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**Conference Paper**

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# Fixed-term Employment and Fertility: Theory and Evidence from German Micro Data

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**Abstract**

In Germany, it has become conventional wisdom that the economic uncertainty associated fixed-term employment contracts prevents young couples from realizing their desire to have children. From a research perspective, it is however far from clear whether fixed-term contracts are the obstacle to family formation that the public *a priori* expect them to be. In this paper, we first develop a simple dynamic bargaining model that allows us to ask theoretically: under what conditions will couples choose to have children early on in life, postpone it to later in life, or decide to remain childless? And: to what extent does the economic uncertainty associated with holding fixed-term employment contract affect these choices? We obtain two theoretical predictions. On the hand, job uncertainty at the beginning of women's employment careers causes couples to postpone parenthood. On the other hand, job uncertainty in women's mid-career lives causes couples to enter parenthood instead of remaining voluntarily childless. We bring these theoretical predictions to data from the German Socio-Economimc Panel (SOEP). Ordinary least squares and fixed-effects estimations show that, at the beginning of women's employment careers, holding a fixed-term employment contract and the probability of entering parenthood are negatively correlated. When considering women in their mid-career lives, holding a fixed-term contract has a positive impact on the probability of entering parenthood.

*Keywords:* Fertility, household bargaining, Fixed-term contracts
*JEL Classification:* D13, J13, J22

## 1. Introduction

This paper is concerned with fixed-term employment and examines how it influences the fertility decisions of young couples. Fixed-term employment contracts imply that the termination of a job is determined by objective conditions such as reaching a certain date, completion of an assignment or return of another employee who has been temporarily replaced. Fixed-term employment flexibilizes the recruitment process and is therefore thought to foster employment. During the last decade, the prevalence of such contracts has increased drastically in the German labor market. Indeed, the share of temporary employed workers went up from 6.1 percent in

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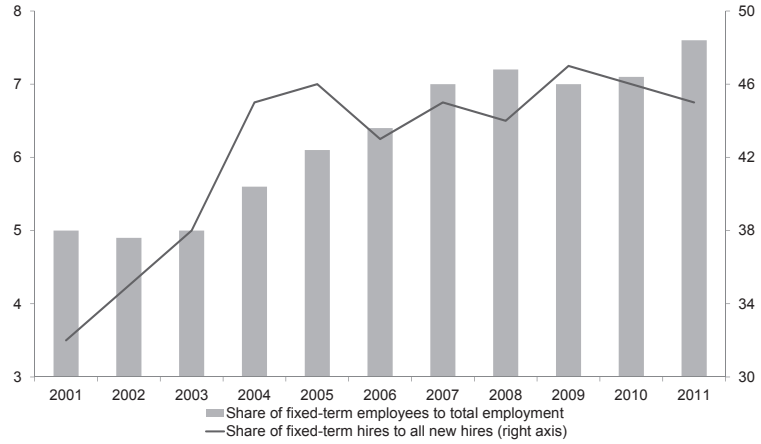
Figure 1: Share of fixed-term employment in percent




Source: IAB-Establishment Panel (2001-2011), Hohendanner (2012)

2001 to 9.5 percent in 2011, as Figure 1 shows. This reflects an increase of over 55 percent within one decade. Even more noticeably, the share of fixed-term contracts in the subpopulation of new employees is about 45 percent. Almost every second new job begins with a fixed-term employment (Hohendanner, 2012).

This increase in the prevalence of instable employment coincides with another phenomenon: while the total fertility rate in Germany remains at the very low level of less than 1.4 children per woman and the birth rate per 1,000 people is the lowest of all OECD countries[1], the preferences for having children among young women and men are rather strong. In 2008, for example, almost 90 percent of all 25 to 27 years old men and women stated the desire to have 2 or more children if the circumstances allow it, while only 5 percent planned to remain childless. With roughly 2.2, the average number of children desired is well above the total fertility rate in Germany (see Table 1).

By now it has become conventional wisdom that the economic uncertainty associated fixed-term employment contracts prevents many young people from realizing their desire to have children. However, from a research perspective, it is far from clear whether fixed-term contracts are the obstacle to family formation that the public a priori expect it to be. Indeed, no clear theoretical framework has yet emerged for the study of this problem and the existing evidence is inconclusive. With this paper, we aim to fill this gap by examining, theoretically and empirically, the impact of fixed-term contracts on the fertility behavior of young couples.

Standard microeconomic theories of fertility behavior (Becker, 1981; Samuelson, 1956) focus on a static framework in which a husband and a wife are assumed to adopt, at the outset of marriage, a utility-maximizing lifetime plan for childbearing and for their allocation of resources.

[1]For both numbers, see www.http://data.worldbank.org.

Table 1: Child preferences in Germany, 2008

| | Men | Women | Total |
|---|---|---|---|
| 0 | 5.48 | 4.57 | 5.02 |
| 1 child | 5.95 | 6.82 | 6.39 |
| 2 children | 59.98 | 56.84 | 58.39 |
| 3 children | 21.07 | 22.84 | 21.96 |
| 4 and more children | 7.51 | 8.93 | 8.23 |
| Average number of children | 2.20 | 2.28 | 2.23 |

Source: Pairfam (2008).
Note: Weighted, own calculations.

Moreover, the utility function being maximized is typically assumed to reflect the preferences and tastes of all family members. In sharp contrast to this static and unitary framework, we develop a dynamic bargaining model that allows us to link the fertility choices of couples, i.e., whether and when to have children, to the degree of uncertainty they face in their jobs. To proceed in the simplest possible manner, we will focus on the behavior of a representative couple in a simple two-stage game. At the outset of each stage, the couple chooses whether or not to have a child. Conditional on the outcome of this decision, the couple then has to decide how to allocate their time between market work and home production of "child quality". The dynamic bargaining structure of the model allows us to address two important questions. First, the two-stage design enables us to shed light on the question of timing of childbearing. More precisely, we are be able to ask theoretically: under which conditions will couples choose to have children early on in their working life, postpone it to later in life, or decide to remain childless? And: to what extent does the economic uncertainty associated with holding fixed-term employment contract affect these choices? Second, the model allows us to infer from individual choices how fixed-term employment affects the overall level of fertility in the population. Our main theoretical findings are twofold. On the one hand, job uncertainty at the beginning of women's employment careers causes couples to postpone parenthood. On the other, for couples who decide not to have children early on in their working life, job uncertainty in women's mid-life employment careers induces couples to enter parenthood instead of remaining voluntarily childless. Due to this two opposing effects, the overall impact on fertility of temporary employment contracts remains ambiguous.

In the empirical part of the paper, we bring these theoretical predictions to the data as they give a mapping from job uncertainty in women's employment careers into the incidence of childbearing. Based on the survey years 2000 to 2010 of the German Socio-Economic Panel (GSOEP), we first apply simple ordinary least squares (OLS) estimation methods. We restrict our sample to childless women between 20 and 40 years which have completed their education and are employed at the day of the interview. Furthermore, the respondents should have a partner in order to be in the sample. The outcome variable of interest "family formation" is operationalized by identifying a successful conception within 12 months after the interview takes place. Due to endogeneity concerns associated with holding a fixed-term employment, we make use of the panel structure of the data and estimate fixed effects regressions (FE).

