The Career Costs of Children*

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Abstract

We estimate a dynamic life-cycle model of labor supply, fertility and savings, incorporating occupational choices, with specific wage paths and skill atrophy that vary over the career. This allows us to understand the trade-off between occupational choice and desired fertility, as well as the sorting both into the labor market and across occupations. We quantify the life-cycle career costs associated with children, how they decompose into loss of skills during interruptions, lost earnings opportunities and selection into more child-friendly occupations. We analyze the long-run effects of policies that encourage fertility and show that they are considerably smaller than short-run effects.

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1 Introduction

In almost all developed countries, despite significant improvements over the last decades, women still earn less than men (see Blau and Kahn (1996), and Weichselbaumer and Winter-Ebmer (2005) for evidence), are often underrepresented in leading positions, and their careers develop at a slower pace.[1] Having children may be one important reason for these disadvantages, and the costs of children for women's careers and lifetime earnings may be substantial. One key question for investigation, therefore, is the magnitude of these costs and how they decompose into loss of skills during interruptions, lost earnings opportunities, and lower accumulation of experience. Another important question is how intended fertility, even *before* children are born, affects the type of career a woman chooses. Addressing these issues requires an understanding of the dynamics of women's choices, how unobserved fertility preferences and ability affect the sorting into different career paths, and how intermittency patterns, work decisions, savings decisions and fertility choices interact with each other.

This paper addresses these questions, by estimating a dynamic model which describes the labor supply, occupational choices, assets, marital status and fertility decisions of women over the life-cycle. Our model builds on the early work by Polachek (1981), Weiss and Gronau (1981) and Gronau (1988), which emphasizes the important connection between expected intermittency and occupational choice. Like Polachek, we allow different occupations to have different entry wages and different rates of atrophy (skill depreciation) and wage growth. In addition, we allow atrophy rates to vary over the career cycle, and occupations to vary according to their amenity value with regards to children. We cast this in a dynamic setting which endogenizes occupational choice, human capital, wages, savings decisions and fertility, and which allows for unobserved heterogeneity in ability and the taste for children. Hence, our model integrates occupational and fertility choices into a woman's life cycle plan, where women with different fertility plans opt for different occupations so as to balance a potentially higher wage path with higher atrophy rates during work interruptions. Further, it explicitly

[1]See for instance Catalyst (2009).

implements risk aversion and savings, thus taking account of the trade-off between building up assets early in the career and maternity during a woman's most fertile period.

While many papers have addressed the issues of female labor supply and fertility, most have dealt with them in isolation.[2] Early papers that analyze female labor supply and fertility jointly use reduced-form models, such as Moffitt (1984) or Hotz and Miller (1988). More recent papers that use dynamic life-cycle models to study these as joint decisions include Francesconi (2002), Gayle and Miller (2006), Sheran (2007) and Keane and Wolpin (2010). We extend this work in three significant ways. First, we incorporate occupational choices to better understand the interplay between job characteristics, such as skill atrophy or differential wage growth, and the planning of fertility, as well as the sorting that takes place both into the labor market and across occupations. Second, we allow for skill atrophy, which can differ not just between occupations, but also over the career cycle. This is important to capture the trade-off between occupational choice and desired fertility, with possibly high atrophy rates at career stages where fertility is most desirable. Third, we allow for an inter-temporal budget constraint and risk aversion, which adds to our understanding of the relationship between savings and fertility, and is important when investigating the dynamic aspects of policies that incentivise fertility.

We study this for Germany, where individuals who choose to attend lower track schools at age 10 (about 65% of each cohort) enroll after graduation (and at the age of 15-16) in a 2-3

[2]Early papers by Becker (1960), Willis (1973) and Becker and Lewis (1973) study fertility decisions and their dependence on household background variables in a static context. Several authors, including Heckman and Willis (1976), Ward and Butz (1980), Rosenzweig and Schultz (1983), Wolpin (1984), Rosenzweig and Schultz (1985), Cigno and Ermisch (1989), Heckman and Walker (1990), Blackburn, Bloom, and Neumark (1990), Hotz and Miller (1993), Leung (1994), Arroyo and Zhang (1997) and Altug and Miller (1998), propose dynamic models of fertility, but assume labor supply decisions as exogenous. On the other hand, a related literature on women's labor supply behavior takes fertility decisions as exogenous; see, for example, Heckman and Macurdy (1980), Blau and Robins (1988), Eckstein and Wolpin (1989), van der Klaauw (1996), Hyslop (1999), Attanasio, Low, and Sanchez-Marcos (2008), Keane and Sauer (2009), Blundell et al. (2013); see Blundell and Macurdy (1999) for a survey.

year vocational training program in one of 360 occupations within the German apprenticeship system.[3] This unique setting enables us to observe initial occupational choices for these individuals before fertility decisions are made, but conditional on individual preferences for future fertility. Our primary dataset is of administrative nature, and allows precise measurement of wages, career interruptions, labor supply, and occupations, including the initial occupational choice, for many cohorts across different regions over several decades. We combine this data with survey data to measure fertility, household formation and savings decisions.

Our model and estimated parameters produce valuable insights into the different components of the career costs of children, the contribution of fertility to explaining the male-female wage differential, and the short-run and long-run impact of transfer policies on fertility. We estimate that about three quarters of the career costs of children stem from lost earnings due to intermittency or reduced labor supply, while the remainder is due to wage responses, as a result of lost investments in skills and depreciation. More specifically, we show that skill depreciation rates are higher in mid-career and differ across occupations, as do the opportunity costs of raising children and the child raising value, so that different occupational choices lead to different costs of raising children and affect the timing of their birth. Our results highlight that the selection into different careers is based not only on ability, but also on desired fertility, so that some costs of fertility incur well before children are born.

Both atrophy and prior selection into child friendly occupations based on expected fertility therefore contribute to the career costs of children. We also provide evidence on dynamic selection, where fertility leads to changes in the ability composition of working women over the life-cycle. Using a sample of comparable male cohorts who made similar educational choices, we run simulations to understand better the wage differences between women and men over the life course, and how these are affected by fertility decisions. We find that fertility explain an important part of the gender wage-gap, especially for women in their mid-thirties.

[3]These occupations range from hairdresser to medical assistant to bank clerk, and two in three individuals of each birth cohort follow an apprenticeship-based career route. See Fitzenberger and Kunze (2005) for details on the occupational choices of males and females.

Finally, we use our model to simulate the impact of pronatalist transfer policies. Most previous studies that investigate the effect of these policies on fertility are based on difference-in-difference (DiD) designs and focus on short-term impacts. [4] In contrast, our model allows us to evaluate both short term and long term effects and to distinguish between responses through the timing of fertility in reaction to an announced policy, vs. a change in overall fertility. In doing so, we show not only that the long-run effect of a subsidy policy is considerably lower than the short-run effects estimated in the literature but that such policies may also have a long-run impact on skill accumulation, labor supply and occupational choice. More importantly, we demonstrate that these policies are likely to have a far larger impact on younger women, as they can adjust many life course decisions older women have already made. These younger cohorts however are typically not considered in DiD type studies as their fertility does not respond in a narrow window around the policy.

2 Background, Data, and Descriptive Evidence

2.1 Institutional Background and Data

Following fourth grade (at about age 10), the German education system tracks individuals into three different school types: low and intermediate track schools, which end after grade 9 and 10 (age 15/16), or high track schools, which end after grade 13. About one third of the cohorts studied here attend each of the three school types. Traditionally, only high track schools qualify individuals for university entrance, while low and intermediate track schools prepare for highly structured 2 to 3-year apprenticeship training schemes that combine occupation-specific on-site training 3-4 days a week with academic training at state schools 1-2 days a week. [5] These programs, which train for both blue- and white-collar professions, cover

[4]See, for instance, Milligan (2005), Laroque and Salanie (2014), Cohen, Dehejia, and Romanov (2013), and Lalive and Zweimüller (2009).

[5]For instance, training is only provided in recognized occupations, skilled training personnel must be present at the training site, and trainees must pass monitored exit examinations.

many occupations that in the U.S. require college attendance (e.g., nurse, medical assistant, accountant). At the end of the training period, apprentices are examined based on centrally monitored standards, and successful candidates are certified as skilled workers in the chosen profession.

In our analysis, we concentrate on women born in West Germany between 1955 and 1975 who attend lower and intermediate track schools and then enroll in an apprenticeship training scheme after school completion.[6] We follow these women throughout their careers for up to 26 years in the labor market. We draw on three main datasets (described in more detail in Appendix A): register-based data from the German social security records (IABS data) and survey data from the German Socio-Economic Panel (GSOEP) and the Income- and Expenditure Survey (EVS). The IABS data covers a 2% sample of all employees in Germany that contributed to the social security system between 1975 and 2001 and provides detailed information on wage profiles, transitions in and out of work, occupational choice, education, and age, and periods of apprenticeship training. The sample we construct contains about 2.7 million observations on wages and work spells. We use the GSOEP data to measure, for a sample from the same birth cohorts as in the register-based dataset, women's fertility behavior over their careers, as well as family background and spousal information. Finally, we use the EVS data to compute savings rates.

All analyzes concentrate on the German population. Because the register data exclude the self-employed and civil servants, we exclude these groups from our analysis, as well as all individuals who have ever worked in East Germany. We provide more detail about the sample construction in Appendix A.[7]

[6]Women born in East Germany experienced different conditions while growing up behind the Iron Curtain and we do not observe them in administrative data until after German reunification.

[7]Earnings in all data sets we use have been deflated using Consumer Price Index data for private households (German Statistical Office) and converted into Euros, with the base year being 1995.

2.2 Occupation Groups

We allocate occupations to groups that reflect the tradeoff between careers that offer a higher wage but punish interruptions, and careers that imply lower profiles but also lower atrophy rates. To achieve that, we use information on the task content of occupations, drawing on the task-based framework introduced by Autor, Levy, and Murnane (2003). This results in an aggregation of the many occupations into three larger groups according to characteristics that are meaningful in the context we study, distinguishing between occupations where tasks performed are mostly routine, occupations where tasks are mostly analytic or interactive, and occupations where tasks are mostly manual, but not routine. We refer to these three occupational groups as routine, abstract and manual occupations.[8]

Requirements in jobs with mainly abstract tasks are likely to change at a faster pace than those in routine dominated occupations, while those in manual occupations may take an intermediate position. For instance, shop assistants and sewers are classified as routine occupations, and require a set of skills that is acquired in the early stages of the career (like product knowledge and relational skills), but unlikely to change much over time. On the other hand, bank clerks and medical assistants (classified as abstract) are likely to require constant updating of their skills because of rapidly changing information technologies or new financial products, while nurses and stewards (classified as manual occupations) may take an intermediate position. We show below that wage profiles, but also atrophy rates are indeed higher in abstract occupations than in routine or manual occupations.

[8]Autor, Levy, and Murnane (2003) distinguish between (i) non-routine analytic, (ii) non-routine interactive, (iii) routine cognitive, (iv) routine manual, and (v) non-routine manual jobs. These are often combined into abstract (i, ii), routine (iii, iv) and manual (v) jobs. We follow Gathmann and Schonberg (2010), Black and Spitz-Oener (2010) and Dustmann, Ludsteck and Schoenberg (2009) who allocate two digit occupations to these three groups, using data from the German Qualification and Career Survey 1985/86, and which includes survey information on tasks performed on the job. The construction of the task indicators and the classification of occupations across the three groups are detailed in Appendix A. Table D1 illustrates the ensuing classification of the 20 most frequent occupations in our sample.

2.3 Occupational Choice, Labor Supply, Fertility and Savings

In Table 1, we present descriptive statistics for the whole sample and by current occupation. About 45% of all women in our sample choose an initial (training) occupation with more abstract tasks, while 25% and 30%, respectively, choose routine or manual occupations. The second row of the table illustrates that current occupational proportions are similar to those for initial occupations, indicating that few women switch occupations over their careers. This is confirmed by the transition rates across groups in the second panel of the Table, illustrating that 98.6% of individuals remain in the same occupational group in two consecutive years.

