women divide their time between work, home production, and leisure. Women's wage rate depends on their initial human capital (education level) and their accumulated labor market experience over the first 4 periods (12 years) of their careers.

Marriage Market At the beginning of adulthood, all men and women are matched in couples according to the distribution $\Pi(x, z)$, where x and z are wife's and husband's initial

productivity levels respectively. Each couple is assigned an initial match quality, γ which is uniformly distributed across couples. At the end of every period each couple receives a match quality shock - γ' - from the distribution $\Gamma(\gamma'|\gamma)$ with a persistence parameter γ_c. Upon observing the shock, individuals decide whether to remain married or whether to divorce unilaterally. If couples divorce, they enter the next period as divorcées, and remain divorced for the rest of their lives.

Home production The home produced good, which also encompasses child care, requires the wife's time input (t_a^h) and a market purchased input, m_a.[13] The importance of the time input d_a is a function of the child's age,

$$H_a = (t_a^h)^{d_a}(m_a)^{(1-d_a)}, \tag{1}$$

where,

$$d_a = d_y^{a^{d_m}}. \tag{2}$$

Utility Women receive utility from consumption of a market good, c_a , from consuming a home produced good H_a, from leisure t_a^l, and, if they are married they also enjoy the quality of their match (γ_a). Married men receive utility from the match quality, consumption of the private and the home-produced good, but they do not obtain utility from their wives' leisure. Men's own leisure does not enter utility because it is a fixed number. The utility of a married woman, $U_w(.)$ is hence given by

$$U^w(c_a, H_a, t_a^l, \gamma_a) = \frac{1}{1-\sigma_c}{c_a}^{1-\sigma_c} + \phi_h H_a + \frac{\phi_l}{1-\sigma_l}{t_a^l}^{1-\sigma_l} + \gamma_a,$$

while the utility of her husband is

$$U^h(c_a, H_a, t_a^l, \gamma_a) = \frac{1}{1-\sigma_c}{c_a}^{1-\sigma_c} + \phi_h H_a + \gamma_a.$$

[13]We assume husbands' time dedicated to home production to be zero as in the data it does not vary across women's labor force participation status.

For divorced women, utility U_d^f, is the same as for married women except that there is no match quality. However, divorced men only obtain utility, U_d^m from consumption of the private good. We hence assume that upon divorce, children remain with their mother, and that they do not provide utility unless they are in the household.[14]

Wage dynamics Hourly wage rates grow according to the following process for the first 4 periods (12 years) of a career. They remain constant afterwards.

$$w_t = (1 + g(l_{t-1}))w_{t-1}, \tag{3}$$

where g - the growth rate - is a function of past labor market participation,

$$g(l_{t-1}) = [g^f g^p g^n]. \tag{4}$$

In order to map women's continuous labor force participation decisions to these growth rates, we assume that full time employment (l^f) requires that she works at least 50% of her time (8 hours per day), whereas part-time employment (l^p) requires that she works between $25-50\%$ (4 hours each day). Men are assumed to work full-time (8 hours per day), thus their wages grow at rate g^f.

Labor force participation decision Every period the couple has to decide how much time the woman dedicates to market work. They decide whether she works or not, and if she does, whether she works part time or full time. Her remaining time is split between home production and leisure.

3.1 Value Functions

3.1.1 Marriage

The value of marriage for a couple with a child of age a is defined as the weighted sum of individuals' expected values of marriage.

$$\max_{l_a, t_a^h, m_a} (\mu V_{m,a}^w(x, z, l_{a-1}, \gamma_a) + (1 - \mu)V_{m,a}^h(x, z, l_{a-1}, \gamma))$$

[14]This simplifying assumption allows us to only keep track of divorced women instead of divorced couples.

s.t.

$$c_a = \Phi(2,1)(T(zl^f + w_a(x, l_{a-1})l_a) - m_a - (1-\omega)F_a^{l_a} I_{l,a} + T_k),$$

$$H_a = (t_a^h)^{d_a}(m_a)^{(1-d_a)}$$

$$1 = t_a^h + t_a^l + l_a,$$

where $\Phi(2,1) = \frac{1}{(2+1\epsilon_1)^{\epsilon 2}}$ denotes economies of scale in consumption and $T = \theta_0^m(zl^f + w_a(x, l_{a-1})l_a)^{1-\theta_1^m}$ is the tax schedule for married couples. F_a^l is the child care hourly fee to be paid if the woman works and which depends on the age of the child and if she works full or part time. $I_{l,a}$ is an indicator function for a working wife. Child care costs are subsidized at rate ω. T_k denotes a government transfer to families with children.

The individual value of marriage for a woman with a child of age a is

$$V_{m,a}^w(x, z, l_{a-1}, \gamma) = Uw(c_a, H_a, t_a^l, \gamma) + \beta EV_{m,a+1}^w(x, z, l_a, \gamma)$$

and her expected continuation value is

$$EV_{m,a+1}^w(x, z, l_a, \gamma) = E_\gamma(V_{m,a+1}^w(x, z, l_a, \gamma')IJ + V_{s,a+1}^w(x, l_a)(1 - IJ))),$$

where I and J are indicator functions equal to 1 if the value of marriage is larger than the value of divorce for the woman and the man respectively. The first term corresponds to the expected value of marriage in the following period, while $V_{s,a+1}^w(.)$ is the value of divorce in the following period defined below.

3.1.2 Divorced women

Divorced women receive utility from consumption of the market good and the home produced good, similar to couples,

$$V_{s,a}^w(x, l_{a-1}) = \max_{l_a, t_h, m_a} (U(c_a, H_a, t_a^l) + \beta V_{s,a+1}^w(x, l_a) - c_d I_f)$$

s.t.

$$c_a = \Phi(1,1)(T(w_a(x, l_{a-1})l_a) - (1-\omega))F_a^{l_a} I_{l,a} - m_a + s_a + T_k + T_s + T_w(1 - I_{l,a}))$$

$$1 = t_a^h + t_a^l + l_a$$

$$H_a = (d_a m_a^\rho + (1 - d_a)(t_a^h)^\rho)^{1/\rho}$$

where $\Phi(1,1) = \frac{1}{(1+1\epsilon_1)^{\epsilon 2}}$ and $T = \theta_0^s(w_a(x, l_{a-1})l_a)^{1-\theta_1^s}$ are economies of scale for a household composed of one child and one adult, and the tax schedule for single individuals respectively.

Divorced women with children will receive child alimony from their ex-husbands, s_a, which dependent on the child's age. In addition, divorced women receive a transfer T_w if they do not work. Furthermore, working fulltime ($I_f = 1$) implies a utility cost, c_d, for divorced women.[15] If a woman divorces, she remains divorced for the rest of her life, thus her expected continuation value is

$$EV_{s,a+1}^w(x, l_a) = V_{s,a+1}^w(x, l_a).$$

3.1.3 Divorced men

Divorced men only receive utility from consumption of the market good

$$V_{s,a}^h(z) = \max_{c_a}(U(c_a)) + \beta V_{s,a}^h(z)$$

s.t.

$$c_a = T(zl^f) - s_a.$$

Divorced men pay alimony s_a to their ex-wives. Once divorced, they remain divorced for the rest of their lives, and hence $EV_{s,a+1}^h(z) = V_{s,a+1}^h(z)$.

4 Calibration

In order to quantitatively assess how much endogenous divorce matters for explaining married women's market and housework hours over the life cycle, we calibrate our model. Given that a model period corresponds to three years, the discount factor β is set to 0.88 to match a

[15] The transfer and the utility cost are set for calibration purposes to match the labor force participation of divorced women in the second period to closely capture the value of divorce. They might correspond to welfare transfers in case of non-working divorced mothers and the cost of being a lone parent working full time.

yearly interest rate of 4%. Policy parameters are taken directly from German data. Unless otherwise stated, the statistics used for calibration come from a 2011-2016 sample of West German mothers age 20 to 60 with a youngest child below the age of 18. In particular, we consider weighted statistics, and in line with our model we group mothers by the age of their children, a. We aggregate over 2 periods. During periods 1 and 2 when children are [0-3) and [3-6) years old, mothers are defined as mothers of small children and during periods 3 and 4 when children are [6-12) years old they are defined as mothers of young children. Households face a discrete choice of mothers' work time: full, part time or no work. Home production can be up to 16 hours with half hour intervals. Leisure is defined as disposable time of 16 hours minus time dedicated to market work and home production. Expenditure on market goods for the production of the home good is capped at 30 % of household income and can be chosen in 1 % increments. All monthly payments and transfers are transformed to per unit of market productive time, by dividing the amounts by 160 (four weeks, five days per week, 8 hours per day).

To pair women and men, we use a matching matrix $\Phi(s, s)$, with $\Phi(i, j)$ being a particular element of this matrix, and where $i \in s$ and $j \in s$ denote women's and men's education levels respectively - see Table A8 of the Appendix. In particular we use the International Standard Classification of Education (ISCED 1997) and define: (1) primary schooling, (2) lower secondary, (3) upper secondary or vocational, (4) upper secondary and vocational, (5) higher vocational, and (6) university. Following Guner et al [2012], we use men's average hourly wages by education at age 25 to 35 to assign initial wage rates, see Table **??** in the Appendix. We assume that men and women have the same initial wages and their wages evolve differently due to households' decisions on women's labor market participation. Therefore, the gender wage gap arises endogenously in our model.