Our first empirical results suggest that holding a fixed-term contract is negatively associated with the probability of conception independent of which estimator is used. Unfortunately, this association is hardly statistically significant in the whole sample of women. In a subgroup analysis a different picture is shown. We run estimations separately for women below 29 years, from

29 to 34 years and from 35 to 40 years as well as for women with and without tertiary education. While for younger women the probability for conception is lowered by job uncertainty, in the older age groups conception becomes rather more likely depending on the time that has passed since completion of education or vocational training. We interpret these results as being supportive of the predictions arising from the theory.

The remainder of the paper is organized as follows. The following section discusses the related literature. Section 3 develops a theoretical model as a vehicle for guiding the empirics and interpreting the results. Section 4 describes our data and the methodology we employ to test the main ideas behind the model. Section 5 presents the results. Section 6 concludes.

## 2. Related Literature

From a theoretical perspective, the paper contributes to an extensive literature that examines non-unitary models of household behavior. In one common approach, spouses are assumed to have their own preferences and to maximize the surplus of cooperation via Nash-bargaining. In the early family bargaining models, the so-called divorce threat models of Manser and Brown (1980) and McElroy and Horney (1981), bargaining power depends upon the expected well-being of the spouses outside marriage. In contrast to this external threat point, the separate-spheres model (Lundberg and Pollak 1993) assumes an internal threat point in which husband and wife behave non-cooperatively. However, fertility decisions under uncertainty have not yet been analyzed using bargaining frameworks. Indeed, recent papers like Ranjan (1999) and Rainer et al. (2011) propose individual decision-making models to examine fertility choices under uncertainty. Rainer et al. (2011) develop a model of individual decision-making in a dynamic setting with biological uncertainty. Women are able to decide between early childbearing, postponing childbearing or remaining childless and the probability of successful conception diminishes with the age of the woman. Ranjan (1999) proposes an individual decision-making model with two periods and income uncertainty in the second period. In his framework, it might be optimal for individuals to postpone childbearing if their future income seems to be uncertain. To summarize, since both papers analyze the fertility choice in an individual set-up, they fail to account for the fact that fertility typically is the outcome of a joint decision-making process involving two interdependent partners. The proposed project fills this gap.

The focus of the empirical section is on fixed-term employment and couples' fertility choices. In this respect, a small but growing literature is relevant for the proposed research. For Germany sociological studies are prevailing. For instance, Kreyenfeld (2010) finds no evidence that holding a fixed-term contract influences the fertility decision of young couples. Gebel and Giesecke (2009) confirm these results. They find a postponement of first period in response to periods of unemployment but not to periods of fixed-term employment. Tölke and Diewald (2003) look at young men entering fatherhood. They find evidence for a postponement of first birth due to economic uncertainty. While the empirical evidence for Germany is somewhat conclusive, Spanish studies report more robust results. De la Rica and Iza (2005) conclude that fixed-term employment has a strong negative effect on the hazard of marriage for men and delays childbearing for women. Ahn and Mira (2001) find smaller but also negative effects of holding a fixed-term contract on the probability of marriage and first birth. Finally, Sutela (2012) concludes that, in Finland, fixed-term employment is negatively associated with entering parenthood. The above studies focus mostly on empirical associations between holding a fixed-term contract and fertility but do not provide causal evidence.

## 3. Theory

### 3.1. The Basic Model

We propose a simple dynamic model in which couples decide whether and when to have children and how to allocate their time between market work and child care. The model has two time periods ($k = 1, 2$) and a continuum households. Each household comprises a husband ($h$) and a wife ($w$). We assume that couples want at most one child. At the beginning of each period $k$, couples can, if they wish, make an attempt to have a child. We assume that there are no biological constraints regarding the fertility of couples in period 1, and therefore let the probability that an attempt to become pregnant is successful be equal 1. In period 2, however, individuals are older and the fecundity of women, in particular, has started to decline. Therefore, the probability that an attempt to have a child in period 2 is successful is $0 < p < 1$. Once the outcome of the fertility choice in period $k$ has been realized, couples need to decide how much to work and how much time to spend in home production. Assuming that each spouse has a unit of active time endowment, we let $\ell_{ik}$ denote $i$'s ($i = h, w$) time devoted to employment in period $k$, and let $t_{ik}$ denote $i$'s time in household production. Thus, spouses' time constraints in period $k$ are given by

$$\begin{aligned} \ell_{hk} + t_{hk} &= 1 \\ \ell_{wk} + t_{wk} &= 1 \end{aligned} \tag{1}$$

When working in the labor market in period $k$, each spouse can earn a wage $\omega_{ik}$. We assume that the wage rate of each spouse $i$ in the first period is fixed at the initial rate $\omega_i > 0$. We assume that the initial wage rate of the husband is bigger than the wife's. Second period wages of each spouse are augmented by human capital acquired in first-period jobs such that

$$\begin{aligned} \omega_{h2} &= \omega_h(\pi + \ell_{h1}) \\ \omega_{w2} &= \omega_w(\pi + \ell_{w1}), \end{aligned} \tag{2}$$

where $\pi > 1$. We will refer to the initial wage profile $(\omega_h, \omega_w)$ as a couple

We assume transferable utility throughout. Within marriage, spousal payoffs in period $k$ are given by

$$\begin{aligned} U_{hk} &= \gamma_h + c_{hk} + \delta_k v(G_k) - \tau_k \\ U_{wk} &= \gamma_w + c_{wk} + \delta_k v(G_k) + \tau_k \end{aligned} \tag{3}$$

Spouse $i$'s payoff in marriage depends on four factors. First, there are some private gains from marriage, $\gamma_i > 0$. Second, each spouse derives utility from private consumption, $c_{ik}$. Private consumption in each period is specified as private labor market income so that

$$\begin{aligned} c_{hk} &= \omega_{hk}\ell_{hk} \\ c_{wk} &= \omega_{wk}\ell_{wk} \end{aligned} \tag{4}$$

Third, the variable $\delta_k$ is an indicator that equals 1 if the couple has a child in period $k$, and is 0 if the couple does not have child. We think of $G$ as the amount of a home-produced "child good" ("child quality"), which is a pure public good to both parents. We specify a very simply home

production technology in which each spouse may contribute time to the raising of their child:

$$G_k = t_{hk} + t_{wk} = (1 - \ell_{hk}) + (1 - \ell_{wk}) \tag{5}$$

Thus, spousal time inputs into the production of child quality are perfect substitutes. We assume that the benefits from child quality are evaluated through the function $v(\cdot)$, which increasing, strictly concave, and twice differentiable function. Fourth, $\tau_k$ denotes an inter-spousal transfer of utility, which can be positive (if the transfer is from $h$ to $w$) or negative (if the transfer is from $w$ to $h$).