In the third panel, we report initial wages at age 20 and real wage growth in each of the three occupation categories, after 5, 10, and 15 years of potential experience. Women in more abstract occupations not only earn higher wages than those in the two other groups at the start of their careers, but also have a higher wage growth at each level of experience. The next panel reports the accumulation of total labor market experience, and broken down by part-time and full-time work, by occupational category and evaluated after 15 years of potential labor market experience. Women who have chosen an occupation with predominantly abstract tasks accumulate 1.2 years (or 10 %) more total work experience and about 1.6 more full-time work experience over this period than women in routine task-dominated occupations. Finally, the next panel reports changes in daily wages after an interruption of 1 or 3 years, where changes in work hours, firm size, and occupation are conditioned out. The overall log wage loss for a one (three) year interruption is about 0.12 (0.21) log points. Wage losses are highest in abstract, and lowest in routine occupations.

Thus, the costs of interruptions both in terms of forgone earnings as well as atrophy differ between occupational groups, and are highest in occupations dominated by abstract tasks. This is reflected by different fertility patterns, as shown in the penultimate panel, where women in abstract jobs are more likely to remain childless or to have only one child, while being less likely to have two or more children, and being older at the birth of their first child. While these figures suggest therefore sizeable differences between women who choose different occupational careers at an early point in their life cycle, they cannot be interpreted causally due to selection of women into occupations, fertility behavior, and labor supply patterns based on fertility preferences and labor market abilities.

In Figure 1 we plot the average household savings rates as a function of the age of the woman. Savings rates have a hump-shaped profile, at least until age 50, starting at about 7% at age 20 and reaching a peak at age 28, after which they decrease. The figure suggests that savings are build up before the arrival of children, indicating that savings are an important element in the fertility decision, and that parents are smoothing consumption over the life cycle and in response to the added expenditures linked to children. Building up a sufficient stock of assets could therefore be an important reason to delay pregnancy, in addition to career considerations.

3 A Life-Cycle Model of Fertility and Career Choice

Our objective is to develop an estimable life-cycle model to assess the career costs of children. To achieve that, our model has to be able to evaluate the costs of fertility by considering all associated decisions. There are at least three elements that determine the career costs of children. First, children may require intermittency periods of unearned wages during which women cannot work. Second, during intermittency, there will be no skill accumulation, and existing skills may depreciate. Third, depending on ability and expected fertility, women may sort into occupations that minimize the expected career costs of children. In particular, occupations may differ in terms of opportunity costs of raising children and in how skills depreciate. To understand how these different determinants of the costs of fertility operate, we need to understand how fertility is planned. This requires, in addition to the above components, modeling of the evolution of assets over a woman's work career, which in turn will interact with both fertility- and career decisions. Thus, consideration of savings decisions is an important building block in our model. In the next section, we describe the main components of our model. We provide a more detailed description in Appendix B. In Table D2 we collect the notation we use.

3.1 The Set-Up

In each period, individuals choose consumption (and savings), whether to have an additional child, labor supply, and the type of occupation they work in. Frictions in the labor market imply that individuals have to wait for offers to adjust their labor supply. In the first period, around the age of 15, they decide on a particular training occupation and enroll into a 2-3 year apprenticeship training scheme. Time is discrete, a period lasts for 6 months, and we consider women in the age range between 15 to 80, thus starting at the age when occupational decisions are made. We first present the building blocks of our model and then show how decisions are taken.

Ex ante heterogeneity. We allow for ex-ante heterogeneity, which we model in terms of discrete mass points, along four dimensions: labor market productivity - or ability - (f_i^P), taste for leisure (f_i^L), taste for children (f_i^C), and potential infertility (f_i^F). We collect these characteristics in the vector f_i. As four dimensional heterogeneity is very demanding in terms of identification and computation, we place some restrictions on how these characteristics vary across individuals. We group together ability and the taste for leisure. While individuals with high ability can have a different taste for leisure than low ability individuals, we do not allow for heterogeneity in the taste for leisure, conditional on ability. We allow for unobserved heterogeneity in the "taste for children" to be correlated with ability and the taste for leisure, and we estimate this correlation. Further, we assume that potential infertility is orthogonal to the first three characteristics, meaning that, while women know the first three characteristics, they do not anticipate infertility, and they do not learn from unsuccessful conception attempts. Based on medical evidence, we fix the proportion of infertile women at 5%. [9]

[9]Data from the U.S. indicate that about 8% of women aged 15 to 29 have impaired fecundity (see Centers for Disease Control and Prevention (2002)), although some may give birth after treatment for infertility.

Occupation and labor supply. In our model, several features describe an "occupation" o_{it} (which takes three values denoting whether an occupation is "routine", "abstract" or "manual"). First, each occupation has a particular wage path, characterized by different log wage intercepts and different returns to work skills (denoted x_{it}). Second, occupations are characterized by the pace with which skills depreciate through intermittency (atrophy). Third, arrival rates of offers when out of work differ across occupations. Finally, occupations differ in their amenity value with regards to children, as in some occupations, women can better vary their work hours to care for their children. By allowing for occupational choices, we build into our model an important aspect of women's career decisions, which has first been emphasized by Polachek (1981). We extend Polachek's formulation, by allowing these choices to be taken in conjunction with fertility choices, and by considering the "child raising value" of occupations.[10]

In any occupation, individuals can work either full time (FT) or part time (PT). They can also choose to be unemployed (U), or out of the labor force (OLF), and we record the choice in the variable l_{it}. We assume that offers for alternative occupations and working hours arrive at random, but that arrival rates differ according to current occupation and labor supply status. We refer the reader to Appendix B for further detail on functional forms. Furthermore, women who are working face an exogenous and constant probability of layoff δ.

Budget constraint. The budget constraint of the household is given by:

$$A_{it+1} = (1+r)A_{it} + net(GI_{it}; h_{it}, n_{it}) - c_{it}^{HH} - \kappa(age_{it}^{K}, n_{it}) I_{l_{it}=FT,PT,n_{it}>0} \, , \tag{1}$$

where A_{it} is the stock of assets and r the interest rate (which we assume as fixed and set at 4 percent). In our model, assets are accumulated for precautionary motives as individuals are risk-averse and face shocks to wages, labor market participation and household size. Assets are used to finance periods out of the labor force, fluctuations in household earnings, and costs associated with children and retirement. Households cannot borrow against future income to

[10]See also Goldin (2014) who stresses this point as an important aspect of occupational choice.

finance the costs induced by having children and need to delay fertility to accumulate sufficient assets (see also Heckman and Mosso (2014) for a discussion of imperfect borrowing in a model of parenting). Total household consumption is denoted as c_{it}^{HH}, which is equal to the woman's own consumption, c_{it}, scaled by the number of adults and children in the household.[11] Further, we denote by GI_{it} the gross income of the household, which consists of the labor earnings of the husband, the labor earnings of the wife if she works, unemployment benefits or maternity leave benefits if eligible, and government transfers according to the number of children.[12] If children are present, but the father has left the household, the father contributes to the household budget through child support.[13] During retirement, women receive retirement benefits, which are a fraction of their last earnings. Net income $net(GI_{it}; h_{it}, n_{it})$ is derived from gross income, using institutional features of the German tax code, and is a function of the number of children and the presence of a husband (where $h_{it} = 1$ if a husband is present), as tax rates vary between singles and couples. Finally κ is a cost incurred if children are present and the mother decides to work and includes the cost of child care. We assume it depends on the age of the youngest child (denoted age_{it}^{K}) and the number of children, n_{it}. We estimate this cost along with the parameters of the model.

[11]We use a scale similar to the "OECD modified scale", where the "number of adult equivalent" is equal to one plus 0.5 for a second adult and 0.3 for each child, see Hagenaars, de Vos, and Zaidi (1994). As these consumption weights are derived for the average household in OECD countries, they may not be pertinent for the population we study. We therefore estimate the weight of children, while holding constant the weight of adults.

[12]Unemployment benefits depend on past earnings, which in turn are functions of the previous occupation, accumulated skills and unobserved productivity. Individuals are eligible for benefits if they had been working prior to becoming unemployed. Maternity benefits consist of two components, a fixed one, and a variable one, that depends on former labor market status.

[13]The father's compulsory contribution is 15% of his income for each child, see Duesseldorfer Tabelle (2005) for more detail.

Skills and wages. While working, individuals accumulate skills. Skills are increased by one unit for each year of full time work and by 0.5 units for each year of part time work.[14] When out of work, skills depreciate, and the rate of atrophy $\rho(x_{it}, o_{it}) < 1$ depends on the occupation and the previous level of skills:

$$\begin{aligned} x_{it+1} &= x_{it}\ \rho(x_{it}, o_{it}), \\ \rho(x_{it}, o_{it}) &= \rho_1(o_{it}) I_{x_{it}\in[0,5[} + \rho_2(o_{it}) I_{x_{it}\in[5,7]} + \rho_3(o_{it}) I_{x_{it}\in[8,\infty[}, \end{aligned} \tag{2}$$

where ρ_1, ρ_2, ρ_3 are vectors of parameters, specific to each occupation, and I_j is an indicator variable taking the value of one if j is true (i.e. if the level of skills x_{it} falls in the interval in brackets). We thus allow for career interruptions being more detrimental at career stages where learning is intense or where individuals compete for key workplace positions, a potentially important factor to understand the timing of fertility.[15]

Female full-time daily wages depend on skills, x_{it}, occupation, o_{it}, and individual productivity f_i^P:

$$\ln w_{it} = f_i^P + \alpha_O(o_{it}) + \alpha_X(o_{it})x_{it} + \alpha_{XX}(o_{it})x_{it}^2 + \eta_{it}\ , \tag{3}$$

where η_{it} is an iid shock to log wages. The wage profile is specific to a given occupation, with different intercepts and different returns to skills.[16]

Marriage, divorce and husbands' earnings. Women's probability of getting married in each period depends on their age, skills, and taste for children (f_i^C). Conditional on being married, women face a probability of divorce which depends on their age and the presence of

[14]We do not consider occupation-specific skills as in the data we observe very few individuals switching occupation during the life-cycle.

[15]This extends the empirical literature that assumes constant depreciation rates across occupations or career stages, see e.g. Kim and Polachek (1994) and Albrecht et al. (1999). We chose the nodes of 5, 7 and 8 based on results from reduced form regressions.

[16]As wage profiles are flat after 15 years of accumulated work experience, we assume that there exists a threshold, $\bar{x}$, beyond which the marginal effect of skills on wages is zero. We estimate this threshold along with the other parameters.

children. The functional forms for these probabilities are shown in Appendix B.1. Our model therefore allows for the age of marriage to vary with unobserved characteristics, where women with a higher taste for fertility may marry at younger ages. To the extent that unobserved heterogeneity such as differences in productivity, taste for children or leisure affect labor market attachment, these characteristics will also influence marital status through the effect on skills.

We model the earnings of the husband, $earn^h_{it}$, which capture both their wages and labor supply. We assume earnings depend on observed characteristics of the woman, as in van der Klaauw (1996) or Sheran (2007), which in our case include age and occupation. We extend these papers by allowing earnings to depend also on her unobserved ability, f^p_i:

$$earn^h_{it} = \alpha^h_0 + \alpha^h_{a1} age^M_{it} + \alpha^h_{a2} age^{M2}_{it} + \sum_j \alpha^h_j I_{o_{it}=j} + \alpha^h_P f^P_i + \eta^h_{it}\,, \tag{4}$$

where $I_{o_{it}}$ is an indicator variable equal to one if the wife is working in occupation j, and η^h_{it} is a shock assumed to be *iid* and normally distributed with mean zero.[17] As we allow for a rich set of characteristics, both observed and unobserved, to influence marital status and husbands' earnings, our model captures essential ingredients of a marriage market with assortative matching and differential marriage rates across women, while at the same time remaining tractable.[18] Husbands contribute to the income of the household, providing resources and insurance against income or labor market shocks.

Conception. If a woman decides to conceive a child, a child is born in the next period with a probability $\pi(age^M_{it}, f^F_i)$. This probability takes into account potential infertility, although

[17]We estimate the variance of η^h_{it} using data on earnings for the spouses, including non-employment spells, so that η^h_{it} takes into account unemployment shocks as well. We assume that the shock to the husband's earning is orthogonal - conditional on observables and a fixed effect specified in equations (3) and (4)- to the shock to the woman's wage. In the data, the wage/earnings residuals within a household are weakly correlated with a coefficient of -0.04 and a standard deviation of 0.001.