We take the growth rates of women's wages according to experience from our estimates of the Mincer wage regression (see Section A.3). Given that one period is equivalent to three years, we set the wage growth rate of working full time to be equal to the estimated coefficient of years working full time $(1 + g)^3$ -g^f = 0.1112 (yearly growth, 0.037). We do the same for returns to part time experience: $g^p = 0.0300$, (yearly growth, 0.01) -, and we estimate that no participation in the labor market leads to an annual depreciation of wages, so that $g^n = -0.0240$, (yearly growth, -0.008).

We assume a Cobb-Douglas production function for housework and child care, and we calibrate parameter d_a to match the share of time in home production of mothers who work full

time and those who work part-time in period 1. The weight of home production in utility ϕ_k is set to 1.6368 to target couples' expenditure on households goods and services. The curvature of the utility functions σ_c and the curvature of the utility of leisure, σ_l are calibrated to match the 3 moments related to mothers' labor force participation: the share of mothers with small children who work, the share of mothers with young children who work and the share of mothers with young children who work full time. Finally the weight of leisure in utility ϕ_l is calibrated to match time spent by all married mothers on housework and child care. Parameters ϵ_1 and ϵ_2 correspond to economies of scale in consumption, and following Cutler and Katz [1992] ϵ_1 is set to 0.4 and ϵ_2 takes on value 0.5.

We set the prices of child care to differ by the time spent in child care. We calibrate the price of full-time child care, while we take the price of part-time child care from the literature. Wrohlich [2006] reports an expected monthly cost of part time and full-time day care using the probability of obtaining a subsidized child care slot and the costs of public and private care. We use the child care costs in a part time slot to calculate the hourly cost of child care if a mother works part time for children between 0-2 and 3-6 years of age. The expected cost of child care for children aged 0-2 is €183 per month. We estimate the hourly cost of child care to be 1.525 for women who work part time up to 30 weekly hours, while for children aged 3-6, the hourly cost is set to 0.75 as the monthly expected cost is €90. We calibrate the cost of hourly child care for a full time slot when children are small $(0-6)$ to match the full time participation when children are small. Mothers tend to be on parental leave over this period and thus it is hard to estimate the cost of child care if this women are not participating. For those mothers with children of age 7-9 we assume that full time working mothers face the same cost as before, while part-time working mothers face no cost as children attend school. Cost of child care for children over 9 years of age is set to zero.

The following two parameters play a key role in matching marriage statistics in our model. We assume that couples' match quality is distributed according to a generalized Pareto distribution $\Gamma(\gamma)$ with location parameter γ_l calibrated to -0.7105 to target the share of individuals divorcing after the first period. Persistence, or the probability of receiving the same match quality in the following period, $p(\gamma_c)$ is set equal to 0.8 to match the share of divorced individuals in period 3. In order to reflect the value of divorcing, we need to match the labor force participation of divorced mothers. To match the share of divorced mothers who participate full time in the second period we impose a utility cost c_d to full time employment each period and we give a transfer to non-working divorced mothers T_w so as to match the labor force participation of divorced mothers in the second period.

Table 4: Parameters

Parameter	Explanation	Value	Source
Parameters set a priori			
β	discount factor	0.88	-
F_1^p	cost of child care, part-time, period 1	1.525	Wrohlich(2006)
F_2^p	cost of child care, part-time, period 2	0.75	Wrohlich(2006)
ϵ_1	economies of scale	0.4	Cutler and Katz(1992)
ϵ_2	economies of scale	0.5	
Calibrated Parameters			
$F_{1,2,3}^f$	cost of child care, full-time, periods 1, 2, 3	1.725	
d_y	parameter of time input in home production	0.826	
d_m	parameter of time input in home production	0.447	
ϕ_h	utility weight home produced goods	1.6368	
ϕ_l	utility weight leisure	0.8505	
σ_c	curvature of utility, consumption	0.89	
σ_l	curvature of utility, leisure	0.45	
γ_l	location parameter, match quality	-0.7105	
γ_c	persistence in match quality	0.8	
c_d	utility cost, full time working divorced mother	3.05	
T_w	transfer divorced non-working mothers	2.049	
Policy Parameters			
θ_0	tax function	0.95	Holter, Krueger, Stepanchuk (2015)
θ_1^m	tax function, married	0.23	Holter, Krueger, Stepanchuk (2015)
θ_1^s	tax function, single	0.19	Holter, Krueger, Stepanchuk (2015)
ω	child care subsidy	0	
T_k	Child transfer	1.125	Kindergeld
s	child alimony	2.9741	Average alimony received, 2011-2016

Finally, we determine the model's policy parameters for the tax schedule, child care subsidies - ω and child alimony - s_a and the child transfer, T_k. We follow Holter, Krueger, Stepanchuk [2015] and set τ_0 for both married and single individuals to 0.95 and τ_1 to 0.23 for married and 0.19 for single. In Germany, public child care slots are highly subsidized - OECD [2008]. However, availability of these slots for small children (0-3) is very restricted, especially in West Germany. The large majority of mothers thus does not have access to highly subsidized child care for their small children. Hence, effective child care costs are high. We set child care subsidies, ω equal to zero in our benchmark economy. Households with children receive a transfer, Kindergeld, of 180 on average for a child, T_k which in our model is equivalent to setting the transfer to 1.125. We assume that the child remains with the mother after divorce such that she is the recipient of any alimony.[16]. For now, we assume that all divorced fathers pay the same amount of alimony - 475.851€ which is the average alimony received in our data. We hence set s_a to 2.9741 for the periods when children are

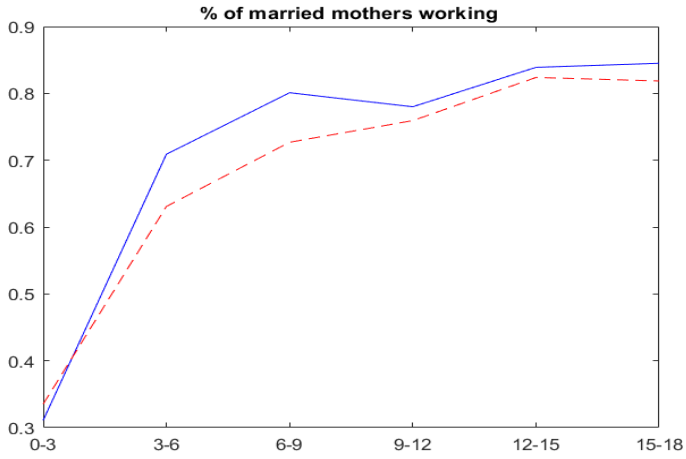
[16]The vast majority of children in Germany live with their mothers after divorce. According to Geisler et al [2018] around 61% (23%) live with heir mothers and have regular (no contact) with their fathers.

in the divorced mother's household. For computational reasons, we normalize all our prices by the highest initial hourly wage. All parameters are displayed in Table 4.

5 Results

Table 5 presents targeted moments from our benchmark model together with the corresponding data moments. Our model matches the data on married mothers' labor force participation and divorce statistics fairly well. As children are older, mothers' full and part time labor force participation increases. Full time employment is more likely among divorced women compared to married women. Our model period corresponds to 3 years and given that we have used aggregate moments of 6 years to calibrate the model, we have more un-targeted moments to assess the validity of the model. Figure 1 shows the percentage of married mothers working over their child's life cycle. The model reproduces the life cycle properties of the data fairly well.

Figure 1: % of married mothers who work over child's life cycle



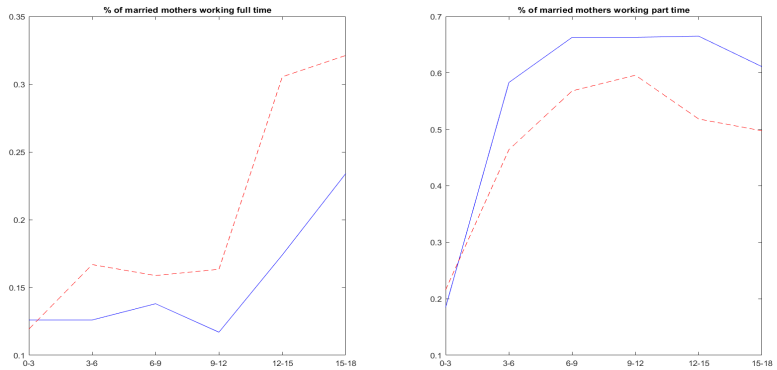
Solid line: Data; Dashed line: Model.

Figure 2 displays the percentage of mothers working full time and part time out of all mothers, respectively. The model cannot replicate the small increase observed in the data of mothers working full time over their children's life cycle. However, it does a very good job in matching the pattern of strongly increasing part time participation over the child's first nine years of life.