We consider an environment in which *ex ante* agreements on behavior within marriage cannot be part of enforceable marriage contracts. As a consequence, spouses are unable to commit to fertility choices and time allocations at the outset of marriage. This, in turn, implies that, after fertility and time allocations choices are made, spouses renegotiate *ex post* over whatever marital surplus has been created. We assume that the spouses Nash-bargain over the division of the marital surplus in this negotiation, where divorce is the relevant threat point. When divorced, spousal payoffs in period $k$ are given by

$$\begin{aligned} V_{hk} &= c_{hk} + \delta_k \eta_h v(G_k) \\ V_{wk} &= c_{wk} + \delta_k \eta_w v(G_k) \end{aligned} \tag{6}$$

Note that, if a couple has a child in a given period, child quality remains a public good if the couple divorce at the end of the period (Weiss and Willis, 1985). We assume, however, that the (marginal) benefits from child quality are lower in divorce than in marriage, as parents cannot enjoy the full benefits from child quality in divorce (Rasul, 2006). We therefore let $\eta_i \in (0,1)$. The parameter $\eta_i$ might, for example, represent the fraction of time spent by the child in parent $i$'s custody if the spouses divorce. In line with econometric evidence suggesting that divorced mother value time spent with their child much more highly than divorced fathers (Del Boca and Ribero, 2001), we assume that $\eta_w > \eta_h$ throughout.

The sequence of events within each period is as follows.

***Stage (a)*** Married couples decide whether to try to have a child, which is assumed to require mutual consent. Thus, if one of the spouses vetoes the attempt to become pregnant, the couple remains childless.

***Stage (b)*** Spouses observe the outcome of the fertility choice. They then decide noncooperatively how to allocate their time between market work and home production.

***Stage (c)*** The benefits from market work and child quality are realized. Spouses then decide whether to remain married or divorce. If they remain married, the bargain over the surplus created by marriage over divorce.

We assume that, if a couple splits up at the end of period 1, the spouses will remain single and childless in period 2 and therefore derive utility from private consumption only. We also assume that a individual's intertemporal utility function is additively separable. For notational convenience, we let $f(\alpha) \equiv \arg\max_{z \geqslant 0}\{\alpha z + v(1-z)\}$ throughout. The next subsection deals with the choices of couples in reverse order. Assuming symmetric information across spouses, we solve for the unique subgame perfect equilibrium of the model and refer to it just as the equilibrium in what follows.

### 3.2. Fertility Choices and Time Allocations

Consider a couple who decided to have a child at the start of period 1 ($\delta_1 = 1$). Suppose first that the couple has split-up at the last stage of the first period. In this case, each spouse is single in the second period and derives utility from private consumption only. Thus, it is optimal for each spouse to spent his or her entire time endowment working in the labor market. The corresponding second-period single-state payoffs are respectively:

$$\begin{aligned} \hat{V}_{h2}^S &= \omega_h(\pi + \ell_{h1}) \\ \hat{V}_{w2}^S &= \omega_w(\pi + \ell_{w1}) \end{aligned} \tag{7}$$

Now suppose the couple is still married at the beginning of the second period. Since the couple already had a child in the first period, they will not try to have child again in the second period ($\delta_2 = 0$). For an arbitrary set of prior time allocation choices, it follows that the marriage- and divorce payoffs at the final stage of the second period are given by:

$$\begin{aligned} U_{h2} &= \gamma_h + \omega_h(\pi + \ell_{h1})\ell_{h2} - \tau_2 \\ U_{w2} &= \gamma_w + \omega_w(\pi + \ell_{w1})\ell_{w2} + \tau_2 \end{aligned} \quad \text{and} \quad \begin{aligned} V_{h2} &= \omega_h(\pi + \ell_{h1})\ell_{h2} \\ V_{w2} &= \omega_w(\pi + \ell_{w1})\ell_{w2} \end{aligned}$$

Although it is efficient for the husband and the wife to remain married at the end of the second period (since $U_{h2} + U_{w2} > V_{h2} + V_{w2}$), the couple need to reach an agreement over the division of the marital surplus by determining the level of the inter-spousal utility transfer $t_2$. Under the Nash bargaining solution with divorce as the threat point, the equilibrium bargained inter-spousal transfer is given by

$$\hat{\tau}_2 = \frac{\gamma_h - \gamma_w}{2}.$$

Moving backwards to the second stage of period 2, it is straightforward to verify that it is optimal for each spouse to spent their entire time endowment working in the labor market. Formally:

$$\hat{\ell}_{h2} = 1 \quad \text{and} \quad \hat{\ell}_{w2} = 1.$$

The second-period Nash-bargained equilibrium payoffs to the husband and the wife are therefore respectively

$$\begin{aligned} \hat{U}_{h2}^N &= \overline{\gamma} + \omega_h(\pi + \ell_{h1}) \\ \hat{U}_{w2}^N &= \overline{\gamma} + \omega_w(\pi + \ell_{w1}) \end{aligned} \tag{8}$$

where $\overline{\gamma} = (\gamma_h + \gamma_w)/2$.

We now move backwards to the first period. At the last stage of the first period, the intertemporal marriage and divorce payoffs of a couple with a child are given by:

$$\begin{aligned} U_h &= \gamma_h + \omega_h\ell_{h1} + \nu(G_1) - \tau_1 + \hat{U}_{h2}^N \\ U_w &= \gamma_w + \omega_w\ell_{w1} + \nu(G_1) + \tau_1 + \hat{U}_{w2}^N \end{aligned} \quad \text{and} \quad \begin{aligned} V_h &= \omega_h\ell_{h1} + \eta_h\nu(G_1) + \hat{V}_{h2}^S \\ V_w &= \omega_w\ell_{w1} + \eta_w\nu(G_1) + \hat{V}_{w2}^S \end{aligned}$$

where $G_1 = (1 - \ell_{h1}) + (1 - \ell_{w1})$. As at the last stage of the second period, it is efficient for the couple to remain married (since $U_h + U_w > V_h + V_w$). Under the Nash bargaining solution with

divorce as the threat point, the equilibrium bargained inter-spousal transfer is now given by:

$$\hat{\tau}_1 = \frac{\gamma_h - \gamma_w}{2} + \frac{(\eta_w - \eta_h)v(G_1)}{2}.$$

Moving backwards to the second stage of the first period, we provide details of the time allocation problem of the husband and the wife in the appendix. Here, it is important to point out that our assumption on the home production technology implies that the husband chooses full-time employment and therefore specializes completely in market work. The wife as the spouse with the lower wage rate and higher anticipated evaluation of child quality adjusts her labor supply depending on her opportunity cost of time. Formally, letting $\theta_i = 1 + (\eta_i - \eta_j)/2$ for $i, j = h, w$ and $i \neq j$, the wife's labor supply solves:

$$2\omega_w - \theta_w v'(1 - \ell_{w1}) = 0. \tag{9}$$

In equilibrium, we therefore have

$$\hat{\ell}_{h1} = 1 \quad \text{and} \quad \hat{\ell}_{w1} = f(2\omega_w/\theta_w).$$

It now follows immediately that

$$\begin{aligned} \hat{U}_h &= 2\bar{\gamma} + \omega_h(\pi + 2) + \theta_h v(1 - f(2\omega_w/\theta_w)) \\ \hat{U}_w &= 2\bar{\gamma} + \omega_w(\pi + 2f(2\omega_w/\theta_w)) + \theta_w v(1 - f(2\omega_w/\theta_w)) \end{aligned} \tag{10}$$

are the spouses' intertemporal equilibrium payoffs if they have a child in period 1, taking account of the decisions that they will subsequently make.