[18]Dynamic models of marriage markets and schooling or labor supply have been derived by e.g. Chiappori, Iyigun, and Weiss (2009) and Eckstein and Lifshitz (2014).

women do not know or learn about it. Drawing on medical evidence we allow the probability of conception to decline with age. [19] Note that a child can be conceived out of wedlock, although this is uncommon in Germany during the period we consider.[20]

Dynamic choice. At the start of each period, individuals take as given the variables that form their state space Ω_{it}:

$$\Omega_{it} = \left\{ l_{it-1}, o_{it-1}, A_{it-1}, h_{it-1}, age^M_{it}, x_{it}, n_{it}, age^K_{it}, \Upsilon_{it}, f_i \right\} .$$

The state space is composed of variables set at the end of the previous period: labor supply l_{it-1}, occupation o_{it-1}, assets A_{it-1} and marital status (presence of a husband) h_{it-1}. It also comprises variables updated at the start of the period: age (age^M_{it}), skills x_{it}, number of children (including any newborn child) n_{it}, and the age of the youngest child age^K_{it}. The state space includes a vector of iid shocks to preferences affecting labor market status, occupation and conception as well as income or earning shocks (which we collect in a vector Υ_{it}), and the different dimensions of ex-ante heterogeneity, collected in the vector f_i.

The value function for individual i in period t is given by:

$$V_t(\Omega_{it}) = \max_{\{b_{it}, c_{it}, o_{it}, l_{it}\}} u(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it}, \Upsilon_{it}, f_i) + \beta E_t V_{t+1}(\Omega_{it+1}) , \tag{5}$$

where β is a discount factor, and E_t is the expectation operator conditional on information in period t. The expectation of the individual is over the vector of future preference and income shocks Υ_{it+1}, and future shocks to marital status.

In each period the individual chooses whether to conceive or not (denoted by the indicator variable b_{it}), her consumption (or equivalently household consumption), occupation o_{it} and

[19] Khatamee and Rosenthal (2002) estimate that a woman has a 90% chance of conceiving within a year at age 20, a 70% chance at age 30, and a 6% chance at age 45. After age 50, the probability of conception is almost zero.

[20] We do not allow for conception errors, as in Sheran (2007), as we do not have such information, but our model allows for shocks to preferences regarding conception, so that two seemingly similar women may differ in their decision to conceive.

labor market status l_{it}. The choice of occupation and labor market status become effective at the end of the period.

Utility is derived from her own consumption c_{it}, labor market status l_{it} (which reflects the amount of leisure time available), the amenity value of an occupation o_{it}, and the number of children n_{it} (we abstract from modelling the quality of children). We write the utility function as:

$$u_{it} = u_1(c_{it}, l_{it}; n_{it}, f_i^L) + u_2(n_{it}; f_i^C, age_{it}^K, l_{it}, o_{it}, h_{it},) + u_3(b_{it}, \Upsilon_{it}) \tag{6}$$

The utility function has three parts. The first sub-function is the utility derived from consumption and leisure. We allow for curvature in the utility function over consumption to allow for risk aversion, by specifying a constant relative risk averse function. The utility of consumption is interacted with leisure (labor supply), as in Attanasio, Low, and Sanchez-Marcos (2008), the taste for leisure as well as the number of children.

The second sub-utility is the utility of children. The utility a woman derives from children depends on her taste for children and on four further factors, the age of the youngest child, age_{it}^K, labor supply, l_{it}, occupation, o_{it}, and her marital status, h_{it}. The age of the youngest child reflects that leisure may be particularly valuable when children are young. The specification also allows for complementarity between children and leisure. These features help explaining why many mothers take time off from the labor market.[21] Occupation may affect the marginal utility of children as some occupations may be more demanding and impose constraints for working mothers. Finally, marital status is part of the utility function to allow for the possibility that raising children imposes less of a utility cost if a partner is present.

The third sub-utility collects preference shocks pertaining to the choice of conception (b_{it}). We describe in Appendix B.3 in detail the functional form for the subutility functions.

[21]We do not model child quality, as the goal of our analysis is the study of the careers of women and not the production of child quality per se. See Del Boca, Flinn, and Wiswall (2014) for a model of child quality and parental inputs, which however does not consider fertility choices, savings, occupational choices and depreciation of skills. With data on labor supply and fertility, our formulation is observationally equivalent to models where mothers derive utility over child quality, which is produced with parental time inputs.

Labor market choices are taken until 60, at the age at which women retire and live an additional 20 years, deriving utility from consumption, leisure, and children. During that period, they finance consumption from retirement benefits and by de-cumulating assets. Choices are made under the constraints detailed above, as well as some additional institutional constraints, which we describe in Appendix B.4. For instance, women who are out of the labor force cannot apply for unemployment benefits, and pregnant women in employment have the option to return to their previous occupation after their maternity leave (although not necessarily at the same wage, as skills depreciate when out of work).

Initial choice of occupation. At time $t = 0$, women enter apprenticeship training, typically around age 15 or 16, and decide on a specific training occupation o_{i0} by comparing the expected flow of utility for each occupational choice with the current cost, which depends on the region of residence R_i and the year of labor market entry ($Year_i$), as well as a preference shock, ω_{io}, drawn from an extreme value distribution and specific to each possible occupation o. These costs arise from temporary or local shortages of training positions in particular occupations and we use those to identify the choice of occupation. The apprenticeship training lasts three years, so the payoff is received six periods later (as a period in our model lasts for half a year):

$$o_{i0} = \arg\max_{o} \left(\beta^6 E_0 V_6(\Omega_{i6}) - cost(o, R_i, Year_i) - \omega_{io}\right). \tag{7}$$

We do not model choices during the training periods. Training regulations in Germany commit firms to fulfilling the entire period of the apprenticeship contract, so individuals cannot be fired. We assume that women begin making choices about fertility once they have completed their training.[22]

[22]Teenage pregnancy rates are very low in Germany. For instance, in 1998, only 1.3% of women between 15 and 19 gave birth, compared to 5.2% in the U.S. (see UNICEF (2001)), and 4.7% between 15 and 18 in the UK (see http://www.fpa.org.uk/professionals/factsheets/teenagepregnancy).

3.2 Estimation

3.3 Method and Moments

The model is estimated using the method of simulated moments (MSM) (see Pakes and Pollard (1989) and Duffie and Singleton (1993)), which allows us to combine information from different data sources on career choices, wages, savings and fertility decisions over the life cycle. The method also allows us to address time aggregation, through simulations, as the sample frames of our data sets vary, from semi-annual (in the IAB data) to annual frequencies (in the GSOEP).

In this approach, the model is solved by backward induction (value function iterations) based on an initial set of parameters, and then simulated for individuals over their life cycles.[23] The simulated data provide a panel dataset used to construct moments that can be matched to moments obtained from the observed data. Using a quadratic loss function, the parameters of the model are then chosen such that the simulated moments are as close as possible to the observed moments. Because the focus of our model is on describing life-cycle choices, we remove regional means and an aggregate time trend from all our moments.[24]

The method of simulated moments yields consistent estimates. However, as shown by Eisenhauer, Heckman, and Mosso (2014), its finite distance properties depend on the choice of moments, the number of simulations, and the weighting matrix, and we follow their suggestion and choose both static and dynamic moments. To obtain a smoother criterion function, we weight the moments with a diagonal matrix which contains the variances of the observed moments.

[23]We refer the reader to Appendix B.5 for an extensive discussion on the numerical solution of the model.

[24]Removing regional and aggregate effects when calculating moments implies that we are relying on difference-in-difference variations to identify our model. In other words, the model is not identified from pure cross-sectional variations or time-series variations that could introduce spurious correlation. An alternative choice would be to model regional differences together with a choice of residence, which would be infeasible within our framework. Kennan and Walker (2011) model location choices In a simpler setting.

The full list of moments used to identify the model is displayed in Table 2, grouped by the choices they identify, i.e. labor supply and occupational choices, wages, savings, fertility and marital status. In each of these categories, we rely on simple statistics that ensure that the model reproduces the basic trends and levels in the real data. These moments include variables such as the proportion of women in each occupation, average wages, hours of work, number of children and savings rates, all computed at different ages ranging from 15 to 55. [25] We further describe fertility choices by ages at first and second birth and their heterogeneity by including centiles of the age at first and second birth in our list of moments.

In addition, we add conditional moments, which relate the main outcome variables to other endogenous variables, either for the same period or adjacent periods. Eisenhauer, Heckman, and Mosso (2014) argue that such moments are crucial to identify the parameters of dynamic models such as ours.[26]

Information contained in regressions of log wages on career interruptions contribute to the identification of the atrophy rate parameters in equation (2), as in Polachek (1981). More specifically, we use information from regressions of the change in log wages for individuals who interrupt their career on the duration of the interruption, dummies for experience levels, occupational groups, and the interaction of duration and experience. This information alone is not sufficient to identify the atrophy parameters, due to the non-random selection into maternity and more generally into non-working spells. However, by matching the simulated moments to those obtained from the observational data, our model, which specifies the process through which these choices are made, allows us to identify the underlying structural parameters. We follow here similar identification schemes that have been used in previous literature (see for

[25]We follow the cohorts in our main data from age 15 to 40. To completely characterize their life cycle, however, we also use supplemental data from slightly older cohorts to construct moments that describe wages and labor supply at ages 45, 50 and 55. We verify that at age 40, the labor supply and wages of these older cohorts are very similar to those of the younger ones.

[26]For instance, dynamic moments we use link current wages to past and future wages, or past labor supply or fertility decisions, current labor supply to previous labor supply, and current savings with past fertility decisions.

instance Del Boca, Flinn, and Wiswall (2014)).

Our model also allows for unobserved heterogeneity in the level of wages (ability), as in equation (3), and in the utility derived from children.[27] We model the heterogeneity as a mass point distribution and allow for a correlation between both dimensions. We use discrete mass points, which are estimated together with the relative proportion in the sample in a similar way as in Heckman and Singer (1984). To identify the proportion of individuals in each ability "type", we proceed in several steps. We first regress log wages on experience and occupation and compute wage residuals for each individual. This residual contains information on unobserved ability, f_i^P. We then use the cross-sectional variance of these wage residuals as a moment. We also regress the number of children on age to compute a fertility residual, which contains information about the unobserved taste for children, f_i^C, and we correlate it with the wage residual to provide information on the correlation between ability and desired fertility.

We construct these conditional moments from different data sets and use for each moment the data set that contains the most precise information. For instance, moments pertaining to wages and labor supply are computed from the administrative IAB data. Information on fertility is gathered from the GSOEP, and information on savings rates from the EVS. In total, we rely on 743 moments to identify our model. Appendix B.6 provides further evidence on the identification of the model.

3.4 Model Fit

Overall, the model fits the sample moments well in an economic sense. However, due to our very large sample (we observe 2.7 million work spells and earnings), our moments are estimated with very high precision, which leads, not surprisingly, to statistical rejection of global equality of estimated and simulated moments. For instance, the proportion of women working full time at age 30 is 37.5% in the data, while the model prediction is 37.1%. Statistically the equality

[27]As explained earlier, we groups together heterogeneity in ability and taste for leisure.

of these two moments is nonetheless rejected, with a t-statistic of 3.8.[28] Locally, however, we cannot reject the equality of the observed and simulated moments at the 95% confidence level in 53% of the cases, despite our large sample. Furthermore, the model matches trends in labor supply and work hours well, as well as the number of children and spacing of births by age. It is also able to match wage profiles by age and initial occupation, the savings rate by age, and the coefficients of a regression of log wage on work experience by occupation. The model also replicates closely the dynamic moments. For instance, a regression of our simulated data for log wages on the lead and lagged log wages give very similar results to the ones in the data (respectively 0.51 versus 0.53 and 0.48 versus 0.46, see Table D6). To economize on space in the main text, we refer the reader to Appendix C for a detailed presentation of the model fit and an extended set of tables.