Table 5: Data and model moments: targeted

	Benchmark	Data
Moments referring to married mothers		
% working full time, period small	14.31	12.60
% non working, period small	51.70	50.20
% working full time, period young	16.11	12.80
% non working, period young	25.69	20.90
% time spent on home production, full time work, period 1	34.37	25.81
% time spent on home production, part time work period 1	59.58	63.68
% time spent on home production, no work period ,1	86.04	93.85
% time spent on home production, all	61.26	61.54
expenditure on children, as % of income	15.97	11
Moments referring to divorced mothers		
% divorces, period 2	7.64	7.30
% divorces, period 4	21.90	18.50
% divorced working full time, period 2	15.98	19.20
% divorced non working, period 2	14.46	17.20

Figure 2: % of married mothers who work over child's life cycle, full and part time



Solid line: Data; Dashed line: Model.

5.1 Divorce and women's employment decisions

To highlight the importance of modeling divorce endogenously we carry out two exercises: the first one takes divorce as exogenously given and hence independent of couples' value of marriage, while in the second exercise we rule out divorce.[17] For the first exercise, we take for each period the share of divorced individuals by couple's education from our benchmark economy to determine couples' divorce probabilities.[18] The resulting model moments are displayed in Table 6 next to those from our benchmark economy where divorce is endogenous. When divorce is exogenous and independent of couples' value of marriage, married mothers work more full time whereas their participation is similar to before. When unable to affect the probability of divorce via decisions on time allocation, women work more full time because it guarantees higher future wages increasing women's outside option. On the other hand, when divorce is endogenous women work fewer hours, they work more part time and spend more time on home production in order to achieve a higher value of marriage making divorce less likely.

In our second exercise we rule out divorce. In this case, the observed changes in model moments arise because of two channels: selection and behavior. Couples who would have divorced must now remain married, and hence their decisions will affect aggregate moments of married individuals (selection effect). On the other hand, not being able to divorce also affects individuals' decisions directly (behavioral effect). We isolate the behavioral effect by considering only decisions made by those women who would have remained married taking from the benchmark economy for each period the share of couples who have remained married by education type, previous labor force participation of the wife and match quality. Thus the pure behavioral effect is defined by decisions of these couples. Table 7 displays the results next to the benchmark economy. When we rule out divorce, married women work more full time than in our benchmark economy in all periods. This suggests that optimally, some couples – mostly low educated couples – would want to lower home production and increase consumption of the private good, were it not for the risk of divorce. Results regarding reduced expenditure on children and less time spent on home production when divorce is

[17] Most of the literature on the labor force participation of married women follows one of these two approaches. Greenwood et al [2016], Mazzocco, Ruiz and Yamaguchi [2013], Eckstein et al [2019] are some of the few exceptions to the rule, but different from us, they do not focus on the relationship between hours worked and divorce.

[18] We have also tried with divorce probabilities depending on couple's type and match quality and divorce probabilities depending on couple's type and every couple receiving the average match quality of the distribution. Results are very similar.

Table 6: Exogenous divorce

	(1) Benchmark	(2) Exogenous divorce
Moments referring to married mothers		
% working full time, period small	14.31	36.72
% non working, period small	51.70	47.90
% working full time, period young	16.11	34.61
% non working, period young	25.69	17.30
% working full time, period 1	11.93	36.95
% working full time, period 2	16.69	36.50
% working full time, period 3	15.88	34.71
% time spent on home production, full time work, period 1	34.37	34.37
% time spent on home production, part time work period 1	59.58	59.38
% time spent on home production, no work period ,1	86.04	86.19
% time spent on home production, all	61.26	54.81
expenditure on children, as % of income	15.97	14.35
Moments referring to divorced mothers		
% divorces, period 2	7.64	7.30
% divorces, period 4	21.90	18.50
% divorced working full time, period 2	15.98	16.74
% divorced non working, period 2	14.46	14.46

impossible confirm this. These findings could in principle be due to selection. However, from period 2 onward we can consider separately decisions of women who would have remained married in the benchmark economy - behavioral effect only. Here, we observe that these women would also work more full time than in the benchmark economy in both periods 2 and 3.

Regarding participation on the other hand, whereas without divorce, more women work when children are very young 0-3, this is not the case when children get older 3-6, and changes again when they are 6-9. Higher participation in the first period is driven by the desire to increase consumption of the private good as discussed before. However, without divorce in the second period participation does not increase as much as in our benchmark economy because women worry less about depreciation of their human capital. Nevertheless, the couple's by income is in part determined by her income and hence in period 3 when child care costs are significantly reduced as children enter primary school at age 6, participation increases. It actually increases more than in the benchmark economy, for couples who would and those who would not have divorced, because a low level of home production is not threat to divorce.

Table 7: Ruling out divorce

	(1) Benchmark	(2) No divorce	(2)Behavioral effect only
Moments referring to married mothers			
% working full time, period small	14.31	36.94	
% non working, period small	51.70	34.43	
% working full time, period young	16.11	36.94	
% non working, period young	25.69	19.86	
% time spent on home production, all	61.26	52.93	
expenditure on children, as % of income	14.35	13.95	
% working full time, period 1	11.93	36.95	-
% non working, period 1	66.49	35.49	-
% working full time, period 2	16.69	36.94	32.75
% non working, period 2	36.91	33.37	35.13
% working full time, period 3	15.88	36.94	30.93
% non working, period 3	27.31	19.86	23.79
% time spent on home production, period 1	74.17	59.33	-
% time spent on home production, period 2	61.31	55.36	56.85
% time spent on home production, period 3	56.08	48.98	51.44

5.2 Counterfactual experiments

We propose three counterfactual experiments to evaluate the effects of different policies on women's labor force participation and divorce: a subsidy to child care costs, less progressivity of the tax system and higher alimony payments. Table 8 reports the percentage point changes in the model's moments in our benchmark calibration next to those under there is a subsidy to child care costs as well as these moments under exogenous divorce as well as for the no-divorce case. We introduce a 13% subsidy (ω) to child care costs which is the amount necessary to decrease child care costs faced by mothers working full-time in the first period to the costs faced by mothers working part-time in the same period.

Lowering the cost of childcare leads to more married mothers working full time, when children are small (0-3 years) and in particular when they are between 3 and 6 years old, and mother's time in home production and child care becomes less important. Note that the small increase in the share of non-working married mothers is simply a composition effect, as more women, and in particular those who work, divorce. Among divorced women, the share of those not working decreases and divorce increases because the cost of raising a child are lowered. Note that the increase in divorce also feeds back into women's labor force participation decisions, raising the share of full time workers. As more women work full time , less time is spend

on home production. Given the assumption of the Cobb-Douglas production function for home production, as time is reduced, we would expect expenditure to increase. However, as income increases, the share devoted to child care and home production falls.

When divorce is exogenous, there is no re-optimization when the price of child care is lowered by 13%. We merely observe an income effect, as higher income lowers the share of expenditures devoted to child care and home production. When divorce is exogenous, individuals maximize a weighted average of the value of divorce and marriage, and lowering the costs of child care affects both in a similar way. On the other hand, when divorce is ruled out, couple decide to increase the share of mothers working full time as child care becomes cheaper. Note that this increase is lower than in our benchmark model, due to the fact that here the threat of a higher divorce risk is not active. The absence of this feedback mechanism leads to effects of smaller magnitude overall.

Table 8: Experiment: Subsidy to child care costs

Effects in percentage points	**13% subsidy**		
	benchmark model	exogenous divorce	no divorce
Moments referring to married mothers			
% working full time, period small	+6.38	0	+2.42
% non working, period small	+0.06	0	-0.98
% working full time, period young	+13.73	0	+2.41
% non working, period young	+0.01	0	0
% time spent on home production, full time, period 1	+0.69	0	+0.30
% time spent on home production, part time period 1	-0.05	0	+0.07
% time spent on home production, no work period ,1	+0.01	0	+0.04
% time spent on home production, all	-2.37	0	-0.7
expenditure on children, as % of income	-0.65	-0.8	-0.17
Moments referring to divorced mothers			
% divorces, period 2	+0.39	0	–
% divorces, period 4	+0.23	0	–
% divorced working full time, period 2	+1.24	0	–
% divorced non working, period 2	-0.71	0	–

In the second experiment, we propose reducing the progressivity of the tax schedule in Germany for couples to the US level. Table 9 reports the percentage point change in model's moments for the benchmark and the exogenous and no divorce case. As working for the secondary earner becomes more attractive, more married mothers work and more work full time. This reduces their time spend in home production and child care and expenditure increases,

but drops as a share of income. The increase in income and women's accumulated human capital makes divorce more attractive and divorce rates increase. This is why the labor force participation effects are larger in our benchmark model compared to the exogenous divorce case where the threat of divorce is maintained constant. Less tax progressivity for couples has the largest effects on mothers working full time in the no divorce case, as this policy change affects the entire lifetime income of couples who never divorce. In our benchmark model on the other hand, there is no change for individuals' income once they divorce. Note that changes in divorced women's labor force participation are due to composition effects. As more women divorce, also those who do not work, or who do nor work full time divorce.