Consider now couple who decided not to have a child at the start of period 1 ($\delta_1 = 0$). Suppose first that the couple has split-up at the last stage of the first period. In this case, each spouse is single in the second period and derives utility from private consumption only. Thus, it is optimal for each spouse to spent his or her entire time endowment working in the labor market. The corresponding second-period single-state payoffs are given by eq. (7).

Now suppose the couple is still married at the beginning of the second period. Consider first the case in which the couple decides not to try for a child in the second period. As we have already established above, spouses who don't have child in the second period will work full-time in the labor market. The second-period Nash-bargained equilibrium payoffs to the husband and the wife are therefore as in eq. (8). At the last stage of the first period, the intertemporal marriage and divorce payoffs of a couple without a child are then:

$$\begin{aligned} U_h &= \gamma_h + \omega_h \ell_{h1} - \tau_1 + \hat{U}^N_{h2} \\ U_w &= \gamma_w + \omega_w \ell_{w1} + \tau_1 + \hat{U}^N_{w2} \end{aligned} \quad \text{and} \quad \begin{aligned} V_h &= \omega_h \ell_{h1} + \hat{V}^S_{h2} \\ V_w &= \omega_w \ell_{w1} + \hat{V}^S_{w2} \end{aligned}$$

It straightforward to verify that is efficient for the couple to remain married. Moreover, under the Nash bargaining solution with divorce as the threat point, the first-period bargained inter-spousal transfer is now given by:

$$\tilde{\tau}_1 = \frac{\gamma_h - \gamma_w}{2}.$$

Clearly, it is now optimal for both spouses to spend their entire time endowment working in the

labor market. It therefore follows immediately that

$$\begin{aligned}\tilde{U}_h &= 2\bar{\gamma} + \omega_h(\pi+2)\\ \tilde{U}_w &= 2\bar{\gamma} + \omega_w(\pi+2)\end{aligned} \tag{11}$$

are the intertemporal equilibrium payoffs of spouses who choose to remain childless in both periods, taking account of the time allocation decisions that they will accordingly make.

Consider now a married couple who decides to try for a child in the second period. With probability $1-p$ the attempt will be unsuccessful and the couple will remain childless. In this case, both spouses work full-time in the labor market, and their second-period Nash-bargained equilibrium payoffs are therefore as in eq. (8). With probability $p$, however, the couple will have child at the start of the second period. For an arbitrary set of prior time allocation choices, it follows that the marriage- and divorce payoffs at the final stage of the second period are given by:

$$\begin{aligned}U_{h2} &= \gamma_h + \omega_h(\pi+\ell_{h1})\ell_{h2} + v(G_1) - \tau_2\\ U_{w2} &= \gamma_w + \omega_w(\pi+\ell_{w1})\ell_{w2} + v(G_1) + \tau_2\end{aligned} \quad \text{and} \quad \begin{aligned}V_{h2} &= \omega_h(\pi+\ell_{h1})\ell_{h2} + \eta_h v(G_1)\\ V_{w2} &= \omega_w(\pi+\ell_{w1})\ell_{w2} + \eta_w v(G_1)\end{aligned}$$

Under the Nash bargaining solution with divorce as the threat point, the second-period bargained inter-spousal transfer is now given by:

$$\overline{\tau}_2 = \frac{\gamma_h - \gamma_w}{2} + \frac{(\eta_w - \eta_h)v(G_1)}{2}.$$

Moving backwards to the second stage in the second period, we show in the appendix that our home production technology implies that one of the spouse will specialize completely in market work while the other will devote time to both the labor market and household production. While at this stage of the game it could be either the husband or the wife who specializes in market work, we proceed here under the assumption that it is the husband to who does. In the appendix we demonstrate that, under the assumptions made, it will indeed be the husband who works full-time in equilibrium. The wife's first-order condition for her second-period labor supply is given by:

$$\omega_w(\pi+\ell_{w1}) - \theta_w v'(1-\ell_{w1}) = 0 \tag{12}$$

The second-period time allocations are therefore given by

$$\overline{\ell}_{h2} = 1 \quad \text{and} \quad \overline{\ell}_{w2} = f((\omega_w(\pi+\ell_{w1}))/\theta_w),$$

while the second-period Nash-bargained payoffs to the spouses are:

$$\begin{aligned}\overline{U}^N_{h2} &= \bar{\gamma} + \omega_h(\pi+l_{h1}) + \theta_h v(1 - f((\omega_w(\pi+\ell_{w1}))/\theta_w)),\\ \overline{U}^N_{w2} &= \bar{\gamma} + \omega_w(\pi+l_{w1}) f((\omega_w(\pi+\ell_{w1}))/\theta_w)) + \theta_w v(1 - f((\omega_w(\pi+\ell_{w1}))/\theta_w)).\end{aligned} \tag{13}$$

We now move backwards to the first period. At the last stage of the first period, the intertemporal marriage and divorce payoffs of a couple who does not have a child in the first period but will

have one in the second period are are given by:

$$\begin{array}{ll} U_h = \gamma_h + \omega_h \ell_{h1} - \tau_1 + \overline{U}^N_{h2} & \\ U_w = \gamma_w + \omega_w \ell_{w1} + \tau_1 + \overline{U}^N_{w2} & \text{and} \end{array} \quad \begin{array}{l} V_h = \omega_h \ell_{h1} + \hat{V}^S_{h2} \\ V_w = \omega_w \ell_{w1} + \hat{V}^S_{w2} \end{array}$$

It is readily verified that is efficient for the couple to remain married. Under the Nash bargaining solution with divorce as the threat point, the first-period bargained inter-spousal transfer is now given by:

$$\overline{\tau}_1 = \frac{\gamma_h - \gamma_w}{2} + \frac{(\overline{U}^N_{h2} - \hat{V}^S_{h2}) - (\overline{U}^N_{w2} - \hat{V}^S_{w2})}{2}$$

Moving backwards to the second stage of the first period, we establish in the appendix that is optimal for both spouses to spend their entire time endowment working in the labor market. Formally,

$$\overline{\ell}_{h1} = 1 \quad \text{and} \quad \overline{\ell}_{w1} = 1,$$

It therefore follows that

$$\begin{aligned} \overline{U}_h &= 2\overline{\gamma} + \omega_h(\pi+2) + \frac{p}{2}\left[2\nu(1 - f((\omega_w(\pi+1))/\theta_w)) - \omega_w(\pi+1)(1 - f((\omega_w(\pi+1))/\theta_w))\right] \\ \overline{U}_w &= 2\overline{\gamma} + \omega_w(\pi+2) + \frac{p}{2}\left[2\nu(1 - f((\omega_w(\pi+1))/\theta_w)) - \omega_w(\pi+1)(1 - f((\omega_w(\pi+1))/\theta_w))\right] \end{aligned} \tag{14}$$

are the intertemporal equilibrium payoffs of a couple who remains childless in the first period but attempts to have a child in the second period, taking account of the time allocation decisions that they will make throughout their life.