4 Results

4.1 Estimated Parameters

To describe wages, hours of work, occupational choices, the number of children, the spacing of births, and savings decisions over the life cycle, we estimate a structure that is defined by a total of 73 parameters.[29] We now discuss subsets of these parameters.

[28]The J-statistic for the overall fit of the model is equal to 123,352, which implies the rejection of the equality of predicted and observed moments at any confidence level. The chi-square critical value at the 5 percent level and 670 degrees of freedom is equal to 731. The equality of the predicted and observed moment would not be rejected were the sample size about 100 times lower, which would still be larger than the samples sizes typically used in structural models.

[29]In addition, the initial choice of occupation, allowing for a fully interacted model with regional and time effects in the cost function (see equation (7)) is defined by 88 parameters.

4.2 Atrophy rates, wages and amenity values by occupation

We display in the first panel of Table 3 the atrophy rates, measured as the value of skill loss resulting from a one-year work interruption, which we allow to vary by level of skills and by occupation (see equation (2) and Appendix **??** for details). As skills accumulate in the same way as work experience, but depreciate when out of work, a skill level of x is equivalent to x years of uninterrupted work experience, and we report the atrophy rates at 3, 5, and 10 years.

In routine occupations, atrophy rates are low and vary between 0.06% and 0.6%. In contrast, in abstract occupations, atrophy rates are far higher, and vary substantially over the career cycle (between 0.1% and 6.9% per year), while manual jobs take an intermediate position. In both types of occupations, atrophy rates are highest at about 6 years of uninterrupted work experience, suggesting that intermittency is far more costly at intermediate career stages, possibly due to differing learning intensity over the career cycle, and important career steps being decided at those career points.[30] An uninterrupted work experience of 6 years corresponds on average to an age of 26 years, which is when many women find it desirable to have children. Fertility decisions are therefore likely to be affected far more by career concerns in abstract (and to some extent in manual) jobs than in routine occupations. This is in line with the evidence in Table 1 on the age at first birth across occupational groups. In addition, the non-linear evolution of atrophy rates in these occupations, being highest at mid-career stages, adds a further important (and so far largely ignored) consideration when considering occupational choices of women, and how these interact with desired fertility.[31]

[30] Kim and Polachek (1994) estimate atrophy rates of about 2% to 5%, depending on the sample and the estimation techniques. Albrecht et al. (1999) find atrophy rates of about 2% per year. Both papers do not allow for differences by occupation, or level of skills.

[31] Contrasting these estimates with those from simple (fixed effects) regressions as in Polachek (1981) and Kim and Polachek (1994), obtained by first simulating life-cycle careers using our model and then regressing changes in log wages following interruptions on the time out of work by occupation, and allowing for non-linearities, leads to estimates that understate the role of atrophy, but re-produce the ranking across occupations. This is mainly due to such regressions ignoring that those who return to work are positively selected, as they are more likely to have drawn a positive wage shock, something that is built into our model and

In Panel B of Table 3 we display the parameters of the (log) wage as a function of uninterrupted work experience (defined as in equation (3)), which represent average treatment effects of working full time in a given occupation.[32] The estimates suggest that wage returns to human capital (the constant terms) are highest in abstract occupations. Furthermore, while wage increases are similar across occupational groups in the early years, wage profiles are less concave in abstract occupations, and continue to grow at a faster pace at higher total work experience.[33] Thus, interruptions at mid-career in abstract jobs are not only more costly because of higher atrophy rates, but also due to considerably higher opportunity costs as individuals forgo earnings while not in work.

An additional dimension when balancing occupational choice with labor supply and fertility decisions, besides atrophy rates and opportunity costs, is the amenity value of an occupation with regards to children (which can be interpreted as the ease with which women in these occupations can combine work with childraising).[34] We present estimates of these amenity values, normalized to be zero for routine occupations, in Panel C of Table 3. The figures show that - in comparison to routine jobs - abstract jobs are least desirable when children are present. Our estimates imply that if abstract and manual occupations had the same amenity value as routine ones, the proportion of women opting for abstract or manual occupations would increase by 5%. The amenity of part-time work - an option chosen by many mothers in our data -is likewise lower in abstract jobs, as the second row of this panel shows. Our estimates imply that if women in abstract jobs had the same amenity value for part-time jobs than in routine ones, the proportion of part-time work in abstract jobs would be 7% higher

estimation.

[32]Compared to the OLS coefficients shown in Table D6, these structural parameters are "causal", taking account of selection; further, they refer to a measure of skills which, unlike real experience, depreciates when the individual is out of work.

[33]For instance, after 10 years of uninterrupted work experience, wages in abstract jobs increase by about 2% more per additional year than in the other two occupations.

[34]These parameters are identified through variations in labor supply of women with and without children in various occupations, which cannot be explained by differences in atrophy rates, opportunity costs or selection.

by the age of 30. These estimates point at a complex interaction between career- and fertility decisions. Women in abstract occupations face higher atrophy rates, higher opportunity costs of leaving the labor market, and have a higher utility cost of handling children and work. This will induce women with a higher desired fertility to chose more often careers in routine occupations and to have children earlier. On the other hand, as children are costly, higher wages in abstract jobs - and the prospect of marrying a better husband - makes this career also desirable, as assets can be built up faster to smooth consumption when children arrive. We illustrate these tradeoffs below.

4.3 Utility of Consumption

Table 4 presents estimated parameters that characterize consumption decisions. The estimate of the discount factor (first row) is 0.96 annually, similar to values in the previous literature (e.g. Cooley and Prescott (1995)). Our estimate for the curvature of the utility function (or the relative risk aversion, row 2) is close to 2, again a common value in the literature. Row 3 displays the estimated weights children have in the consumption equivalence scale. This parameter is important as it drives not only fertility choices, but also savings choices to smooth consumption over the life cycle. Our estimate is close to 0.4, slightly higher than the one in the "modified OECD scale", which is equal to 0.3. The last two rows present the estimates of the cost of childcare, distinguishing between the age of the youngest child. These are estimated to be 31 euros per day for infants and 12 euros per day for older children.[35]

The consumption costs of children and the cost of childcare suggest that households may gain from smoothing consumption, by anticipating births. We illustrate this in Figure 2, which shows that savings rates start to increase at least four years prior to birth, and decline afterwards. Hence, savings are likely an important factor to understand fertility decisions and

[35] The average cost of day care in Germany is estimated by the OECD to represent about 11% of net family income (http://www.oecd.org/els/soc/PF3.4%20Childcare%20support%20-%20290713.pdf), which amounts to about 15 euros per day. Our estimated parameter takes also into account other expenses linked to work and children such as transportation.

how these are affected by policy interventions, something that we investigate in Section 4.7.

4.4 Unobserved heterogeneity

Panel A in Table 5 lists the parameters that characterize individual types. As explained above, we allow for unobserved heterogeneity, with two different levels of ability/taste for leisure, and two types of preferences towards fertility. Columns LA/HC, LA/LC, HA/LC, HA/HC refer to combinations of Low Ability (LA) - High Ability (HA) and Low taste for children (LC) - High taste for children (HC) types. Note that as we explain in Section 3, we allow groups with different ability to have different taste for leisure. The first row reports the proportions for the four type combinations in our data. The next two rows show the differences in log wages across ability types, and the utility of leisure, where we have normalized LA type women to zero. High ability women earn wages that are 0.14 log points higher than low ability women and have a lower utility of leisure (by about 26%). Rows 4 and 5 display the utility of children for the different categories, showing that women with a high taste for children (HC) obtain positive utility for both the first and second child, while LC types only derive a positive utility for the first child.[36] The correlation between taste for children and ability is close to zero, suggesting that it is not the combination of high ability and low taste for children that leads women in better paid careers to have fewer children; rather, the choice of a steeper career paths for these women induces considerable costs through the sacrifice of fertility.

Panel B, which reports estimated type-specific fertility rates and proportions in the different occupations, shows that women with a low taste for children have on average about one child, while women with a high taste have 1.9 children. Interestingly, we do not find much difference in terms of total fertility with respect to ability. The last three rows in the table show the proportion of each type in the three different occupational groups, providing evidence of sorting on ability and desired fertility: close to 50% of women with a low taste for

[36] As the model also allows for idiosyncratic preference shocks towards conception, women with low permanent taste for children (f_i^C) may nonetheless have more than one child.

children opt for an abstract occupation, while routine occupations are relatively more frequent for women with a high taste for fertility. [37]

4.5 Career Costs of Fertility

We now use our model to assess the career costs of children, which is how much a woman would gain in monetary terms if she decided not to have children. We evaluate these costs by simulating life-cycle outcomes under two scenarios. First, we simply match the model to the fertility pattern in our data, which serves as our baseline scenario. Second, we set the conception probability to zero, so that a woman knows ex ante that no children will be conceived, and will therefore base all her decisions on that knowledge. This includes the initial choice of occupation, as well as labor market decisions and savings over the entire life-cycle.[38] We first present the differences in career paths for the two scenarios along various dimensions. We then compute the cost of children as the net present value of the difference in life cycle earnings at age 15 between the two scenarios.[39]

Occupational choice and labor supply. Figure 3a displays the differences in occupational choices at age 15 between the two scenarios. It shows that the expectation about future fertility affects the choice of occupation even before fertility decisions are taken: a woman who knows that she will remain childless is less likely to work in routine and manual occupations (by about 3% and 2% respectively), and more likely to work in occupations involving mainly abstract tasks (by about 5%). This is an important insight, suggesting that key career decisions are affected by the expectation about future fertility, possibly long before fertility decisions are

[37]We report other parameter estimates as well as the arrival rates of offers in different states in Section D in the Appendix.

[38]Note that, as the probability of marriage and the type of husband depend on endogenous choices such as occupation and skills, a change in fertility will also affect women along this margin. We find however that these indirect effects are small.

[39]As we are interested in the career costs for a single individual, we compute partial equilibrium results. The results might differ if all women chose not to have children.

taken, and implies that some of the career costs of children are determined even before a child is born. Below we will assess the magnitude of these costs.

Figure 3b plots the difference in labor supply over the life cycle between the two scenarios. In the no-fertility scenario, a woman is more likely to work at any age: the difference increases from about 10% in her early twenties, to 30% in her mid thirties. It then declines to about a 10%, as women who had children gradually return to the labor market. Hence, the difference in labor supply over the life cycle is an important component of the overall costs of children, as we demonstrate below. Fertility affects labor supply also at the intensive margin: Figure 3c shows that children increase the probability to work part-time (conditional on working), and the difference increases with age to reach about 25 percentage points between age 35 and 45. Interestingly, and comparing Figures 3b and 3c, women who return to the labor market in their late 30's and early 40's tend to remain in part time jobs, compared to the non-fertility scenario. This feature comes from the fact that women derive a higher utility of leisure when children are present, but need to work to finance higher consumption needs. The effect of fertility on women's labor supply over the life cycle has also a stark impact on work experience: our simulations show that by the time they retire at age 60, mothers have on average 22% less work experience per child.

Wages and selection over the life-cycle. Figure 3d plots the deviation of wages in the no-fertility scenario from the baseline scenario. Here, and in the simulations below, we report average daily (rather than hourly) wages conditional on working. Hence, differences across scenarios result from differences in skills, the number of hours worked per day, occupational choices, and differences in the ability composition of women who choose to work. The figure shows that, while at age 20, the daily wage in the no fertility scenario is only about 0.03 log points higher than in the baseline scenario, this difference rises to 0.22 log points by age 40, and then slightly declines when women return to the labor market. Hours of work contribute only partly to these differences in daily wages. We find that by age 40, the full time wage in the non fertility scenario is on average 10% higher than in the baseline scenario.

One reason for this difference in wages is composition. There is a long tradition in economics - dating back to the seminal work of Heckman (1974) and including work by Blau and Kahn (1996), Blundell et al. (2007), Mulligan and Rubinstein (2008) and Olivetti and Petrongolo (2008) - of evaluating the selection of women into the labor market. Our model allows us to assess the role of fertility decisions in shaping the ability composition of women in the work force over the life cycle. In Figure 3e, we present the ratios of working women of low versus high ability over the life cycle under the two scenarios. In the no-fertility scenario, this ratio is close to 0.43 and relatively stable, while in the fertility scenario, the composition of working women changes substantially over the career cycle. While at age 20, the ratio is equal to 0.42, it decreases to 0.37 by age 35, when low ability women are less likely to work than high ability women,[40] and rises again toward the end of the working life as mothers return to the labor market. Hence, selection into the labor market due to fertility is time-varying, and depends both on fertility choices and the timing of births. Part of the rise in the wage differential in Figure 3d is therefore due to this dynamic selection, with the difference in wages due to differential ability (f_i^P) at age 35 being equal to about 0.01 log points out of a total difference of 0.22 log points.