Table 9: Experiment: Less progressivity

Effects in percentage points (before: $\theta_1^m = 0.23$, $\theta_1^s = 0.19$)	**US tax progressivity** $\theta_1^m = \theta_1^s = 0.19$		
	benchmark model	exogenous divorce	no divorce
Moments referring to married mothers			
% working full time, period small	+17.66	+3.99	+29.07
% non working, period small	-13.4	-18.38	-5.83
% working full time, period young	+19.13	+4.18	+29.06
% non working, period young	-2.36	0	-5.59
% time spent on home production, full time, period 1	+0.01	0	+0.01
% time spent on home production, part time period 1	-0.07	0	+1.01
% time spent on home production, no work period ,1	-0.73	0	+0.04
% time spent on home production, all	-6.57	0	-8.67
expenditure on children, as % of income	-1.61	0	-2.28
Moments referring to divorced mothers			
% divorces, period 2	+0.65	0	–
% divorces, period 4	+3.76	0	–
% divorced working full time, period 2	-0.27	0	–
% divorced non working, period 2	+1.42	0	–

Finally, we increase alimony payments by 10%, see Table 10. In this case we can only compare our change in results in the benchmark model and the exogenous divorce case as by definition under the no divorce scenario alimony payments will not have any effect. In our benchmark model , higher alimony payments lead to lower full time participation by married mothers. However, the share of women not working only increases among those with small children 0-3 years old, when mother's time in child care matters most. For those with older children, not working becomes less attractive. This is due to the fact that divorce also becomes more likely when alimony payments are higher and hence women

still have an incentive in accumulating human capital for the divorce case. Time spent on home production and child care increase overall, driven by the relativity large increase in non-working mothers when children are small. As this implies lower income for couples, the share of expenditures on children increase, even though we would expect it to fall in absolute terms, given that now more time is devoted to them. As expected, the higher alimony payments, lead to a reduction in labor force participation of divorced mothers, both along the intensive and extensive margin. In the exogenous divorce case, on the other hand, we basically only observe a reduction in the share of divorce women working full time as alimony payments increase. This highlights the fact that changes in alimony payments only affect married couples decisions in as far as they are able to alter the probability of divorce. Our results are hence in line with empirical findings in Chiappori et al [2017] who did not find any affect of a change in Canadian alimony law on women's labor force participation decisions in newly formed couples, who had been able to internalize the policy change.

Table 10: Experiment: Increase in alimony payments

Effects in percentage points	10% increase	
	benchmark model	exogenous divorce
Moments referring to married mothers		
% working full time, period small	-2.28	0
% non working, period small	+14.68	0
% working full time, period young	-2.5	+0.03
% non working, period young	-0.39	+0.01
% time spent on home production, full time, period 1	+0.01	0
% time spent on home production, part time period 1	+0.29	0
% time spent on home production, no work period ,1	-0.26	0
% time spent on home production, all	+2.38	0
expenditure on children, as % of income	+0.56	0
Moments referring to divorced mothers		
% divorces, period 2	+2.08	0
% divorces, period 4	+4.35	0
% divorced working full time, period 2	-1.7	-4.34
% divorced non working, period 2	-0.38	0

6 Conclusion

We show empirical evidence for a positive relationship between wives spending more hours working in the market (and less hours dedicated to home production and child care) and

divorce for married couples in Germany. This suggests that even though working part time implies a cost in terms of lower future wages, affecting in particular divorced women, married women could be optimally choosing to work only part time to reduce the risk of divorce.

Motivated by this empirical evidence we build a dynamic life cycle model of women's labor force participation, home production, and divorce decisions, that allows us to study this mechanism in detail. We use our model to highlight the importance of modeling divorce endogenously when accounting for married women's time allocation. When divorce is exogenous or ruled out, full time participation of married women is overestimated, and their time dedicated to home production and child care underestimated.

Policies aimed at increasing labor force participation of married women need to take into account this mechanism that could dampen anticipated effects. Running three policy experiments we show that conclusions from each are altered when divorce is assumed exogenous or ruled out. Our findings hence highlight the importance of considering couple dynamics, and ultimately divorce decisions, when analyzing the effect of different labor market policies on women's labor supply.

References

Alesina, Alberto; Ichino, Andrea and Loukas Karabarbounis (2011): "Gender-Based Taxation and the Division of Family Chores," *American Economic Journal: Economic Policy,* 3(2), pp. 1-40.

Bargain, Olivier; González, Libertad; Keane, Claire and Berkay Özcan (2012): "Female labor supply and divorce: New evidence from Ireland," *European Economic Review,* 56, pp. 1675-1691

Becker, Gary S.; Landes, Elisabeth M. and Robert T. Michael (1977): "An Economic Analysis of Marital Instability," *Journal of Political Economy,* 85(6), pp. 1141-1187

Bertrand, Marianne; Kamenica, Emir and Jessica Pan (2015): "Gender Identity and relative Income within Households," *Quarterly Journal of Economics,* 130(2), pp. 571-614.

Bick, Alexander and Nicola Fuchs-Schündeln (2017): "Taxation and Labor Supply of Married Couples across Countries: A Macroeconomic Analysis," *Review of Economic Studies*, forthcoming.

Bittman, Michael; England, Paula; Sayer, Liana; Folbre, Nancy and George Matheson (2003): "When Does Gender Trump Money? Bargaining and Time in Household Work," *American Journal of Sociology,* 109(1), pp. 186-214

Blebo, Miriam and Elke Wolf (2000): "How much does a year off cost? Estimating the wage effects of employment breaks and part-time periods," ZEW Discussion Papers, No. 00-69.

Blossfeld Hans-Peter and Andreas Timm (2003): *Who Marries Whom? Educational Systems as Marriage Markets in Modern Societies,* Springer Science & Business Media.

Bremmer, Dale and Randy Kesselring (2004): "Divorce and female labor force participation: Evidence from Time-series data and cointegration," *Atlantic Economic Journal,* 32(3), pp. 175-190.

Bredtmann, Julia and Christina Vonnahme (2017): "Less Alimony after Divorce - Spouses' Behavioral Response to the 2008 Alimony Reform in Germany," Ruhr Economic Papers No. 702.

Bundesministerium für Familie, Senioren, Frauen und Jugend (2005): Gender-Datenreport, 1. Datenreport zur Gleichstellung von Frauen und Männern in der Bundesrepublik Deutschland, München.

Chakraborty, Indraneel; Holter, Hans A. and Serhiy Stepanchuck (2015):"Marriage stability, taxation and aggregate labor supply in the US vs. Europe," *Journal of Monetary Economics* 72, pp. 1-20.

Cherlin Andrew (1977): "The effect of children on marital dissolution," *Demography,* 14(3), pp 265-272.

Chiappori, Pierre-Andre; Iyigun, Murat; Lafortune, Jeanne and Yoram Weiss (2017): "Changing the rules midway: The impact of granting alimony rights on existing and newly formed partnerships," *Economic Journal,* 127, pp. 1874-1905.

Cooke, Lynn Prince (2006): ""Doing" Gender in Context: Household Bargaining and Risk of Divorce in Germany and the United States," *American Journal of Sociology,* 112(2), pp. 442-472.

Cutler, David M. and Lawrence Katz (1992): "Rising Inequality? Changes in the Distribution of Income and Consumption in the 1980s," *American Economic Review*, 82(2), pp. 546-551.

del Boca, Daniela and Daniela Vuri (2007): "The mismatch between employment and child care in Italy: the impact of rationing," *Journal of Population Economics,* 20(4), pp 805-832.

Eckstein Zvi; Keane, Michael and Osnat Lifshitz (2019): "Career and Family Decisions: Cohorts born 1935-1975," *Econometrica,* 87(1), pp 217?253.

Eckstein, Zvi and Osnat Lifshitz (2011): "Dynamic Female Labor Supply," *Econometrica,* 79(6), pp 1675-1726.

Eurostat (2015): "Gender pay gap in unadjusted form."

Fernández, Raquel and Joyce Wong (2017): "Free to Leave? A Welfare Analysis of Divorce Regimes," *American Economic Journal: Macroeconomics,* 9(3), pp. 72-115.

Fernández, Raquel and Joyce Wong (2014): "Divorce Risk, Wages, and Working Wives: A Quantitative Life-Cycle Analysis of Female Labour Force Participation," *Economic Journal,* 124(576), pp. 319-358.

Geisler, Esther; Köppen, Katja; Kreyenfeld, Michaela; Trappe, Heike and Matthias Pollmann-Schult (2016): "Familien nach Trennung und Scheidung in Deutschland," Deutsche Gesellschaft für Demographie.

Greenwood, Jeremy; Guner, Nezih; Kocharkov, Georgi and Cezar Santos (2016): "Technology and the Changing Family: A Unified Model of Marriage, Divorce, Educational Attainment, and Married Female Labor-Force Participation," *American Economic Journal: Macroeconomics,* 2016, 8(1), pp. 1-41.

Guner, Nezih; Kaygusuz, Remzi and Gustavo Ventura (2012): " Taxation and Household Labour Supply," *Review of Economic Studies,* 79(3), pp 1113-1149.

Holter, Hans A.; Krueger, Dirk and Serhiy Stepanchuk (2015): "How Do Tax Progressivity and Household Heterogeneity Affect Laffer Curves?, " mimeo.

Johnson, William R. and Jonathan Skinner (1986): "Labor Supply and Marital Separation," *American Economic Review,* 76(3), pp. 455-469.

Knowles, John (2013): "Why are Married Men Working So Much?," *Review of Economic Studies,* 80, pp 1055-1085.