We now want to understand what fertility decisions various types of couples will make. The analysis boils down to studying the intertemporal equilibrium payoffs derived above. For each spouse $i$, we compare $\overline{U}_i$ with $\hat{U}_w$ as well $\hat{U}_w$ with $\max\{\overline{U}_i, \hat{U}_w\}$, and establish the following:

**Proposition 1.** *For given $\pi > 1$, there exist two critical wages for the wife $\omega^\kappa_w(\pi)$ ($\kappa = 0, 1$) ranked increasingly in $\kappa$ such that:*

1. *When $\omega_w \leqslant \omega^0_w(\pi)$, the couple has a child in the first period ("early childbearing"). The corresponding labor supply choices over the two periods are:*

$$(\hat{\ell}_{h1}, \hat{\ell}_{w1}) = (1, f(2\omega_w/\theta_w)) \quad \textit{and} \quad (\hat{\ell}_{h2}, \hat{\ell}_{w2}) = (1, 1)$$

2. *When $\omega_w \in (\omega^0_w(\pi), \omega^1_w(\pi)]$, the couple remains childless in the first period but tries to have child in the second period ("postponed childbearing"). The corresponding labor supply choices over the two periods are:*

$$(\overline{\ell}_{h1}, \overline{\ell}_{w1}) = (1, 1) \quad \textit{and} \quad (\overline{\ell}_{h2}, \overline{\ell}_{w2}) = (1, f((\omega_w(\pi+1))/\theta_w))$$

3. *When $\omega_w > \omega^1_w(\pi)$, the couple remains voluntarily childless in both periods ("voluntary childlessness"). The corresponding labor supply choices over the two periods are:*

$$(\tilde{\ell}_{h1}, \tilde{\ell}_{w1}) = (1, 1) \quad \textit{and} \quad (\tilde{\ell}_{h2}, \tilde{\ell}_{w2}) = (1, 1)$$

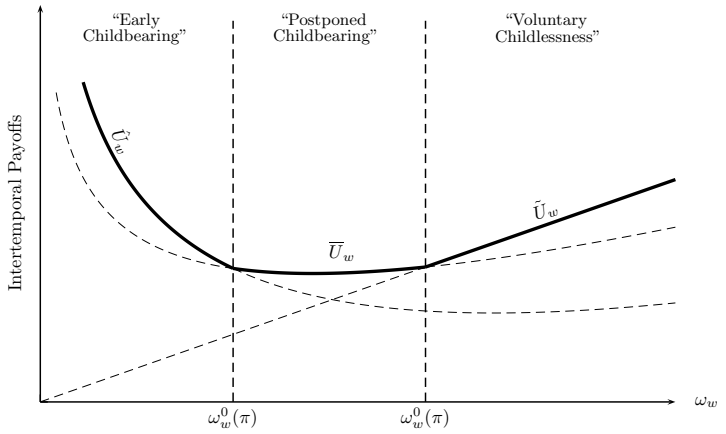



Figure 2: Illustration of Proposition 1.

*Proof.* See the Appendix. □

Figure 2 illustrates this result for a numerical example. In what follows, we analyze how job uncertainty associated with holding a fixed-term employment contract affects the fertility choices of couples.

### 3.3. Job Uncertainty

The main question in this paper is how job uncertainty changes the outcome of the bargaining process and hence the fertility decision. Intuitively temporary employment lowers the expected income as well as the attractiveness on the marriage market of the affected individual. Thus, temporary employment is expected to negatively affect fertility. Moreover, Easterlin (1987) states in his prominent work that individuals have an aspiration level in mind which they want to reach before having children. Often they adopt the well-being of their family of origin as aspiration level which must be ensured for their own family, too. With only a temporary employment contract it is harder to reach the desired income and security level. Therefore, they decide to postpone or cancel fertility. Similarly, Leibenstein (1975) describes the effect of individuals comparing their socioeconomic situation within their respective peer group. The relative well-being within the birth cohort is crucial for the fertility decision - atypical employment arrangements, such as temporary contracts, result in a stigmatization and relatively low living conditions. But in the literature also not unambiguous effects of job uncertainty are mentioned. For example Tölke and Diewald (2003) detect two contrasting effects: a spillover and a compensatory effect. The spillover effect means that successful people at the labor market also do better in family life. First, they find more easily a good match at the marriage market which is an essential requirement for having children. Second, they have the resources to set up a family with all its long-term liabilities and commitments. Especially highly educated young individuals which do not have a secure job contract are not willing to have children as long as they have not established on the labor market. But there is also a compensatory argument in Tölke and Diewald (2003). They argue that life goals are substitutes - if job success stays out, individuals tend to form a family earlier. Again, this holds particularly for a certain subgroup. In this case the individuals with lower educational attainment should invest more in parenthood than in their career since their

opportunity costs are relatively low and their probability of a successful career as well. The opportunity cost argument goes back to Becker (1981). Having a child is costly not only in the sense that a baby needs food, clothes and education[2] later on but also in the sense of lost income. These opportunity costs have two possible explanations. First, due to parental leave the parents lose income directly. Second, during this interruption parents' human capital depreciates which has a negative effect on future earnings. The effect of temporary employment on these costs is ambiguous. Depending on the level of education and income before childbearing, holding a working contract with a limited duration may have a delaying or encouraging impact on the fertility decision of young couples. But also the circumstances can influence the relation between temporary employment contracts and fertility. If one spouse is expected to be a caregiver after the birth of a child, a temporary working contract makes it more attractive for women to enter parenthood immediately (Kreyenfeld, 2010). In contrast, if both spouses return to their occupation soon after birth, a secure and stable working arrangement is demanded.

In our model we focus on the human capital explanation. We assume that, compared to women with permanent work contracts, women with a temporary working contract are not able to realize the same wage increase over the two periods because they find it less profitable to invest in their qualification and firm-specific job skills since working arrangement is only temporary (Autor, 2003). Additionally, the dismissal threat is higher for employees with a contract with limited duration. Thus, they are not able to enforce equivalent wage increases like permanent employees. We model this in as simple reduced form, by supposing that temporary employment contracts lead to an exogenous reduction in the wage growth parameter $\pi$. We have the following:

**Proposition 2.** *An increase in wage uncertainty, represented by a reduction in $\pi$, reduces the wage threshold separating "early childbearing" and "postponed childbearing", $\omega_w^0(\pi)$, but increases the wage threshold separating "postponed childbearing" and "voluntary childlessness", $\omega_w^1(\pi)$.*

On possible interpretation of this result is as follows. For some couples with women located at the lower part of the female wage distribution, an increase in wage uncertainty induces a switch in behavior from "early childbearing" to "postponed childbearing". Before the reduction in $\pi$, these couples decided to have a child in the first period. Their lifetime probability of becoming parents was equal to one. Now, some of these couples postpone the attempt to have a child to the second period, and their lifetime probability of becoming parents falls to $p$. Thus, with probability $1-p$ these couples will end up not having the child they would have had with more job security. However, for some couples with women located at the upper end of the female wage distribution, an increase in wage insecurity does not alter the decision to remain childless in the first period but changes fertility choices in the second period. In particular, the reduction in $\pi$ leads to a lower opportunity cost of children in the second period and causes a switch in behavior away from "voluntary childlessness" towards "postponed childbearing". In other words, as $\pi$ decreases, the lower opportunity cost of children causes some couples who would otherwise have decided against a child later in life to try to have one. This, in turn, increases incidence of childbearing amongst couples with high-wage women.