Decomposing the net present value of fertility choices. The graphs presented above show various aspects of the career costs of fertility in terms of occupational choice, labor supply, and wages. We summarize these costs by calculating their net present value at the start of the career (at age 15) taking account of all earnings, unemployment and maternity benefits (w_{it}^s,$b_{U,it}^s$, $b_{M,it}^s$), where the index $s = F, NF$ stands for the baseline (F) and the no-fertility scenario (NF). Defining an indicator variable $I_{j_{it}^s}$, which is equal to one if j is true under scenario s, the net present value for individual i is given by:

$$NPV_i^s = \sum_{t=0}^{T} \beta^t \left(w_{it}^S I_{work_{it}^s} + b_{U,it}^s I_{Unempl_{it}^s} + b_{M,it}^s I_{Mat.Leave_{it}^s} \right) . \tag{8}$$

[40]As shown above, this is not because low ability women have more children, but rather because they are less likely to come back to work, once their children are older.

We evaluate the relative costs of children by computing $1 - NPV^{NF}/NPV^{F}$, using an annual discount factor of β=0.95. These costs reflect the difference in earnings, labor supply, and occupational choice induced by the presence of children. Based on this calculation, and comparing the baseline scenario with the no-fertility scenario, the overall costs of children are close to 35% of the net present value of income at age 15 (see Table 6).

To better understand the sources of these costs, we isolate two components: the contribution of labor supply, and the contribution of wages (see the second panel in Table 6). The first component is obtained by fixing wages at the scenario with children, while computing the difference in terms of labor supply for women with and without children. The second component fixes labor supply for the no children scenario, and computes the difference in wages for women with and without children. [41] According to this decomposition, about three quarters of the costs (i.e., 27% of the total 35.3% overall reduction in lifetime income) result from differences in the labor supply over the life cycle, while about one quarter results from differences in wages. Thus, although wages are an important component of the cost of children, more important are unearned wages of women who drop out of the labor force for considerable periods over their career.

In the third and fourth blocks of Table 6, we provide two decompositions that break down the contribution of wages into occupational choice and atrophy when out of work, and a respective residual term ("other factors"). The figures in the Table show that the overall contribution of atrophy to the lower wage in the fertility scenario is about 20%, or 5% of the total life-cycle earnings difference in the fertility vs. the non-fertility scenario. Occupational choices at the beginning of the career, and before any fertility decision is taken, represent 19% of the overall costs induced through wages, indicating that a substantial portion of the wage-induced career costs of children is already determined before fertility decisions are made, through occupational choices conditioned on expected fertility pattern.

Table 7 displays the costs of fertility of having one or two children (in terms of net present

[41] As in the standard Oaxaca-type decompositions, there are two alternative reference groups. In the table, we present estimates based on the average of the two.

value at age 15), where we allow the spacing of births to differ. The figures in the Table show that the cost of a second child is lower than the cost of the first child. For instance, a first child at age 20 induces a total career costs of 31 percent compared to a scenario without children. A second child conceived at age 22 increases these costs to 36 percent. The results are qualitatively similar to those in Bertrand, Goldin, and Katz (2010), who also find that the cost of a second child is much lower than the first. The cost of a second child is increasing in the spacing of birth, as it prolongs the time the mother spends out of the labor market. The costs of children are also decreasing in the age at birth, for two reasons. First, as we measure the discounted costs, more distant costs are valued less. Second, older mothers have time to establish themselves in the labor market and accumulate sufficient human capital, which lowers the depreciation rate (see Table 3, panel A). The fact that children impose a lower cost for older mothers does not imply that it is optimal to have children late, however, as women also derive utility from their children. The optimal timing of births is therefore a trade-off between the various costs of children and their utility.

4.6 Fertility and the Gender Gap

Having shown that fertility leads to a sizeable reduction in life-cycle earnings and affects women's wage profiles throughout their careers, we now examine the extent to which the gender gap in earnings can be explained by fertility. To do so, we compare the women studied here to men of similar qualifications.[42] Again, we compute this difference for the average daily (rather than hourly) wage, which we believe is the most appropriate measure because it includes the change from full-time to part- time work as an important margin of fertility adjustment (see Figure 3c).

In Figure 3f, we show the observed daily wages for working males (solid line) and females

[42]These are men belonging to the same birth cohorts, having the same education (lower or intermediate secondary school), who enrolled in an apprenticeship training schemes before labor market entry, and whom we observe from labor market entry onwards

(dashed line) by age, as well as the predicted profile for females from our model (dotted line). The observed and predicted wages for females are very similar, illustrating that the model fits the data well. Whereas men's daily wages increase monotonically with age, women's wages in the baseline scenario increase up to age 27 but then decrease and only begin increasing again after age 38. The overall gap increases as women reduce the number of hours worked between ages 25 and 45 and then return to the labor market with lower labor market experience and depreciated skills once their children are older.

To assess the contribution of fertility to the gender wage gap, we compute, as above, the counterfactual wage profile (conditional on working) of a woman who remains childless and conditions on that knowledge from the start of her career, which in Figure 3f is labeled "Predicted Females, No Fertility". The gender gap closes by about 0.2 log points when women are in their thirties, which corresponds to about a third of the overall gap. [43]

4.7 The Effect of Pro-Fertility Policies on Fertility and Women's Careers

In many countries, fertility is encouraged in the form of tax relief or transfers. A stream of literature has evolved on the effects of such policies on fertility, and sometimes on labor supply. [44] Some of this research, which typically identifies these effects based on policy changes,

[43]These findings are in line with Bertrand, Goldin, and Katz (2010) who, using different techniques, show that fertility-induced differences in the labor supply of MBAs explains a large part of the male-female annual earnings differential, although our population of women is on average less skilled. See also Rosenzweig and Schultz (1985) and Goldin and Katz (2002) who illustrate the impact of fertility shocks on labor market participation and wages.

[44]See, for instance, Cohen, Dehejia, and Romanov (2013) who investigate the effect of Israel's child subsidy program on fertility; Laroque and Salanie (2014) who study the impact of child subsidies in France on total fertility and labor supply; Milligan (2005) who investigates the impact of a new lump sum transfer to families that have a child in Quebec; Sinclair, Boymal, and De Silva (2012) who analyze the effect of a similar policy on fertility in Australia; Haan and Wrohlich (2011) who estimate the effect of child care subsidies on fertility and employment in Germany; Lalive and Zweimüller (2009) who investigate the effects of parental leave policy

nonlinearities in the tax and transfer system, regional variation, and/or changes or differences in entitlements across family characteristics, reports considerable effects on total fertility. The focus of this literature, however, tends to be limited to short-run responses of fertility because of two important problems: first, it is difficult in many datasets to track women affected by such policies over an extended period, and until the completion of their fertility cycle. Second, and more importantly, because data become contaminated over time by other factors that affect the fertility and careers of particular birth cohorts, making a causal statement about the effect of a policy some years after its implementation requires restrictive assumptions. Hence, extant studies pay little attention to long-term consequences and how fertility behavior is affected at the extensive and intensive margins. [45] Yet, long-run effects of policy changes and the way they affect behavior of different cohorts are very important for the evaluation of such policies. Any policy cha29 nge affects different cohorts differently, depending on where women are in their career and fertility cycle when the policy is implemented. While young women about to enter the labor market can adjust not only their fertility behavior but also their occupational choices and entire career paths to the policy change, older women, having already made most career- and savings decisions, have fewer possibilities of adjustment. The effects of the policy will thus change over time as more women condition on it when making their fertility and career choices. At the same time, transfer policies may affect decisions other than fertility, such as labor supply, occupational choices, savings decisions, and human capital investments. These "secondary" effects, despite being important for assessing the full impact of these policies, are hardly investigated.

To help fill this void, we use our life-cycle model to evaluate the effect of a policy that

on fertility in Austria; and Kearney (2004) who studies the impact on fertility of caps on child benefits paid for an additional child.

[45]Two notable exceptions are Parent and Wang (2007) and Kim (2014). Parent and Wang (2007) follow a cohort of Canadian women over their fertility cycle and find that the long-run response is low compared to the short-run response. Kim (2014) studies the long run impact of changes in the child allowance policy in Quebec (see also Milligan (2005)). He finds a small or no permanent impact on fertility.

provides a cash transfer at birth of 6,000 euros. Policies of this type have been implemented in different countries, as illustrated in the above mentioned literature. We show the effect of the policy on the probability of giving birth, by age, in Figure 4a, comparing the behaviour of women under the baseline and the policy. The difference in the probability is positive at first and then negative, showing that the policy induces women to have their children earlier, but it has little effect on the overall number of children per woman.

Next we investigate the aggregate effect of the policy, by computing the number of children born every year, before and after the policy is implemented. In doing this, we leave aside general effects. We use our model to simulate many overlapping birth cohorts of women, between the age of 15 and 60. Each year, a new cohort enters and the oldest cohort exits. Hence, when the policy is implemented, women are at different stages of their life-cycle. The older ones have already made their fertility choices, while the youngest ones are still far from their first child. However, the latter can alter their occupation, their labor supply or their savings in response to the policy. Figure 4b plots the increase in the number of children born every year, compared to a baseline without a cash transfer. The policy starts in year 4 and is not anticipated. We observe a spike in the number of children born, with a 4.5 percent increase in total fertility in the first year of the policy. This spike is what a reduced form analysis would identify as the short-run effect of the policy. However, the effect of the policy lasts more than a few years. The effect reduces to half that size after 8 years and is very close to zero after 20 years. Simulating policies with various levels of benefit, we find a short-run elasticity with respect to benefits of about 0.04.[46]

While Figure 4b displays the composite response to the policy for women in different age groups, we illustrate in Table 8 the effect of the policy on women in three different age groups at the start of the policy (15, 25, 35). For the group of women who are 15 when the policy is implemented and who cannot only adjust fertility, but also their labor supply, consumption- and occupation choices, the proportion of those with no children decreases by

[46]This elasticity is similar to the ones reported by Zhang, Quan, and van Meerbergen (1994) (0.05) and lower than Milligan (2005) (0.10).

0.8%, while the proportion with two children (or more) increases by 0.2%. The policy induces women to have their first child earlier (by 0.4 years) and leads mothers to spend about 0.1 years longer out of work, which translates into lower levels of skills (by about 0.3%). Similar effects of cash transfers have been found by Card, Chetty, and Weber (2007) in the context of a lump-sum severance payment. We also find a moderate increase in part-time work for the youngest cohort. Finally, the proportion of women opting for a routine or manual job increases respectively by 0.3 and 0.07%. Cash transfers therefore allow women to opt for less lucrative careers, while maintaining a similar level of consumption. For older cohorts, the responses are muted as many decisions have already been made, and women have less scope to respond to the policy. For instance, as occupational choices are made predominantly at a young age before training in vocational schools, there is no discernable effect on occupational choices.

An important channel through which cash transfers affect behavior are assets. One reason for fertility to be brought forward are that less assets need to be accumulated before a child is born. To investigate this further, we plot in Figure 4c the change in assets due to the policy for women who have been 15, 20, and 25 when the policy was implemented, in percent deviation from the no policy scenario. The youngest cohort anticipates the policy and saves less in their early twenties. When children are born, around age 27 on average, the conditional cash transfer is saved and spread over a period lasting about 10 years. Assets then decrease below the baseline by about 2% as the household has lower resources due to lower skill levels and more children. The pattern for the older cohorts are similar, but these have less scope to adjust their savings.

These results highlight the important difference not only in the short- and longer run effect of these policies on choices other than fertility, but also stress that the impact of these policies may be largest for cohorts that do not show immediate fertility responses, due to their younger age. For these cohorts, such policies may have important consequences for career decisions as well as savings decisions - aspects that are usually not investigated in the literature.