Kraft, Kornelius and Stefanie Neimann (2009): "Effect of labor division between wife and husband on the risk of divorce; Evidence from German data," SOEPpapers 223.

Laun, Tobias and Johanna Wallenius (2014): "Having It All? Employment, Earnings and Children," Working paper 2017:6, Uppsala University, Department of Economics.

Mazzocco, Maurizio; Ruiz, Claudia and Shintaro Yamaguchi (2013): "Labor Supply, Wealth Dynamics, and Marriage Decisions," mimeo.

Newman, Andrew F. and Claudia Olivetti (2015): "Career Women and the Durability of Marriage," mimeo.

OECD (2010): "Country statistical profile: Germany 2010," *OECDiLibrary*, Organisation for Economic Co-Operation and Development, Paris.

OECD (2008a): "OECD Economic Surveys: Germany," Organisation for Economic Co-Operation and Development, Paris.

OECD (2002): "Germany Country chapter," *Benefits and Wages*, OECD series, Organisation for Economic Co-Operation and Development, Paris.

Papps, Kerry L. (2006): "The Effects of Divorce Risks on the Labor Supply of Married Couples," IZA Discussion Paper, No. 2395.

Ragan, Kelly S. (2013): "Taxes and Time Use: Fiscal Policy in a Household Production Model," *American Economic Journal: Macroeconomics,* 5(1), pp.168-192.

Rangel, Marcos A. (2006): "Alimony rights and intrahousehold allocation of resources: Evidence from Brazil," *Economic Journal,* 116, pp-627-658.

Social Security Administration (2014): "Income of the Population 55 or Older, 2014, Poverty Status of Aged Persons based on Family Income," US Social Security Administration.

Statistisches Bundesamt (2015): "Tageseinrichtungen für Kinder nach Art der Plätze und Platz-Kind Relation nach Ländern," Statististik der Kinder-und Jugendhilfe, available upon request for years 1990 (West), 1991 (East), 1998 (Total) and 2002 (Total).

Stevenson, Betsey (2008): "Divorce Law and Women's Labor Supply," *Journal of Empirical Legal Studies,* 5(4), pp. 853-873.

Stevenson, Betsey and Justin Wolfers (2007): "Marriage and Divorce: Changes and their Driving Forces," *Journal of Economic Perspectives,* 21(2), pp. 27-52.

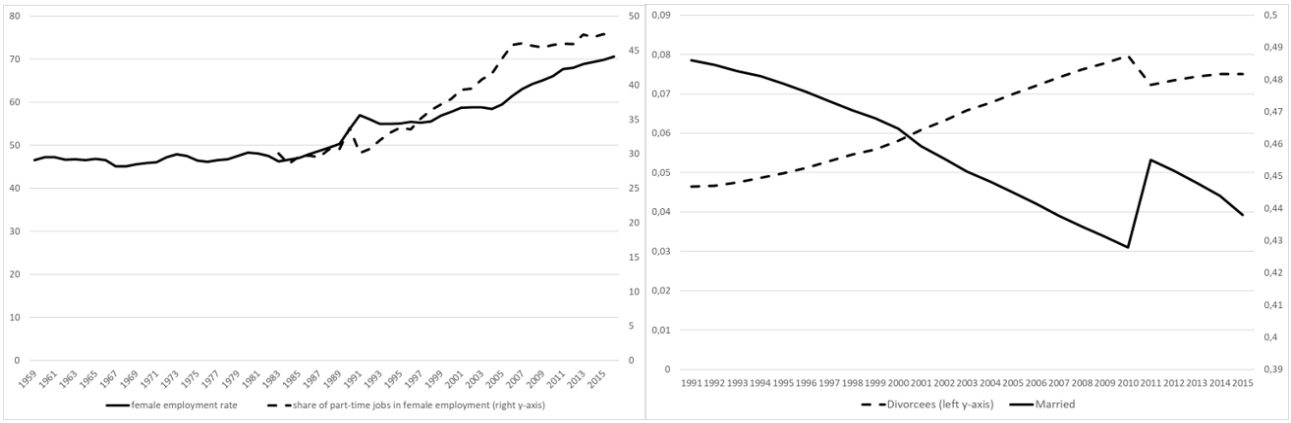
Voena, Alessandra (2015): "Yours, Mine, and Ours: Do Divorce Laws Affect the Intertemporal Behavior of Married Couples?," *American Economic Review,* 105(8), pp. 2295-2332.

Wrohlich, Katharina (2006): "Labor supply and child care choices in a rationed child care market," DIW Discussion Papers, No. 570.

A Appendix

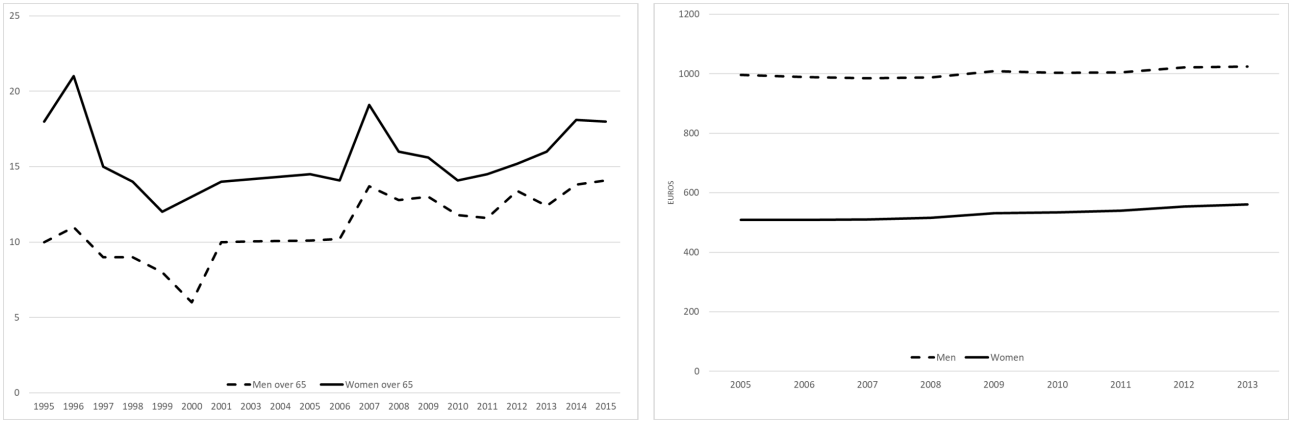
A.1 Figures

Figure A-1: Female employment, part-time work, married and divorced individuals in Germany



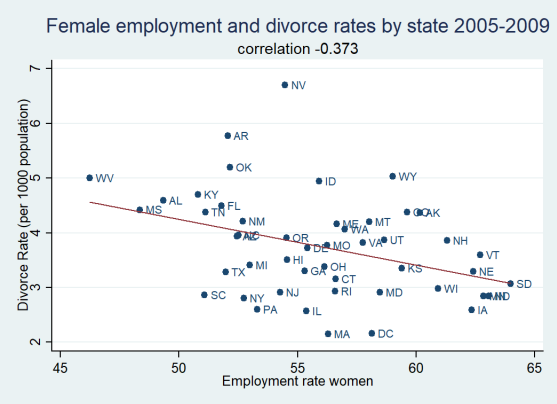
Data: Statistisches Bundesamt for demographics and female employment; OECD for share of part-time.

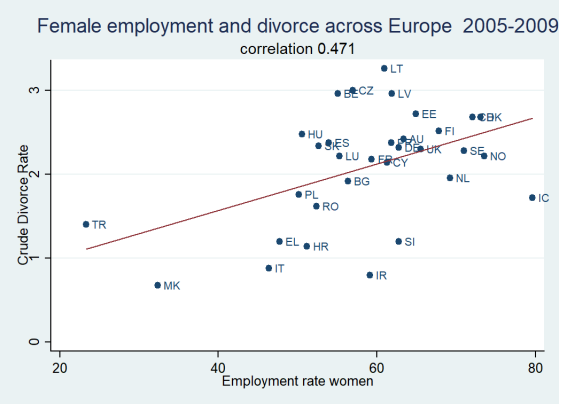
Figure A-2: Average old age pensions and at risk-of-poverty-rates for individuals over 65, for men and women, Germany



Data: Statistisches Bundesamt (monthly averages correspond July 1st of each year)

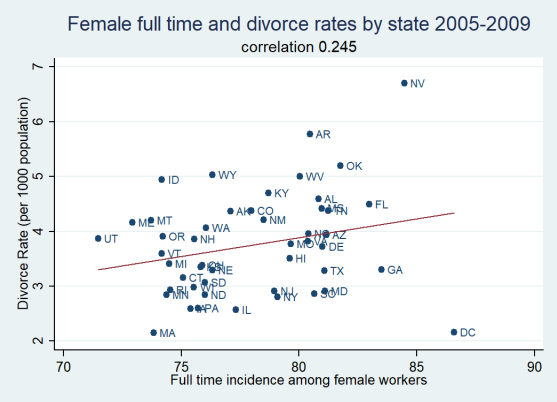
Figure A-3: Divorce rates and female employment in US and Europe

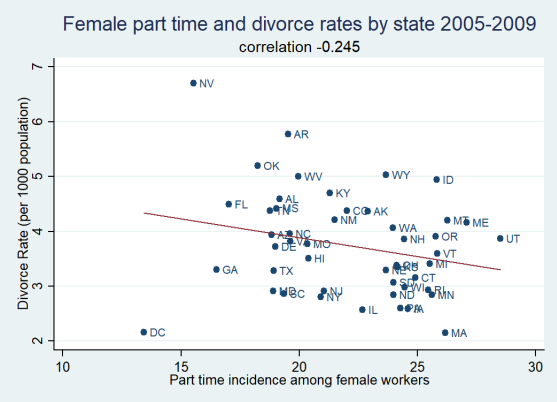




Divorces: US National Center for Health Statistics-National Vital Statistics Report; population numbers and female employment are from the OECD; Eurostat for Europe

Figure A-4: Divorce rates and female full-and part time employment in US





Divorces: US National Center for Health Statistics-National Vital Statistics Report; population numbers and female full-time employment are from the OECD.