An alternative interpretation, which does not rely on the position of women in the wage distribution and hence can be used to guide our empirical approach, is as follows. On the hand,

[2] According to Becker (1981) child quality became more important than child quantity during the last decades which means that parents want to ensure that they can afford a proper education for their children rather than having numerous children what results in declining fertility rates.

job uncertainty at the beginning of a woman's employment careers causes couples to postpone parenthood. On the other, for couples who decide against having children early on in their working life, job uncertainty in women's mid-life employment careers induces couples to enter parenthood instead of remaining voluntarily childless. Due to this two opposing effects, the overall impact on fertility of temporary employment contracts remains ambiguous.

## 4. Data and Empirical Specification

### 4.1. Data

Generally, the data demands for micro level assessments of labor market effects on family formation are very high insofar as they require information on the exact timing of events and need to provide detailed and comprehensive information on employment and on birth histories. The advantage of the longitudinal data sets we make use of is that it meets both conditions.

We employ the German Socio-Economic Panel (SOEP) which is the largest longitudinal panel data set in Germany. It currently contains annual interviews of over 12,000 households and more than 20,000 individuals respectively. Since 1984 the participants of this study have been re-interviewed 28 times and several refreshment samples have been added. This wide time horizon makes the SOEP data especially valuable for our intended research. The data is a representative sample of the German residential population. All members of a randomly selected household are interviewed and for family types which are of particular interest an additional questionnaire has to be filled out. SOEP contains detailed information about a variety of individual as well as household specific socio-economic characteristics including age, gender, family status, education and income. Moreover, the respondents provide information about their labor market history as well as their current labor force status. Most importantly, we know whether their employment contract is permanent or fixed-term. The data also includes measures of social participation, life satisfaction, general values and preferences. For all cohabiting couples we can merge partner information to the respective spouse.

In the analysis we focus on one main outcome variable which is the decision for a first birth - what we call family formation. But the fertility decision is rather taken at conception than at the birth itself. Therefore, we generate a variable which indicates whether a childless respondent has tried to conceive a child up to 12 months after the interview took place. Therefore, the date of birth is backdated by 9 month and the difference to the interview date is calculated. The outcome takes on the value 1 if conception takes place within 12 months after the interview. We use the waves 2000 to 2010 from the SOEP data to compute the conception variable but loose by backdating the last two waves. Therefore, in the further analysis only observations from 2000 to 2008 can be used. Since SOEP reports only for mothers the date of birth of their first child, we have to exclude male respondents for the moment. Additional restrictions of our sample are guided by theoretical as well as empirical considerations. First, the theoretical framework excludes single, non-working individuals from the model set-up. Second, from an empirical point of view convincing arguments support the limitation of the sample. We exclude women without completed education or vocational training and focus on women in employment. The reason is that for women in education or training holding a contract with limited duration is absolutely common and additionally they face many different uncertainties so that quantifying a single effect seems to be quite ambitious. Hence, by including them in the sample we would probably overestimate the effect of fixed-term employment. Furthermore, we assume that all females in the sample have a male partner. Of course a stable partnership might be a channel

through which fixed-term employment might influence the fertility decision, but we want to exclude the marriage market effects and concentrate only on the channel of job uncertainty. Since we are interested in family formation as an outcome, and not general fertility, we focus on the transition to parenthood and exclude women which already have a child. In other words, only women which are childless at their first appearance are added to our sample as long as they report their first conception. In addition, the age group of interest is the group of 20 to 40 year old individuals which are potentially in the period of family formation. Above this threshold the reasons for staying childless might be much more heterogenous and hard to quantify. For instance, many women over age 40 and without children have a strong preference for staying childless and are therefore not influenced by potential job uncertainty. Finally, we end up with a sample of 1,538 persons and 4,597 observations.

The main explanatory variable is an indicator whether a woman holds a fixed-term contract or not. Only working individuals have to answer this question except for self-employed. Thus self-employed women are dropped from the sample. We think that this is not a problem since self-employment is associated with a high degree of uncertainty not related to what we are interested in. The effects of the uncertainty of self-employment are not subject to this study. As further observable characteristics we include individual and background as well as job and partnership characteristics. Individual controls are age and its square since older individuals should have a higher propensity to have children which is expected to decrease in higher age. In addition, the covariates contain dummies for migrant background and currently living in East Germany. The fertility decision of migrants might be influenced by cultural aspects, in East Germany the well-established system of public child care might matter. Furthermore, indicators of the respondents highest educational attainment are included. Mother's tertiary education is a proxy for the socio-economic background of the respondent. Since the probability of holding a fixed-term contract might be influenced by job characteristics, the set of controls also covers part-time work and public sector employment. Finally, net household income and martial status are summarized as partnership controls. Table 2 shows means of our outcome of interest and basic control variables separately for individuals with a permanent and a fixed-term contract and the difference between both groups. Obviously, the two groups differ significantly in almost all characteristics. This is a strong sign for selection of different individuals in the different categories of employment contracts. For instance, only 25 percent of permanent employees work in the public sector but 43 percent of the temporary employed. Similarly, the shares of highly educated married women vary strongly between the two groups. Thus, if we do not control for these characteristics, a selection bias might occur. Interestingly, some variables do not show significant differences in their mean between permanent and fixed-term employment. The proportion of migrant women and women with elementary education is the same in both groups. Our outcome variable of interest, conception within 12 months after interview, does not differ significantly as well; approximately 10 percent of women in both subsamples become pregnant. This is a first weak sign that the decision for a children and holding a fixed-term contract is not correlated in the full sample. Nevertheless, more advanced empirical methods have to be applied to study this relationship.