5 Conclusion

In this paper, we develop and estimate a model of fertility and career choice that sheds light on the complex decisions determining fertility choices, how these interact with career decisions, and how they determine the career costs of children. Following early work by Polachek (1981), we consider occupational choice as an essential part of a woman's career plan. We show that different occupations imply not only different opportunity costs for intermittency and different wage growth, but diverge in the amenity "child raising value". Moreover, the loss of skills when interrupting work careers varies across occupations, is non-linear over the career cycle, and are highest at around mid-career, which has potentially important implications for the interplay between career choice and fertility.

Thus, the costs of fertility consist of a combination of occupational choice, lost earnings due to intermittency, lost investment into skills and atrophy of skills while out of work, and a reduction in work hours when in work. In addition, fertility plans affect career decisions already before the first child is born, through the choice of the occupation for which training is acquired - an aspect that is not only important for policies aimed at influencing fertility behavior, but also for understanding behavior of women before children are born. An important additional aspect for the life time choices of fertility and career are savings that help women to smooth consumption. Furthermore, fertility leads to sorting of women into work, with the composition of the female workforce changing over the life course of a cohort of women, due to different career- and fertility choices made by women of different ability.

These complex interdependencies between fertility and career choices imply that pronatalist policies have effects over and above their primary intention, something that we illustrate in the simulations of our model. Moreover, the impact of any such policy is likely to be particularly pronounced for cohorts of women that are at the beginning of their careers, as they are able to adjust all future decisions in response, such as occupational choices and the timing of the first birth. These women however are usually not the subject of analysis in empirical work that evaluates these policies, the reason being that due to their young age, their fertility behavior does not respond around the policy implementation. Furthermore, it is not just fertility that may be affected, but other career decisions associated with fertility as well. Our analysis suggests that responses of this sort may be important, leading to possibly undesired consequences of any such policies. As DiD designs require restrictive assumptions to interpret longer term effects to policy interventions as causal, they typically focus on short term effects around the policy intervention. Combinations of clean designs with structural models of the sort presented in this paper may therefore be an avenue that helps exploring the longer term effects of policy interventions.

Appendix

A Data

A.1 The Data

As outlined in Section 2, our first dataset is a 2% sample from the German Social Security statistics, provided by the German Institute for Employment Research (IAB), which contains detailed information on wage profiles, transitions in and out of work, occupational choice, education, age, and periods of apprenticeship training. We use these data to compute the career histories of West-German females who have undergone vocational training within the apprenticeship scheme and belong to the 1955-1975 birth cohorts, meaning that the oldest individual in the first year of the survey (1975) is no older than 15, the earliest age of enrollment in an apprenticeship program. We transform the register data on periods of employment into biannual observations. Our final sample, used primarily to identify wage profiles and the transitions of working versus not-working women, comprises 72,430 women born 1955-1975 and observed from labor market entry until 2001, totalling about 2.7 million work spells and earnings observations. One unique aspect of this dataset is that it allows work histories to be observed from the start of the career onward and gives detailed information about labor market experience.

The register data, however, do not include information on household background, fertility choices, number and age of children, and participation and work behavior by motherhood status. For these variables, we use yearly information on socioeconomic variables from the German Socio-Economic Panel (GSOEP), constructing a sample for the same birth cohorts as in our register-based data (i.e., birth years 1955-1975), and focusing again on women who earned an apprenticeship certificate and did not enroll in higher education. For these women, we compile information on birth year, employment status, part-time or full-time work, occupation, gross and net individual earnings, number of children and year of their birth, whether a husband is present, and if so, his earnings. Our final sample contains a total of 16,144 observations for 1,432 women, with at least 500 in each age group between 21 and 38. For 50% of these women, we have data from 10 or more successive interviews. There are more than 1,000 births in the sample and about 9,700 periods of employment (after apprenticeship). Because the register dataset excludes the self-employed and civil servants, we exclude these groups from our analysis, together with individuals who have ever worked in East Germany, where fertility behavior was very different before German unification in 1989.

To retrieve representative information on household savings behavior and asset holdings and accumulation over the lifecycle, we employ the Survey of Income and Expenditure (Einkommens- und Verbrauchsstichprobe, EVS), a cross sectional survey repeated every 5 years, and we use the 1993, 1998, 2003 and 2008 waves. The survey includes information on the structure and composition of households, their revenue and expenditure, and the type and amount of existing household assets.[47]. We select for each survey year a sample using the same criteria as the IAB and GSOEP samples: households with an adult female who is a member of the birth cohorts 1955-1975 and who has the German nationality; who has obtained an apprenticeship degree, but no further higher education; and who is not a civil servant nor self-employed. We retain information about year of birth, employment status, occupation, number of children in the household, net household income and amount saved by the household, type and value of household assets, and state of residence.

We compute household savings rates to represent household savings behavior. The savings rate is the ratio of the amount saved or dis-saved (in 1995 prices using the Consumer Price Index for private households, obtained from the German Statistical Office) in a period over net household income in that same period.[48] The EVS also contains information regarding

[47]More information about the data set can be found on https://www.destatis.de/EN/FactsFigures/SocietyState/IncomeConsumptionLivingCondi-tions/SUF/SUFIntroduction_EVS.html

[48]Net household income and amount saved are measured per year in 1993, and per quarter in the other years. For comparability, we express net household income in 1993 as a quarterly measure. We drop the 1% lowest and highest values with extreme amounts of household assets, net income or savings rates.

the occupation of the adult female in the household in 1993 and 2003. Only in 2003 is this information sufficiently detailed to allow us to link the EVS job classification to the occupational grouping used in this paper (routine, abstract and manual jobs). The moments that link savings rates and asset holdings to occupation therefore apply only to 2003. In all the moments generated from the EVS sample, we use household sample weights, and year and state fixed effects are removed. The selected sample includes a total of 26,951 households, with an adult female aged between 19 and 51.

A.2 Construction of task-based occupational grouping

We construct the occupational grouping using the German Qualification and Career Survey (QCS) 1985/86, following Dustmann, Ludsteck, and Schoenberg (2009), Gathmann and Schonberg (2010), and Black and Spitz-Oener (2010). The QCS is a representative survey dataset for the West-German labor force aged 15-65, which includes a well-structured battery of questions on tasks performed on the job. We construct task intensity indicators for each individual, which we then aggregate up to 2-digit occupations levels, and categorize these into three occupational groups,. involving mainly routine, abstract, or manual tasks (as described in Section 2). We then match this classification to our GSOEP, IABS and EVS data samples.

Because each job can include a variety of tasks, the task intensity indicators at the 2-digit occupation level are constructed as follows:

1. We categorize tasks x_j (each of which corresponds to a survey question) into 3 broad groups X: Routine, Abstract, Manual ($X \in \{R, A, M\}$)
2. If a task x_j of type X is reported by an individual i, then $x_j^i = 1$ (otherwise 0).
3. We sum over all tasks of type X reported by an individual i: $N_X^i = \sum_{j=1}^{n_X} x_j^i$
4. We denote the total number of tasks (of any type) reported by an individual as $N^i = \sum_{X \in \{R,A,M\}} \sum_{j=1}^{n_X} x_j^i$)

5. We compute the intensity of type X tasks reported by individual i as $j_X^i = N_X^i / N^i$.

6. Each individual ($i = 1, ..., N$) belongs to a 2-digit job category Y. Task intensities are aggregated over all observations i in a 2-digit job category Y ($i \in Y$, n_Y observations). The task intensity of type X in job category Y is then computed as: $I_X^Y = \frac{1}{n_Y} \sum_{i \in Y} j_X^i$

B Model Description

B.1 Probability of Marriage and Divorce

The probability of marriage is a function of age, skills and taste for children:

$$P(h_{it} = 1 | h_{it-1} = 0; age_{it}^M, x_{it}, f_i^C) = \lambda_0^M + \lambda_1^M(age_{it}^M) + \lambda_2^M x_{it} + \lambda_3^M f_i^C\,, \tag{9}$$

where $\lambda_1^M(.)$ is a non-linear function of the age of the woman. We define the probability of divorce as a function of age and the number of children in the household:

$$P(h_{it} = 0 | h_{it-1} = 1; age_{it}^M, n_{it}) = \lambda_0^D + \lambda_1^D(age_{it}^M) + \lambda_2^D n_{it}\,, \tag{10}$$

where again $\lambda_1^D(.)$ is a non-linear function of the age of the woman.

B.2 Job Offer Probability

Offers consist of an occupation $\tilde{o}$ and of hours of work $\tilde{l}$ (either part time or full time work). New offers arrive randomly and depends on the current occupation and hours of work. The probability of receiving a job offer is denoted $\phi_0(o_{it}, l_{it})$. Conditional on having received an offer, the probability of that offer being in occupation $\tilde{o}$ with hours of work $\tilde{l}$ is $\phi_1(\tilde{o}, \tilde{l} | o_{it}, l_{it})$ and depends again on current occupation and hours of work. We impose some structure on that probability as it contains potentially many terms to be estimated. We assume that the offer concerning hours of work depends only on prior hours of work, whereas occupation offers depend on prior occupation and prior working status (i.e. working or out of the labor force, but not whether the individual is in part time or full time work). Variations in the rate of part time work across occupations in the model comes from differential fertility choices across women and the amenity value of occupations with regards to children.

B.3 Utility Function

Women derive utility from their own consumption, the number of children, and leisure. We define I_j an indicator variable taking the value of one if j is true and zero otherwise. The utility function takes the following form for individual i in period t:

$$\begin{aligned} u_{it} &= \frac{(c_{it}/\bar{c})^{(1-\gamma_C)}-1}{1-\gamma_C}\exp\left(\gamma_{PT}^1 I_{l_{it}=PT}+(\gamma_U^1+f_i^L)I_{l_{it}=U}+(\gamma_{OLF}^1+f_i^L)I_{l_{it}=OLF}\right)\exp(\gamma_{NC}I_{n_{it}>0}) \\ &+\left(\gamma_N^1(f_i^C)I_{n_{it}=1}+\gamma_N^2(f_i^C)I_{n_{it}=2}\right).\exp\left(\gamma_{NH}I_{n_{it}>0\&h_{it}=1}\right) \\ &.\exp\left(\gamma_U\right)^{I_{l_{it}=U}}.\exp\left(\gamma_{OLF}+\gamma_{A,OLF}^1 I_{age_{it}^K\in[0,3]}+\gamma_{A,OLF}^2 I_{age_{it}^K\in[4,6]}+\gamma_{A,OLF}^3 I_{age_{it}^K\in[7,9]}\right)^{I_{l_{it}=OLF}} \\ &.\exp\left(\sum_{i_O=1}^{3}\gamma_{i_o,PT}I_{o_{it}=i_o}+\gamma_{A,PT}^1 I_{age_{it}^K\in[0,3]}+\gamma_{A,PT}^2 I_{age_{it}^K\in[4,6]}+\gamma_{A,PT}^3 I_{age_{it}^K\in[7,9]}\right)^{I_{l_{it}=PT}} \\ &.\exp\left(\sum_{i_O=1}^{3}\gamma_{i_o,W}I_{o_{it}=i_o}\right)^{I_{l_{it}=PT,FT}}+\eta_{it}^C b_{it}+\eta_{it}^{NC}(1-b_{it}) \end{aligned} \tag{11}$$

The first term is the utility obtained from consumption (c_{it}). The parameter γ_C is the relative risk aversion and $\bar{c}$ is a consumption scale. As in Attanasio, Low, and Sanchez-Marcos (2008) and Blundell et al. (2013), we allow for an interaction between consumption and labor supply. We distinguish between part time work, unemployment and being out of the labor force. We introduce heterogeneity in the utility of leisure through the variable f_i^L. We also allow the marginal utility of consumption to differ when children are present (through the parameter γ_{NC}). The individual also derives utility from the number of children, which is displayed in the second line. The parameters $\gamma_N^1(f_i^C)$, $\gamma_N^2(f_i^C)$ vary with the taste for children, f_i^C. Finally, we allow the utility from children to differ when a husband is present ($h_{it}=1$).