A.2 Tables

Table A1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.
Separation in t	0.007	0.083	0	1
Duration marriage	16.121	8.106	2	40
Year marriage	1993.246	8.960	1966	2014
Not first marriage for at least one	0.117	0.321	0	1
Her age at marriage	26.307	5.189	18	54
His age at marriage	28.727	5.606	18	56
Born in Germany, he	0.823	0.381	0	1
Born in Germany, she	0.822	0.383	0	1
Reside in urban region in $t-1$	0.74	0.439	0	1
She works fulltime, $t-2$	0.173	0.378	0	1
He works fulltime, $t-2$	0.931	0.254	0	1
She is employed, $t-2$	0.75	0.433	0	1
He is employed, $t-2$	0.961	0.194	0	1
She is in education, $t-2$	0.027	0.163	0	1
He is in education, $t-2$	0.018	0.132	0	1
Her education (<11 years), $t-1$	0.248	0.432	0	1
His education (<11 years), $t-1$	0.322	0.467	0	1
Her education ($11-16$ years), $t-1$	0.621	0.485	0	1
His education ($11-16$ years), $t-1$	0.507	0.5	0	1
Nr. children: 0-1, $t-1$	0.09	0.296	0	2
Nr. children: 2-7, $t-1$	0.493	0.713	0	4
Nr. children: 8-15, $t-1$	0.742	0.864	0	5
His income (in 2015€) $t-2$	4,156.565	3,005.105	0	105,042.016
Her income (in 2015€) $t-2$	1,286.991	1,537.189	0	54,479.422
Home owners, $t-1$	0.32	0.466	0	1
Married after 2008	0.052	0.222	0	1
Observed after 2008	0.493	0.5	0	1
Her share, housework & child care, $t-2$	0.798	0.184	0	1
Couple's hours per day, housework & child care	9.58	7.013	1	56
Cleaning help, $t-2$	0.094	0.292	0	1

N=18,794; 3,484 couples

Table A2: Robustness to different categorizations of hours worked: Risk of separation and wife's hours worked in the market

	(1)	(2)	(3)	(4)	(5)	(6)
A: *Continuous measure of hours*						
Her weekly hours worked, $t-2$	0.009 (0.003)***	0.009 (0.003)***	0.01 (0.003)***	0.009 (0.003)**	0.009 (0.003)**	0.009 (0.003)**
His weekly hours worked, $t-2$	-.003 (0.004)	-.002 (0.004)	-.002 (0.004)	-.002 (0.004)	-.002 (0.004)	-.003 (0.004)
B: *15-hour categories*						
Her hours: 15-35, $t-2$	0.141 (0.106)	0.147 (0.106)	0.153 (0.107)	0.134 (0.108)	0.137 (0.108)	0.137 (0.109)
Her hours: >35, $t-2$	0.299 (0.117)**	0.308 (0.118)***	0.333 (0.122)***	0.275 (0.131)**	0.279 (0.131)**	0.282 (0.132)**
His hours: 15-35, $t-2$	-.347 (0.368)	-.385 (0.369)	-.381 (0.369)	-.360 (0.372)	-.356 (0.372)	-.374 (0.37)
His hours: >35, $t-2$	-.208 (0.306)	-.227 (0.304)	-.223 (0.306)	-.202 (0.313)	-.190 (0.312)	-.221 (0.311)
C: *10-hour categories*						
Her hours: 10-20, $t-2$	0.793 (0.325)**	0.8 (0.328)**	0.8 (0.328)**	0.792 (0.328)**	0.796 (0.329)**	0.793 (0.327)**
Her hours: 20-30, $t-2$	0.767 (0.324)**	0.78 (0.328)**	0.781 (0.327)**	0.761 (0.328)**	0.766 (0.329)**	0.759 (0.327)**
Her hours: 30-40, $t-2$	0.713 (0.332)**	0.728 (0.336)**	0.738 (0.336)**	0.7 (0.338)**	0.708 (0.339)**	0.707 (0.337)**
Her hours: >40, $t-2$	0.973 (0.327)***	1.009 (0.331)***	1.021 (0.332)***	0.96 (0.336)***	0.967 (0.338)***	0.967 (0.336)***
His hours: 10-20, $t-2$	-.269 (0.55)	-.320 (0.62)	-.289 (0.549)	-.265 (0.557)	-.277 (0.555)	-.276 (0.55)
His hours: 20-30, $t-2$	-.364 (0.547)	-.483 (0.787)	-.457 (0.55)	-.429 (0.559)	-.428 (0.558)	-.450 (0.554)
His hours: 30-40, $t-2$	-.442 (0.483)	-3.896 (131.443)	-.482 (0.483)	-.460 (0.494)	-.457 (0.491)	-.494 (0.487)
His hours: >40, $t-2$	-.398 (0.475)	-3.893 (131.443)	-.434 (0.475)	-.411 (0.487)	-.406 (0.484)	-.432 (0.48)
Number of observations	13,977	13,977	13,977	13,977	13,977	13,977

SOEP data: 2000-2016. The dependent variable is "Separation or divorce in t". The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by probit and they include all controls included in our main regressions in Table 1. Individuals who do not work are assigned zero hours. The number of observations is smaller than in our main sample because for employed individuals for which we have information on full-or parttime status but not on weekly hours worked.

Table A3: Robustness using random fixed effects model: Risk of separation and wives' hours worked in the market

	(1)	(2)	(3)	(4)	(5)	(6)
She works fulltime, $t-2$	0.759 (0.213)***	0.78 (0.214)***	0.834 (0.219)***	0.75 (0.231)***	0.757 (0.23)***	0.747 (0.23)***
He works fulltime, $t-2$	0.349 (0.514)	0.379 (0.516)	0.404 (0.517)	0.493 (0.53)	0.514 (0.529)	0.447 (0.531)
She is employed, $t-2$	0.166 (0.24)	0.16 (0.24)	0.185 (0.248)	0.146 (0.25)	0.155 (0.25)	0.223 (0.252)
He is employed, $t-2$	-.432 (0.648)	-.462 (0.649)	-.471 (0.65)	-.434 (0.651)	-.434 (0.651)	-.327 (0.653)
Not first marriage for at least one	1.017 (0.232)***	0.988 (0.24)***	0.978 (0.242)***	0.967 (0.243)***	0.94 (0.243)***	0.893 (0.244)***
Nr. of children: 0-1, $t-1$			-.401 (0.354)	-.403 (0.355)	-.394 (0.354)	-.368 (0.353)
Nr. of children: 2-7, $t-1$			0.107 (0.16)	0.102 (0.161)	0.12 (0.16)	0.175 (0.162)
Nr. of children: 8-15, $t-1$			0.028 (0.13)	0.029 (0.13)	0.031 (0.129)	0.044 (0.129)
Her education (<11 years), $t-1$		0.073 (0.363)	0.077 (0.366)	0.129 (0.377)	0.074 (0.38)	0.036 (0.381)
His education (<11 years), $t-1$		0.164 (0.358)	0.163 (0.36)	0.069 (0.378)	0.068 (0.378)	0.071 (0.38)
Her education ($11-16$ years), $t-1$		-.040 (0.309)	-.035 (0.311)	0.017 (0.319)	0.009 (0.321)	0.008 (0.322)
(0.323)						
His education ($11-16$ years), $t-1$		0.609 (0.313)*	0.609 (0.314)*	0.532 (0.324)	0.56 (0.325)*	0.564 (0.325)*
Her income (in 2015 €), $t-2$				0.00003 (0.00003)	0.00004 (0.00003)	0.00003 (0.00003)
His income (in 2015 €), $t-2$				-.00003 (0.00005)	-.00002 (0.00004)	-.00003 (0.00005)
Home owners, $t-1$					0.383 (0.194)**	0.401 (0.195)**
Married after 2008						0.125 (0.46)
Observed after 2008						-.480 (0.201)**
Number of observations	18,794	18,794	18,794	18,794	18,794	18,794
Number of couples	3,484	3,484	3,484	3,484	3,484	3,484
Times observed (min)	1	1	1	1	1	1
Times observed (max)	15	15	15	15	15	15
Times observed (average)	5.394	5.394	5.394	5.394	5.394	5.395

SOEP data: 2000-2016. The dependent variable is "Separation or divorce in t". The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by random fixed effects cloglog models and they include a polynomial of degree six for duration as well as additional controls for: couples resides in urban area, for him and her: born in Germany, currently in education, age at marriage (none of which are significant at the 10% level).