### 4.2. Methodology

Our basic empirical strategy is to compare individuals with fixed-term contracts (treatment group) and with permanent contracts (control group) how they differ in their fertility behavior. The underlying empirical model can be described in linear regression form as follows:

$$y_{it} = \beta\, ft_{it} + \gamma' X_{it} + \psi_t + \varepsilon_{it}. \tag{15}$$

Table 2: Descriptive statistics SOEP (2000-2010)

| | (1) Permanent Job | (2) Fixed-term Job | (1)-(2) | |
|---|---|---|---|---|
| Conception | 0.10 | 0.09 | -0.01 | |
| Age | 30.2 | 27.2 | -2.97 | *** |
| East Germany | 0.17 | 0.28 | 0.10 | *** |
| Migrant | 0.14 | 0.15 | 0.01 | |
| Mother Tertiary Edu | 0.07 | 0.12 | 0.05 | *** |
| Elementary Education | 0.08 | 0.07 | -0.01 | |
| Secondary Education | 0.63 | 0.55 | -0.08 | *** |
| Tertiary Education | 0.29 | 0.38 | 0.09 | *** |
| Part-time Employment | 0.10 | 0.21 | 0.11 | *** |
| Public Sector | 0.25 | 0.42 | 0.17 | *** |
| Net Household Income | 2783 | 2474 | -309 | *** |
| Married | 0.32 | 0.21 | -0.11 | *** |
| N | 3940 | 657 | | |

*** p<0.01, ** p<0.05, * p<0.1

$y_{it}$ denotes the outcome of interest for individual $i$ at time $t$, $ft_{it}$ is an indicator for fixed-term employment (treatment), $X_{it}$ are observed characteristics as described above, $\psi_t$ are period dummies and $\varepsilon_{it}$ is the unobserved error term. The main task is to identify variables which influence the probability of holding a fixed-term contract and simultaneously correlate with the fertility decision. Not controlling for these variables may leave them in the error term as confounding factors which may cause spurious correlations between fertility and holding a fixed-term contract. For that reason we include gender, age, education, income, dummies for the federal states and several partner characteristics amongst others as covariates. To estimate the coefficient of interest we can use an ordinary least squares (OLS) estimator which quantifies the linear relationship between holding a fixed-term contract and the probability of entering parenthood.[3] Under the assumption that conditional on all observable characteristics the error term is uncorrelated with holding a fixed-term contract OLS yields unbiased estimates.

Since this a very strong assumption, we go one step further and make use of the panel structure of our data set to estimate a fixed effects model (FE). Here the error term can be split into a time-constant ($c_i$ ) and a time-variant unobserved effect ($u_{it}$), so that the equation which we want to estimate becomes

$$y_{it} = \beta\, ft_{it} + \gamma' X_{it} + \psi_t + c_i + u_{it}. \tag{16}$$

Differences in observable and unobservable time-constant characteristics between treatment and control group, such as stable preferences or innate ability, are captured by individual fixed effects and cannot cause any bias problems. The identifying assumption is less strict in the FE model because it only requires

$$E(u_{it}|X_i, c_i) = 0, t = 1, 2, ..., T. \tag{17}$$

The time-variant part of the error term has to be uncorrelated with holding a fixed-term contract conditional on all observable characteristics. This would not be the case if for example mobility,

[3]Of course our outcome variable is dichotomous rather than continuous, so we can use standard probit or logit regression techniques. But since the assumptions under which OLS is consistent are less strict, we will apply use probit or logit estimations only for robustness checks.

which we cannot control for, is correlated with both the fertility outcome and whether an individual holds a fixed-term or permanent employment contract. We discuss this eventuality at the end of section 6.

## 5. Results

We apply these methods to the data to obtain correlations between the dependent and the explanatory variables, in particular holding a fixed-term contract. The results are reported in Table 3. In the first three columns the OLS estimates of a pooled regression of all observations are shown before columns 3 to 6 display the FE estimates. In the basic specification we include only control variables which can be treated more or less exogenously. Since the coefficient of mother's educational attainment is very close to and statistically not significantly different from zero in all estimations, we save the space an exclude it from the table. The second specification adds labor market or job characteristics to the equation and finally household income and marital status represent partnership characteristics. The last two are expected to be highly endogenous and beyond that marital status should be interpreted more as channel than as control variable. Therefore, we exclude them from further analyses reported in Table 4. Note that all specification contain a set of period dummies. First, our results suggest that the older the woman the more likely becomes conception but with slightly decreasing strength since age squared has a negative sign. This holds true for all estimation in Table 3. Women living in East Germany have a higher propensity to decide for a children at least in the OLS setting. This correlation breaks down if FE estimation is applied. There is probably to little variation in the variable to estimate an effect by FE. Similarly, the positive effect of working in the public sector vanishes if we make use of the panel structure in our estimations. The coefficients of the dummies of educational achievement suggest that higher education results in higher probability of conception. Migrant background and part-time employment have no effect on the outcome but the partnership controls marital status and household income are highly and positively correlated with conception. Second and most interestingly, the association between conception and fixed-term employment seems to be negative, or more precisely, the point estimate has a negative sign in all estimations but is not significantly different from zero except for one OLS-specification. In line with theory, there is little evidence for a negative relationship in the full sample, but further estimations for different subgroups might shed light on the exact relation.

In the heterogeneity analysis estimations are done separately for different subsamples. We define three different age groups, namely 20 to 28 years, 29 to 34 years and 35 to 40 years. In addition, we distinguish between a sample of women with tertiary education and one without. Table 4 contains only the coefficients of fixed-term employment on conception. Individual and labor market controls are included in all regressions. As mentioned above, partnership characteristics are excluded for several reasons. Note that both coefficients "Total - Full Sample" are the same as in Table 3.

In the OLS estimations the main findings are that younger women tend to postpone childbearing while this effect vanishes in the later age groups and becomes even positive in one subsample. Highly educated women below 29 years are the most affected since for them the costs of fixed-term employment is the highest. Their investments in education and qualification are substantial and they expect therefore an appropriate return on their investments. Uncertain job arrangements make them work harder and spent more time in the labor market. For women above 28 years the correlations are statistically zero. But without university degree the middle aged women tend to increase their fertility even if they hold fixed-term contract. Here, the opportunity cost argument

Table 3: OLS and FE regressions; dependent variable: Conception within next 12 months

| | OLS | | | FE | | |
|---|---|---|---|---|---|---|
| | Basic | Labor Market Controls | Partnership Controls | Basic | Labor Market Controls | Partnership Controls |
| FT Contract | -0.018 | -0.024* | -0.020 | -0.018 | -0.019 | -0.024 |
| | (0.013) | (0.013) | (0.013) | (0.019) | (0.019) | (0.019) |
| Age | 0.057*** | 0.057*** | 0.052*** | 0.109*** | 0.109*** | 0.095*** |
| | (0.009) | (0.009) | (0.009) | (0.015) | (0.015) | (0.015) |
| Age squared | -0.001*** | -0.001*** | -0.001*** | -0.001*** | -0.001*** | -0.001*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Migrant | 0.022 | 0.023 | 0.016 | | | |
| | (0.014) | (0.014) | (0.014) | | | |
| East | 0.037*** | 0.037*** | 0.048*** | -0.025 | -0.026 | -0.013 |
| | (0.013) | (0.013) | (0.012) | (0.067) | (0.067) | (0.069) |
| Secondary Edu. | 0.013 | 0.017 | 0.016 | 0.243*** | 0.243*** | 0.271*** |
| | (0.016) | (0.016) | (0.016) | (0.085) | (0.085) | (0.088) |
| Tertiary Edu. | 0.033* | 0.030* | 0.031* | 0.297** | 0.298** | 0.332** |
| | (0.017) | (0.017) | (0.018) | (0.132) | (0.132) | (0.132) |
| Part-time | | 0.005 | -0.007 | | 0.015 | 0.016 |
| | | (0.014) | (0.014) | | (0.023) | (0.023) |
| Public Sector | | 0.030*** | 0.029*** | | -0.008 | -0.007 |
| | | (0.011) | (0.011) | | (0.025) | (0.025) |
| Married | | | 0.081*** | | | 0.120*** |
| | | | (0.012) | | | (0.024) |
| HH Income | | | 0.018** | | | 0.048*** |
| | | | (0.009) | | | (0.017) |
| Constant | -0.725*** | -0.732*** | -0.782*** | -2.300*** | -2.298*** | -2.436*** |
| | (0.135) | (0.135) | (0.158) | (0.252) | (0.252) | (0.278) |
| Observations | 4,597 | 4,597 | 4,592 | 4,597 | 4,597 | 4,592 |
| # of women | | | | 1,538 | 1,538 | 1,535 |
| $R^2$ | 0.017 | 0.019 | 0.035 | 0.09 | 0.09 | 0.106 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