The third to sixth lines allow for the utility of children to vary with labor supply and occupation choices. In a demanding occupation, the individual derives a lower utility from children, as it is more difficult to spend time with them. For instance, even if part time work is available, the woman may not be able to stay at home when the child is sick or reschedule hours of work to attend a school performance. We also distinguish between different statuses of non-work, as women who are unemployed may require time to search for a job. It should be noted that, because full time work is the baseline, we do not specify a utility level associated with that outcome. In lines four and five, we allow mothers who work part time to obtain utility from leisure (relative to full-time work) dependent on the age of their youngest child. Here, we distinguish between infancy (0 to 3 years), preschool (4 to 6 years), and primary school (7 to 9 years). The final part of the utility function introduces iid preferences towards conception or non conception, denoted η_{it}^{C} and η_{it}^{NC}. The shock that affects the woman depends on whether she decides to conceive or not (indicated by the indicator variable b_{it}. These shocks are assumed iid and extreme value distributed.

B.4 Dynamic Choice

We now describe in more detail the dynamic choices individuals make. Table D2 lists the notations used in the model. The main text describes it with the generic Bellman equation:

$$V_t(\Omega_{it}) = \max_{\{b_{it},c_{it},o_{it},l_{it}\}} u(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age_{it}^{K}, \Upsilon_{it}, f_i) + \beta E_t V_{t+1}(\Omega_{it+1}) \tag{12}$$

with the state space defined as:

$$\Omega_{it} = \Big\{ l_{it-1}, o_{it-1}, A_{it-1}, h_{it-1}, age_{it}^{M}, x_{it}, n_{it}, age_{it}^{K}, \Upsilon_{it}, f_i \Big\} \tag{13}$$

The Bellman equation can be decomposed into a sequence of choices, involving conditional value functions, where the conditioning is on labor supply status and the decision to conceive or not. We make the distinction between being in work, being unemployed or out of work because individuals face different choice sets. For instance, individuals out of the labor force are not eligible for unemployment benefits and cannot choose to become unemployed in the next period. Individuals who chose to conceive have a probability of becoming pregnant, and cannot be fired. Hence, these conditional value functions model institutional features explicitly, which are only implicit in (12).

The individual maximizes these conditional value functions in sequence, which simplifies the overall model as one can rely on closed-form solutions for some of the choices, given particular distributional assumptions on the taste shocks in Υ_{it} (extreme value distribution). We denote these conditional value functions by indexing them with C for conception or NC if the individual decides not to conceive. We also index them with W for work (either part time or full time, the distinction hours of work is contained in the state variable l_{it} in Ω_{it}), U for unemployment and O for out of the labor force. Finally, we introduce two value functions describing individuals after birth, who enter that state from work or non-employment, and index these respectively by L_W and L_{NW}. At the beginning of a period, women take as given their age, skills, occupation, labor supply in the previous period, the number of children, the age of the youngest child, whether the spouse is present, and family assets. Women first observe the income shock to their wage and to the earnings of the husband, if present, and then decide on whether to conceive a child or not. If conception is successful, the child is born at the beginning of the next period. Women next decide how much to consume and save.

Once fertility and consumption choices have been made, individuals observe shocks to labor supply, which consists of layoffs (if in work) and job offers. These shocks determine the labor status at the beginning of the next period. New offers arrive randomly and have two features: occupation and part time or full time work. The probability of receiving a job offer is denoted $\phi_0(o_{it}, l_{it})$ and depends on the current occupation and hours of work. Conditional on having received an offer, the probability of that offer being in occupation $\tilde{o}$ with hours of work $\tilde{l}$ in period $t+1$ is $\phi_1(\tilde{o}, \tilde{l}|o_{it}, l_{it})$ and depends again on current occupation and hours of work.

Value of working. We start with the value of working and conceiving a child. In writing the values, we distinguish their deterministic part from the stochastic part due to the preference shocks, which we introduce below and which enter in a linear and additive way. As the decision to conceive has already been made, the woman has to decide how much to consume. Choices over occupations and hours of work are taken at the end of the period. The value is written as:

$$
\begin{aligned}
V^{W,C}(\Omega_{it}) \quad & = \max_{c_{it}} u\left(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age_{it}^{K}, \Upsilon_{it}, f_i\right) \\
& + \pi(age_{it}^{M}, f_i^{F})\beta E_t V^{L_W}(\Omega_{it+1}^{P}) \\
& + \delta(1-\pi(age_{it}^{M}, f_i^{F}))\beta E_t V^{U}(\Omega_{it+1}) \\
& + (1-\delta)(1-\pi(age_{it}^{M}, f_i^{F}))(1-\phi_0(o_{it}, l_{it}))\beta Emax \\
& + (1-\delta)(1-\pi(age_{it}^{M}, f_i^{F}))\beta\phi_0(o_{it}, l_{it})\widetilde{Emax},
\end{aligned}
\tag{14}
$$

where E_t is the expectation operator. The first line consists of the current utility of consumption, leisure and children. The second line is the future flow of utility if conception is successful, which occurs with a probability $\pi(age_{it}^{M})$. As the woman is working in the current period, she is entitled to paid maternity leave, with a flow of utility $V^{L_W}(.)$, defined below. This value depends on the next state space Ω_{it+1}^{P}, where the subscript P indicates that the women is pregnant, so that the number of children is increased by one and the age of the youngest child is set to zero. Assets and skills evolve as described in equations (1) and (2).

The last three lines describe the case when conception is unsuccessful. With a probability δ the individual is laid off and starts next period in unemployment, with a value $V^{U}(.)$. If she is not laid off, she does not get an alternative job offer with a probability $1-\phi_0(o_{it}, l_{it})$, and has to choose between staying in work, leaving for unemployment or leaving the labor force. We define the term $Emax$ as:

$$
Emax = E_t \max[V^{W}(\Omega_{it+1}) + \eta_{it+1}^{W}, V^{U}(\Omega_{it+1}) + \eta_{it+1}^{U}, V^{O}(\Omega_{it+1}) + \eta_{it+1}^{O}] \tag{15}
$$

The $\eta_{it+1}^{k}, k = W, U, O$, are utility shocks, and we assume that they are iid and follow an extreme value distribution, which leads to a closed form solution for the $Emax$ operator. The final row of equation (14) describes the case when the individual receives an alternative job offer $\{\tilde{o}, \tilde{l}\}$. This happens with a probability $\phi_1(\tilde{o}, \tilde{l}|o_{it}, l_{it})$. In this case, the individual has to also decide whether to choose this new job. We define the continuation value as:

$$
\begin{aligned}
E\widetilde{max} \quad = \quad & E_t \sum_{\tilde{o}\neq o_{it},\tilde{l}\neq l_{it}} \phi_1(\tilde{o},\tilde{l}|o_{it},l_{it}) \max[V^W(\Omega_{it+1}) + \eta^W_{it+1}, V^W(\tilde{\Omega}_{it+1}) + \tilde{\eta}^W_{it+1}, \\
& \qquad V^U(\Omega_{it+1}) + \eta^U_{it+1}, V^O(\Omega_{it+1}) + \eta^O_{it+1}]
\end{aligned}
\tag{16}
$$

where $\tilde{\Omega}_{it+1}$ is the future state space when the individual accepts the alternative job $\{\tilde{o},\tilde{l}\}$ and where $\tilde{\eta}^W_{it}$ is the shock associated with the alternative offer. The value of working without conceiving is defined as:

$$
\begin{aligned}
V^{W,NC}(\Omega_{it}) \quad = \quad & \max_{c_{it}} u\left(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it}, \Upsilon_{it}, f_i\right) \\
& + \beta\delta E_t V^U(\Omega_{it+1}) \\
& + \beta(1-\delta)(1-\phi_0(o_{it},l_{it}))Emax \\
& + \beta(1-\delta)\phi_0(o_{it},l_{it})E\widetilde{max}
\end{aligned}
\tag{17}
$$

At the beginning of next period, the individual starts with an updated state space Ω_{it+1}, where all the state variables have been updated but the number of children. Here again, the individual can be laid off and starts as unemployed, or has to chose next period's labor market status.

Value of unemployment. When unemployed, the individual can chose whether to stay unemployed for another period, or exit the labor market altogether. If a job offer is received, the individual then decides whether to take up the offer or to remain non-employed. The value of being in unemployment and not conceiving is:

$$
\begin{aligned}
V^{U,NC}(\Omega_i) \quad = \quad & \max_{c_{it}} u\left(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it}, \Upsilon_{it}, f_i\right) \\
& + \beta(1-\phi_0(o_{it},l_{it}))E_t \max[V^U(\Omega_{it+1}) + \eta^U_{it+1}, V^O(\Omega_{it+1}) + \eta^O_{it+1}] \\
& + \beta\phi_0(o_{it},l_{it}))E_t \sum_{\tilde{o}\neq o_{it},\tilde{l}\neq l_{it}} \phi_1(\tilde{o},\tilde{l}|o_{it},l_{it}) \\
& \qquad \max[V^U(\Omega_{it+1}) + \eta^U_{it+1}, V^O(\Omega_{it+1}) + \eta^O_{it+1}, V^W(\tilde{\Omega}_{it+1}) + \tilde{\eta}^W_{it+1}]
\end{aligned}
\tag{18}
$$

where we again denote with a tilda the variables involved with the alternative job, e.g. $\tilde{\Omega}_{it+1}$ is the state space for women who accepted an alternative job. The value of conceiving while in unemployment is defined as:

$$\begin{aligned} V^{U,C}(\Omega_{it}) &= \max_{c_{it}} u\left(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it}, \Upsilon_{it}, f_i\right) \\ &+\pi(age^M_{it}, f^F_i)\beta E_t V^{L_{NW}}(\Omega^P_{it+1}) \\ &+(1-\phi_0(o_{it}, l_{it}))(1-\pi(age^M_{it}, f^F_i))\beta E_t \max[V^U(\Omega_{it+1})+\eta^U_{it+1}, V^O(\Omega_{it+1})+\eta^O_{it+1}] \\ &+\beta(1-\pi(age^M_{it}, f^F_i))\phi_0(o_{it}, l_{it}) E_t \sum_{\tilde{o},\tilde{l}} \phi_1(\tilde{o},\tilde{l}|o_{it}, l_{it}) \max[V^U(\Omega_{it+1})+\eta^U_{it+1}, \\ &\qquad V^O(\Omega_{it+1})+\eta^O_{it+1}, V^W(\tilde{\Omega}_{it+1})+\tilde{\eta}^W_{it+1}] \end{aligned} \tag{19}$$

If conception is successful, the mother is entitled to maternity leave, but will not be entitled to a job at the end of that spell, generating a flow of utility $V^{L_{NW}}(.)$ as defined below.

Value of being out of the labor force. The value of being out of work and trying to conceive a child is modeled as:

$$\begin{aligned} V^{O,C}(\Omega_{it}) &= \max_{c_{it}} u\left(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it}, \Upsilon_{it}, f_i\right) \\ &+\pi(age^M_{it}, f^F_i)\beta E_t V^{L_{NW}}(\Omega^P_{it+1}) \\ &+(1-\phi_0(o_{it}, l_{it}))(1-\pi(age^M_{it}, f^F_i))\beta E_t V^O(\Omega_{it+1}) \\ &+\phi_0(o_{it}, l_{it})(1-\pi(age^M_{it}, f^F_i))\beta E_t \sum_{\tilde{o}\neq o_{it},\tilde{l}\neq l_{it}} \phi_1(\tilde{o},\tilde{l}|o_{it}, l_{it}) \\ &\quad \max[V^O(\Omega_{it+1})+\eta^O_{it+1}, V^W(\tilde{\Omega}_{it=1})+\tilde{\eta}^W_{it+1}] \end{aligned} \tag{20}$$

whereas the value of not conceiving is:

$$\begin{aligned} V^{O,NC}(\Omega_{it}) &= \max_{c_{it}} u\left(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it}, \Upsilon_{it}, f_i\right) \\ &+(1-\phi_0(o_{it}, l_{it}))\beta E V^O(\Omega_{t+1}) \\ &+\phi_0(o_{it}, l_{it})\beta E_t \sum_{\tilde{o}\neq o_{it},\tilde{l}\neq l_{it}} \phi_1(\tilde{o},\tilde{l}|o_{it}, l_{it}) \\ &\quad \max[V^O(\Omega_{it+1})+\eta^O_{it+1}, V^W(\tilde{\Omega}_{it=1})+\tilde{\eta}^W_{it+1}] \end{aligned} \tag{21}$$

It should be noted that individuals who are out of the labor force cannot become unemployed and start claiming benefits.