Table A4: Robustness to absolute times spent on housework & child care by each spouse: Risk of separation, wife's hours worked in the market and at home.

	(1)	(2)	(3)
She works fulltime, $t-2$	0.26 (0.091)***	0.215 (0.093)**	0.215 (0.093)**
He works fulltime, $t-2$	0.151 (0.196)	0.227 (0.2)	0.228 (0.2)
Her hours housework & child care, $t-2$		-.017 (0.008)**	-.017 (0.008)**
His hours housework & child care, $t-2$		0.026 (0.013)**	0.026 (0.013)**
She is employed, $t-2$	0.076 (0.093)	0.019 (0.096)	0.02 (0.096)
Her is employed, $t-2$	-.114 (0.244)	-.090 (0.245)	-.089 (0.245)
Not first marriage for at least one	0.345 (0.095)***	0.35 (0.095)***	0.35 (0.095)***
Her education (>11 years), $t-1$	0.052 (0.143)	0.065 (0.144)	0.067 (0.144)
His education (<11 years), $t-1$	0.036 (0.138)	0.029 (0.138)	0.032 (0.139)
Her education ($11-16$ years), $t-1$	0.033 (0.12)	0.043 (0.121)	0.045 (0.121)
His education ($11-16$ years), $t-1$	0.212 (0.118)*	0.207 (0.118)*	0.21 (0.119)*
Her income (in 2015 €), $t-2$	0.00002 (0.00002)	0.00002 (0.00002)	0.00002 (0.00002)
His income (in 2015 €), $t-2$	-1.00e-05 (0.00002)	-8.34e-06 (0.00002)	-9.10e-06 (0.00002)
Home owner, $t-1$	0.144 (0.073)**	0.141 (0.073)*	0.141 (0.073)*
Married after 2008	0.049 (0.172)	0.048 (0.172)	0.048 (0.172)
Observed after 2008	-.175 (0.073)**	-.188 (0.074)**	-.189 (0.074)**
Cleaning help, $t-2$			0.025 (0.124)
Number of observations	18,794	18,794	18,794

Source: SOEP: 2000-2016. The dependent variable is "separated or divorced in t" The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by probit and they include a polynomial of degree six for duration of marriage as well as additional controls for: couples resides in urban area, number of children age 0-1; 2-7; 8-15; for him and her: born in Germany, currently in education, age at marriage (none of which are significant at the 10% level).

Table A5: Robustness to excluding individuals who "violate" the 24-hour time constraint: Risk of separation, wife's hours worked in the market and at home.

	(2)	(3)
A: *Excluding those who violate it for sum of housework and child care*		
Her share housework & child care, $t-2$	-.330 (0.187)*	-.331 (0.187)*
Couple's hours housework & child care, $t-2$	-.009 (0.008)	-.009 (0.008)
Number of observations	18,209	18,209
B: *Excluding those who violate it for sum of housework and child care plus hours at work*		
Her share housework & child care, $t-2$	-.326 (0.188)*	-.326 (0.188)*
Couple's hours housework & child care, $t-2$	-.007 (0.009)	-.007 (0.009)
Number of observations	18,107	18,107
C: *Excluding those who violate it for sum of housework, child care, hours at work plus leisure*		
Her share housework & child care, $t-2$	-.305 (0.19)†	-.305 (0.19)†
Couple's hours housework & child care, $t-2$	-.008 (0.009)	-.008 (0.009)
Number of observations	17,796	17,796

Source: SOEP: 2000-2016. The dependent variable is "separated or divorced in t" The coefficients are marked with † if the level of significance is between 10% and 12%, * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by probit and they include all controls included in columns (2) and (3) our main regressions in Table 2.

Table A6: Robustness using random fixed effects model: Risk of separation, wife's hours worked in the market and at home

	(1)	(2)	(3)
She works fulltime, $t-2$	0.747	0.607	0.605
	(0.23)***	(0.242)**	(0.242)**
He works fulltime, $t-2$	0.447	0.598	0.602
	(0.531)	(0.538)	(0.538)
Her share, housework & child care $t-2$		-.986	-.986
		(0.478)**	(0.478)**
Couple's hours, housework & child care		-.013	-.013
		(0.017)	(0.017)
She is employed, $t-2$	0.223	0.132	0.131
	(0.252)	(0.259)	(0.259)
He is employed, $t-2$	-.327	-.306	-.304
	(0.653)	(0.653)	(0.653)
Not first marriage for at least one	0.893	0.906	0.907
	(0.244)***	(0.243)***	(0.243)***
Nr. of children: 0-1 $t-1$	-.368	-.386	-.385
	(0.353)	(0.355)	(0.354)
Nr. of children: 2-7 $t-1$	0.175	0.22	0.216
	(0.162)	(0.171)	(0.171)
Nr. of children: 8-15 $t-1$	0.044	0.064	0.062
	(0.129)	(0.132)	(0.133)
Her education (<11 years), $t-1$	0.036	0.1	0.109
	(0.381)	(0.38)	(0.382)
His education (<11 years), $t-1$	0.071	0.072	0.084
	(0.38)	(0.378)	(0.381)
Her education (11-16 years), $t-1$	0.008	0.052	0.061
	(0.322)	(0.321)	(0.322)
His education (11-16 years), $t-1$	0.564	0.554	0.565
	(0.325)*	(0.324)*	(0.327)*
Her income (in 2015 €), $t-2$	0.00003	0.00002	0.00002
	(0.00003)	(0.00003)	(0.00003)
His income (in 2015 €), $t-2$	-.00003	-.00002	-.00003
	(0.00005)	(0.00004)	(0.00005)
Home owners, $t-1$	0.401	0.4	0.401
	(0.195)**	(0.194)**	(0.195)**
Married after 2008	0.125	0.119	0.119
	(0.46)	(0.46)	(0.46)
Observed after 2008	-.480	-.507	-.506
	(0.201)**	(0.202)**	(0.202)**
Cleaning help, $t-2$			0.095
			(0.324)
Number of observations	18,794	18,794	18,794
Number of couples	3,484	3,484	3,484
Times observed (minimum)	1	1	1
Times observed (maximum)	15	15	15
Times observed (average)	5.394	5.394	5.394

SOEP data: 2000-2016. The dependent variable is "Separation or divorce in t". The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by random-fixed effects cloglog models and they include a polynomial of degree six for duration of marriage as well as additional controls for: couples resides in urban area, for him and her: born in Germany, currently in education, age at marriage (none of which are significant at the 10% level).

Table A7: Marginal effects of wife's hours worked in the market and at home on divorce by couple type

Wives and husbands with university education (both work)		
She works fulltime$_{t-2}$	0.0026 (0.0012)**	0.0020 (0.0011)*
Her share hwk and child care $_{t-2}$		-0.0034 (0.002)*
Wives and husbands with university education (she does not work)		
She works fulltime$_{t-2}$	0.0035 (0.0027)	0.0018 (0.0011)*
She is employed, $t-2$	0.001 (0.0015)	0.0003 (0.0007)
Her share hwk and child care $_{t-2}$		-0.003 (0.0020)
Mean failure rate for this couple is 0.005		
Wives and husband medium education (both work)		
She works fulltime$_{t-2}$	0.0049 (0.0018)***	0.0039 (0.0018)**
Her share hwk and child care $_{t-2}$		-0.007 (0.0034)*
Wives and husband medium education (she does not work)		
She works fulltime$_{t-2}$	0.006 (0.004)	0.0035 (0.0018)**
She is employed, $t-2$	0.0019 (0.0027)	0.0007 (0.0014)
Her share hwk and child care $_{t-2}$		-0.006 (0.0034)*
Mean failure rate for this couple is 0.008		
Wives and husband low education (both work)		
She works fulltime $_{t-2}$	0.0032 (0.0013)**	0.0027 (0.0013)**
Her share hwk and child care $_{t-2}$	-	-0.0046 (0.0025)*
Wives and husband low education (she does not work)		
She works fulltime $_{t-2}$	0.0027 (0.0013)**	0.0024 (0.0013)*
She is employed, $t-2$	0.0008 (0.0008)	0.00047 (0.001)
Her share hwk and child care $_{t-2}$	-	-0.004 (0.0025)
Mean failure rate for this couple is 0.0055		

Table A8: Matching matrix

ISCED levels		Spouses: Low (1 & 2)	Medium (3 & 4)	High (5 & 6)	$\sum$
Wo	Low	31.76	56.20	12.04	100
men	Med	7.77	62.07	30.15	100
	High	3.31	32.43	64.26	100

Pooled data from SOEP unbalanced panel 2005-2015 for West German

married women age 20-65 without or with youngest child < 16 $N = 28,960$

A.3 Limited labor market participation and women's wages

Sample To analyze the effect of not working or working only part-time on women's wages, we construct a sample of women age 20 to 60 from more recent waves 2011-2016. Again we exclude those who report to have lived in East Germany in 1989. Table A9 displays the descriptive statistics for this sample which is much larger as we do not require any information on marriage spells nor detailed information on husbands, other than their income. We also include single and childless women. The only significant difference compared to our couple sample is that fewer women in this sample were born in Germany.