comes in. If women above an age threshold still have no permanent contract the opportunity costs of childbearing become small enough so that they decide rather for having children than for working at the labor market. Obviously, the time to graduation or the termination of vocational training rather plays a role than the exact age itself. A similar picture is shown in the FE estimation part of Table 4. The sign in the age group under 29 years is still negative but the correlation now is much smaller and thus insignificant. Again the negative sign disappears and the time since the end of education seems to become important if we put our attention to the older women. The probability of conception within 12 months increases for tertiary educated

Table 4: OLS and FE estimates of FT by age groups and education; DV: Conception within next 12 months

| | OLS | | | FE | | |
|---|---|---|---|---|---|---|
| | Full Sample | Tertiary Education | No Tertiary Education | Full Sample | Tertiary Education | No Tertiary Education |
| Total | -0.024* | -0.035 | -0.025 | -0.019 | -0.073*** | -0.007 |
| | (0.013) | (0.023) | (0.016) | (0.019) | (0.036) | (0.015) |
| Age u29 | -0.050*** | -0.077** | -0.044*** | -0.026 | -0.010 | -0.015 |
| | (0.015) | (0.036) | (0.017) | (0.025) | (0.083) | (0.026) |
| Age 29-34 | 0.01 | -0.049 | 0.096* | -0.016 | -0.104 | 0.132** |
| | (0.030) | (0.036) | (0.054) | (0.050) | (0.065) | (0.062) |
| Age 35-40 | 0.047 | 0.084 | 0.002 | 0.013 | 0.041* | -0.007 |
| | (0.042) | (0.069) | (0.038) | (0.011) | (0.022) | (0.015) |
| *Included controls:* | | | | | | |
| Indiv. | YES | YES | YES | YES | YES | YES |
| Labor | YES | YES | YES | YES | YES | YES |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

women if they are older than 35 years and hold a fixed-term contact at the date of interview. Analogously, in the age group of 29 to 34 old women conception becomes more likely if they do not hold a university degree but instead a fixed-term contract. This pattern again supports the theoretical results and implies that the opportunity costs of childbearing have to be low enough for older women in temporary employment so that they are encouraged to become pregnant.

To sum up, we have shown that holding a fixed-term contract is negatively associated with the probability of conception, however these correlations are hardly statistically significant. Furthermore, we find in the OLS as well as the FE estimations signs for heterogenous effects dependent on the time since the end of education or vocational training. Shortly after the career start women react with postponement of childbearing to uncertain jobs. This is indicated by a negative correlation of fixed-term employment and conception. As time of graduation moves further away, the sign changes and holding a fixed-term contract rather fosters conception. Our explanation for this phenomenon is that the opportunity costs of childbearing are raised for younger and lowered for older women by job uncertainty.

## 6. Outlook

Even after controlling for all observable characteristics and including individual fixed effects, unobservable heterogeneity may still cause a bias. For example, if particular unobserved time-variant characteristics of workers trigger employers to offer them only fixed-term contracts and these characteristics are related to the outcome variables as well or if particular types of employees self-select for (unobserved and time-variant) reasons which are related to fertility into industries with higher fractions of fixed-term jobs, then FE estimation yields only biased estimates of the true causal effect. Therefore, we look for unforeseen events that result in an exogenous variation in the probability of holding a fixed-term contract. This event must not be

correlated with the outcome variable in any way, except through the channel of the type of contract. Under this assumption we are able to estimate unbiased effects of holding a fixed-term contract using an instrumental variable or two-stage least squares (2SLS) approach.

A potential source of exogenous variation might be the tremendous increase in fixed-term employment at the beginning of the last decade (see Figure 1). One can argue that this is due to the macroeconomic conditions which make it necessary for firms to have a more flexible workforce and therefore demand driven. But not all industries are affected equally. Some industries use fixed-term contracts more frequently than others and the industrial structure varies largely across regions in Germany. Thus, some individuals are exogenously exposed to a higher risk of holding a fixed-term contract. Using firm-level data we intend to compute an instrumental variable which reflects time-, region- and industry-specific shares of fixed-term employees depicts the demand rather than the supply side. It will indicate the regional and industry-specific risk of being temporary employed in a given year.

Using the 2SLS approach ensures unbiased estimates under the assumption that the instrument is not correlated with the fertility measure except through holding a fixed-term contract. If moving between regions and changing jobs between industry sectors does not occur, the probability of holding a fixed-term contract differs exogenously for individuals in different regions with different industrial structures. Since the sharp increase in the prevalence of fixed-term contracts was unexpected and happened quickly, we argue that moving to other regions was extremely costly and therefore unlikely to occur. The same argument holds also for changing industry. This includes expensive and time consuming retraining and costly job search. However, we will carefully discuss each of these identifying assumptions and perform sensitivity analysis to guarantee the robustness of our results.

## 7. Conclusion

This paper has explored the theoretical basis and empirical analysis for the claim that economic uncertainty in general and holding a fixed-term contract in particular affects the fertility decisions of young couples. We are the first proposing a dynamic bargaining model which integrates job uncertainty in its set-up. So far, our main findings suggest that on the one hand, job uncertainty at the beginning of women's employment careers causes couples to postpone parenthood. On the other, for couples who decide not to have children early on in their working life, job uncertainty in women's mid-life employment careers induces couples to enter parenthood instead of remaining voluntarily childless. Due to this two opposing effects, the overall impact on fertility of temporary employment contracts remains ambiguous. From a empirical point of view these results are supported to large extend. Using GSOEP data we show that holding a fixed-term contract is negatively associated with the probability of conception. But this association is hardly statistically significant in the sample of all women. In a subgroup analysis a different for younger women the probability for conception is lowered by job uncertainty, in the older age groups conception becomes rather more likely depending on the time that has passed since completion of education or vocational training. This holds true for OLS as well as FE estimations. But still there are good reasons why endogeneity problems might occur even in the FE specification. Therefore, further research has to be done to make sure that the empirical results are not driven by selection into treatment. As mentioned above, we intend to make use of exogenous variation in the probability of holding a fixed-term contract.

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