Table A9: Summary statistics for wage regression

Variable	Mean	Std. Dev.	Min.	Max.
Log hourly wage	2.595	0.571	0	5.527
Log monthly wage	7.257	0.86	0.049	10.675
Higher education ($> 17 years$)	0.133	0.34	0	1
Year	2013.485	1.655	2011	2016
Born in Germany	0.785	0.411	0	1
Resides in urban region	0.728	0.445	0	1
Married	0.583	0.493	0	1
Log(income spouse)	4.092	4.083	0	11.562
Firm tenure	8.871	9.005	0	44.8
Nationality other than German	0.12	0.325	0	1
Number of children under 16	0.810	1.013	0	8
Has children ages 0-3	0.077	0.267	0	1
Years not working	7.566	5.802	0	41
Full time experience (years)	9.499	8.801	0	44
Parttime experience (years)	6.485	6.846	0	40.7
Years full time squared	167.684	275.047	0	1936
Years part time squared	88.919	162.512	0	1656.49

N=30,482

Methodology We run a Mincer wage regression on the log of real hourly wages

$$\log w_{i,t} = \beta_0 + \beta_1 X_{i,t} + \beta_2 J_{i,t} + \beta_3 F_{i,t} + \beta_4 e\tilde{x}p_{i,t} + \beta_5 D_t + \beta_6 D_s + \epsilon_{t,s,i}, \tag{A-1}$$

where $X_{i,t}$ denotes individual controls (education, nationality, country of birth, marital status, spouse's log income – set to 0 for those who are not married), D_t and D_s are year and state fixed effects, $J_{i,t}$ are job characteristics (years with the current firm), $F_{i,t}$ are family characteristics (number of children under the age of 16, having small children aged 0-3), and $e\tilde{x}p_{i,t}$ are variables related to individuals' job market experience where we include years not worked, years of full time and years of part time work as well as the last two terms squared. Note that these controls make it impossible for us to control for age of the individual separately.

Results For women, returns to experience for fulltime jobs are 3.5% higher hourly wages per year, with decreasing returns, see Table A10.[19] For part time jobs, returns in terms of hourly wage also show decreasing returns and are only 0.2% per year. Each year spent not working is associated with 0.6% lower hourly wages, which is considerable given that on average women in our sample take more than 7 years off from work. Signs of other coefficients are as expected. Women with university education, residing in urban areas, and born in Germany have higher hourly wages. The positive and significant coefficients on the number of children and on having small children are due to selection given that few mothers with small children work. As expected, wages increase with years worked within a firm. We test the robustness of our results using log monthly wages controlling for hours worked, and running Heckman selection models using "having a child age 0-3" as our exclusion restriction. Results displayed in Tables A11 and A12 show that numbers for returns to full time jobs and years not working are very robust. Returns to part time experience, on the other hand, vary between -0.3% when using hourly wages and controlling for selection and 1.2% when using log monthly wages. This suggests that women who decide not to work, would actually face wage penalties for their years of part time experience.

[19] Blebo and Wolf [2000] also estimate wage reductions for German women who take years off. The authors find that wage penalties are very dependent on the timing of those breaks.

Table A10: Extend of women's labor market participation and hourly wages

	(1)	(2)	(3)	(4)	(5)
High education ($\geq$ 17 years)	0.49	0.502	0.495	0.477	0.502
	(0.009)***	(0.009)***	(0.009)***	(0.009)***	(0.008)***
Resides in urban area	0.119	0.108	0.118	0.116	0.109
	(0.008)***	(0.006)***	(0.008)***	(0.008)***	(0.007)***
Born in Germany	0.093	0.043	0.04	0.031	0.031
	(0.009)***	(0.009)***	(0.009)***	(0.009)***	(0.008)***
Nationality other than German	-.130	-.078	-.083	-.078	-.064
	(0.011)***	(0.011)***	(0.011)***	(0.011)***	(0.01)***
Married		-.004	-.024	-.004	-.024
		(0.007)	(0.007)***	(0.007)	(0.007)***
Log(income spouse)		0.008	0.007	0.006	0.006
		(0.0009)***	(0.0009)***	(0.0009)***	(0.0008)***
Firm tenure		0.022	0.022	0.021	0.018
		(0.0003)***	(0.0003)***	(0.0003)***	(0.0004)***
Number of children under 16			0.021	0.028	0.037
			(0.003)***	(0.003)***	(0.003)***
Has children: 0-3			0.098	0.071	0.088
			(0.011)***	(0.011)***	(0.011)***
Years not working				-.009	-.006
				(0.0005)***	(0.0005)***
Full time experience (years)					0.035
					(0.0009)***
Parttime experience (years)					0.002
					(0.001)*
Years full time squared					-.0008
					(0.00003)***
Years part time squared					-.0001
					(0.00005)**
Nr. of observations	30,482	30,482	30,482	30,482	30,482
R-squared	0.137	0.243	0.255	0.262	0.304

SOEP data: 2011-2016. The dependent variable is log hourly wages. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by OLS regression and they include year and state-fixed effects.

Table A11: Extend of women's labor market participation and monthly wages

	(1)	(2)	(3)	(4)	(5)
Hours worked	0.011	0.011	0.011	0.011	0.011
	(0.00006)***	(0.00006)***	(0.00006)***	(0.00007)***	(0.00007)***
High education ($\geq$ 17 years)	0.454	0.471	0.457	0.443	0.472
	(0.01)***	(0.009)***	(0.009)***	(0.009)***	(0.009)***
Resides in urban area	0.119	0.107	0.123	0.122	0.115
	(0.009)***	(0.007)***	(0.008)***	(0.008)***	(0.008)***
Born in Germany	0.102	0.053	0.051	0.041	0.032
	(0.01)***	(0.009)***	(0.009)***	(0.009)***	(0.009)***
Nationality other than German	-.142	-.087	-.091	-.085	-.067
	(0.012)***	(0.012)***	(0.011)***	(0.011)***	(0.011)***
Married		0.019	-.003	0.012	-.025
		(0.008)**	(0.008)	(0.008)	(0.008)***
Log(income spouse)		0.008	0.007	0.006	0.006
		(0.0009)***	(0.0009)***	(0.0009)***	(0.0009)***
Firm tenure		0.023	0.024	0.023	0.019
		(0.0004)***	(0.0004)***	(0.0004)***	(0.0004)***
Number of children under 16			0.037	0.042	0.046
			(0.003)***	(0.003)***	(0.004)***
Has children: 0-3			0.109	0.084	0.118
			(0.012)***	(0.012)***	(0.012)***
Years not working				-.008	-.007
				(0.0006)***	(0.0006)***
Full time experience (years)					0.035
					(0.001)***
Parttime experience (years)					0.012
					(0.001)***
Years full time squared					-.0008
					(0.00003)***
Years part time squared					-.0004
					(0.00005)***
Nr. of observations	30,482	30,482	30,482	30,482	30,482
R-squared	0.557	0.612	0.619	0.622	0.639

SOEP data: 2011-2016. The dependent variable is log monthly wages. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by OLS regression and they include year and state-fixed effects.

Table A12: Heckman selection model for hourly and monthly wages

VARIABLES	(1) Log hourly wages	(2) Participation	(3) Log monthly wages	(4) Participation
Resides in urban area	0.111***	-0.026	0.118***	-0.026
	(0.007)	(0.025)	(0.008)	(0.025)
Born in Germany	0.035***	-0.231***	0.036***	-0.231***
	(0.008)	(0.027)	(0.009)	(0.027)
Nationality other than German	-0.063***	0.040	-0.066***	0.040
	(0.010)	(0.031)	(0.011)	(0.031)
Married	-0.010	-0.354***	-0.010	-0.354***
	(0.007)	(0.026)	(0.008)	(0.026)
Log(income spouse)	0.006***	0.015***	0.006***	0.015***
	(0.001)	(0.003)	(0.001)	(0.003)
Firm tenure	0.016***	0.291***	0.017***	0.291***
	(0.000)	(0.004)	(0.000)	(0.004)
Number of children under 16	0.048***	-0.010	0.058***	-0.010
	(0.003)	(0.009)	(0.003)	(0.009)
Has children: 0-3		-1.253***		-1.253***
		(0.026)		(0.026)
Years not working	-0.005***	-0.049***	-0.006***	-0.049***
	(0.001)	(0.001)	(0.001)	(0.001)
Full time experience (years)	0.034***	0.028***	0.033***	0.028***
	(0.001)	(0.003)	(0.001)	(0.003)
Parttime experience (years)	-0.003***	0.118***	0.006***	0.118***
	(0.001)	(0.004)	(0.001)	(0.004)
Years full time squared	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Years part time squared	0.000	-0.004***	-0.000***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Hours worked			0.010***	
			(0.000)	
Constant	2.025***	0.755***	5.346***	0.755***
	(0.044)	(0.120)	(0.049)	(0.120)
Nr. of observations	41,102	41,102	41,102	41,102

SOEP data: 2011-2016. The dependent variable is log hourly (monthly) wages in columns 1 (3) and employment in columns (2) and (4). The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All columns are estimated by Heckman selection model and they all include year and state-fixed effects.