Value of maternity leave. Maternity leave lasts for two periods during which the mother is not working and receives maternity benefit. The amount she gets depends on her prior labor market status. The value of maternity for a woman who previously worked is defined as:

$$\begin{aligned} V^{L_W}(\Omega_{it}) = & \max_{c_{it},c_{it+1}} u\left(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it}, \Upsilon_{it}, f_i\right) + \beta u\left(c_{it+1}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it+1}, f_i\right) \\ & +(1-\phi_0(o_{it}, l_{it}))\beta^2 E_t \max[V^W(\Omega_{it+1}) + \eta^W_{it+1}, V^U(\Omega_{it+1}) + \eta^U_{it+1}, V^O(\Omega_{it+1}) + \eta^O_{it+1}] \\ & +\phi_0(o_{it}, l_{it})\beta^2 E_t \sum_{\tilde{o}\neq o_{it}, \tilde{l}\neq l_{it}} \phi_1(\tilde{o}, \tilde{l}|o_{it}, l_{it}) \max[V^W(\Omega_{it+1}) + \eta^W_{it+1}, \\ & V^W(\tilde{\Omega}_{i,t+1}) + \tilde{\eta}^W_{it+1}, V^U(\Omega_{it+1}) + \eta^U_{it+1}, V^O(\Omega_{it+1}) + \eta^O_{it+1}] \end{aligned} \quad (22)$$

In this state, the women is entitled to maternity leave, which consists on a fixed transfer, and on a variable one, which is a function of prior earnings. If the individual did not work prior to giving birth, she is not guaranteed a job at the end of the maternity leave and receives only the fixed transfer:

$$\begin{aligned} V^{L_{NW}}(\Omega_{it}) = & \max_{c_{it},c_{it+1}} u\left(c_{it}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it}, \Upsilon_{it}, f_i\right) + \beta u\left(c_{it+1}, o_{it}, l_{it}; n_{it}, h_{it}, age^K_{it+1}, f_i\right) \\ & +(1-\phi_0(o_{it}, l_{it}))\beta^2 E_t \max[V^U(\Omega_{it+1}) + \eta^U_{it+1}, V^O(\Omega_{it+1}) + \eta^O_{it+1}] \\ & +\phi_0(o_{it}, l_{it})\beta^2 E_t \sum_{\tilde{o}, \tilde{l}} \phi_1(\tilde{o}, \tilde{l}|o_{it}, l_{it}) \max[V^W(\tilde{\Omega}_{i,t+1}) + \tilde{\eta}^W_{it+1}, \\ & V^U(\Omega_{it+1}) + \eta^U_{it+1}, V^O(\Omega_{it+1}) + \eta^O_{it+1}] \end{aligned} \quad (23)$$

Conception decision. The decision of whether to conceive or not, is taken as:

$$V^k(\Omega_{it}) = \max[V^{k,C}(\Omega_{it}), V^{k,NC}(\Omega_{it})], \qquad k = \{W, U, O\} \quad (24)$$

As the preference shocks towards conception and non-conception η^C_{it} and η^{NC}_{it}, which are part of the state vector Ω_{it}, are drawn from an extreme value distribution, the probability of conception takes a logistic form, with the values of conception and non-conception as arguments. The decision to conceive, noted b_{it} in equation (5) in the main text is the arg max of expression (24).

B.5 Numerical Solution to the Model

The model is solved by backward recurrence beginning at the end of life, which we set at 80 years. For every half year, between the age of 80 and 15, we compute an age-specific value function. The choice set of the agent depends on her age. Between ages 60 and 80, the individual is retired and infertile and therefore has no choices to make in terms of either occupation, labor supply or fertility, and only chooses how much to consume. Prior to retirement, the individual is making choices on consumption, fertility, labor supply and occupation. Between the age of 15 and 60, the probability of conception is declining and has an inverse S shape, as chances of conception after age 45 is very low. Given the value functions at age 15, conditional on a given occupation, the last step of the solution of the model is to compute the optimal choice of the initial occupation.

Some of the state variables of the model are naturally discrete. This includes the number of children (0, 1 or 2), occupational choices (routine, abstract or manual), labor supply in the previous period (working full time, part time, unemployed or out of the labor force) or marital status (single or married). Some variables are discrete in nature, but we restrict them on a coarser grid to save on computational time. This is the case for the age of the youngest child. We solve the value function for ages equal to 0, 3, 6 and 9 and extrapolate linearly the function for ages not on the grid. Beyond the age of 9, we assume that the youngest child imposes the same type of constraints or costs than at age 9.

Other variables such as assets or human capital are continuous variables, which we discretize to be able to solve the model numerically. We use a grid of 14 points for assets, with values between 0 and a value equivalent to about 6 times the total earnings of a household. This value was selected as a function of the distribution of assets observed in the data. Finally, we use a grid with 4 values for the human capital with nodes at 0, 3, 6 and 30. The grid is denser for low skill levels because the return to experience, and therefore presumably skills, is nonlinear. For example, in the data, we observe very flat wages after 15 years of work experience. To calculate the values for points outside of the grid, we always use linear interpolation. Expectations of future value functions are calculated through close-form solutions when shocks are assumed to follow an extreme value distribution. This is the case for the initial choice of occupation, fertility decisions and labor supply transitions. The probability of choosing a particular outcome has a logistic form, where the arguments are conditional value functions. When shocks are drawn from a normal distribution, integration is done through a quadrature method with 5 points of support. Finally, some of the shocks have a uniform distribution (layoff probability, job offer probability) and we use closed-form formulas to calculate expected values. The model assumes 4 types of individuals according to their ability and taste for children. We solve the model separately and in parallel to save computing time.

The estimation is performed using the NAG e04ucf minimization routine together with the simplex algorithm. We start the estimation at many different values of the parameters to make sure the estimation does not end up in a local minimum.

B.6 Estimation Methods and Identification Issues

We estimate the parameters of the model by method of simulated moments (MSM). Denote by θ the vector of parameters of the model. Denote by $\hat{M}_N$ a mx1 vector of empirical moments calculated from a sample of data of size N and by $M_S(\theta)$ a corresponding vector of moments predicted by the model, and constructed using S simulations. Those moments are listed in Table 2. Letting $\hat{W}_N$ denote a m x m weighting matrix, the MSM estimator $\hat{\theta}$ is given by:

$$\hat{\theta} = \arg\min_{\theta} \left(\hat{M} - M_S(\theta)\right)' \hat{W}_N \left(\hat{M} - M_S(\theta)\right) \tag{25}$$

Under the regularity conditions stated in Pakes and Pollard (1989) and Duffie and Singleton (1993), the MSM estimator $\hat{\theta}$ is both consistent and asymptotically normally distributed.

Following Altonji and Segal (1996), we do not use the asymptotically optimal weighting matrix because of its potentially poor small sample properties. Instead, we choose the weighting matrix to be diagonal, with the empirical variances of the moments on the diagonal. For the moments which are based on regressions, we allow for heteroskedasticity. For the moments which consists of means (e.g. average wage by age), we compute this variance with a bootstrap method.

The choice of moments is obviously important and we discuss this in Section 3.3 in the main text. An important issue is whether the moments we choose allow us to identify all the parameters of the model. A sign of poor identification is if the objective function is flat in a large region around the estimated parameters. This arises if the predicted moments do not vary with respect to a given parameter. One reason why this may arise is because the moments we have chosen to identify that parameter are irrelevant.[49] For instance, if one were to try to identify the coefficient of risk aversion without data on consumption or savings, but only with moments on labor supply, the objective function would not be sensitive to a change in that parameter. To check whether our chosen moments identify our parameters well, we compute the objective function for each parameter, both at its estimated value and at a value 1 percent away. Note that this is different from computing the derivative of the objection function as the steps involved in the numerical computation of the derivative would be much smaller than one percent, by several orders of magnitudes. Instead our calculation evaluates how convex the objective function is at the estimated value of the parameters. We display in Figure B1 the sensitivity of the objective function with respect to each of the parameters of the model. We display the percentage change in the objective function following a percentage change in a given parameter. The figure indicates that all the changes are above one percent, and range between 1.6% and 6% (the figure is truncated to the right). This implies that our predicted moments are sensitive to changes in parameters, which means that the empirical moments we selected contain information on all the different aspects of our model.

[49]Another reason why this may arise is because the functional form is too restrictive.

C Goodness of Fit

Tables D1 to D10 show the model fit along different dimensions, with the latter displaying the occupational choices both overall and in the initial period (at age 15). Both the initial and the overall proportion of women in each occupation are well fitted. Likewise, Table D3, which outlines the annual transition rate between occupations, indicates that persistence within occupational choice is closely fitted for all occupations. In Table D2, which shows the proportion of females in full-time work, part-time work, unemployment, and out of the labor force by age, the simulated proportions of females in full-time work and not working after age 20 are close to the observed proportions. Part-time work becomes more frequent with age both in the observed and simulated data, and the reverse holds for full-time work. The peak in the proportion of females out of the labor force at age 35 is also well matched.

The annual transition rates in work hours in each of the occupations is given in Table D1 in which the simulated data exhibit high persistence in each work-hour group, as in the observed data. The occupations also retain their relative persistence ranking in both full-time and part-time work. Wages are displayed in Table D6, both as a function of age and initial occupation, and as a regression of log wage on work experience, by current occupation. The model matches closely the profile of wages. Likewise, the returns to experience for both manual and abstract occupations are similar in both observed and simulated data, especially at low levels of experience. Table D7 shows the wage losses at return to work after interruption. Longer breaks from work and interruptions later in the career imply larger wage losses in both the observed and simulated data. Moreover, a change in hours of work at return to employment implies a wage adjustment in the simulated careers which corresponds closely to the observed change.

The profile of the number of children by age is well fitted in the simulated data (Table D4): females begin bearing children at the same time in both the observed and simulated data. The timing of a second child is also well fitted, although a slightly larger fraction of simulated females either remain childless or have more than one child. Finally, the simulated data for the link between wages, number of children, and occupation, outlined in Table D8 with routine jobs as the reference occupation, match a concave profile over age and exhibit a "child penalty" that, as in the observed data, is increasing in the number of children. The part-time time wages given in this table are also well matched.

D Additional Parameter Estimates

Table D1 presents the estimated parameters pertaining to the earnings of the husband, and to marriage and divorce. Husband's earnings are increasing with age. Women in abstract occupations and to some extent in manual occupations are married to men who earn higher wages, and women of high ability are married to men with higher earnings. The probability of marriage is increasing with age up to 30, and lower after that age. Women with a high taste for fertility are more likely to marry at any age. Table D2 displays the parameters relating to the utility of children. Table D3 displays the probability of offers for occupations and hours of work, after age 15, i.e. once the training period is over.

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Table 1: Descriptive Statistics, by Occupation

	Routine	Abstract	Manual	Whole sample
Initial occupation	25.0%	44.8%	30.3%	100%
Occupation of work	25.4%	52.7%	21.9%	
Annual occupational transition rates:				
if in Routine last year	97.9%	1.5%	0.5%	
if in Abstract last year	0.7%	99.0%	0.2%	
if in Manual last year	0.9%	0.8%	98.3%	
Log wage at age 20	3.598	3.742	3.470	3.634
	(0.297)	(0.301)	(0.386)	(0.337)
Log wage growth, at potential experience=5yrs	0.0485	0.0551	0.0450	0.0510
	(0.187)	(0.156)	(0.196)	(0.175)
Log wage growth, at potential experience=10yrs	0.0181	0.0240	0.0152	0.0208
	(0.187)	(0.206)	(0.223)	(0.206)
Log wage growth, at potential experience=15yrs	0.00995	0.0147	0.0127	0.0133
	(0.206)	(0.195)	(0.211)	(0.200)
Total work experience after 15yrs	11.55	12.81	12.14	12.34
	(3.273)	(2.624)	(2.880)	(2.909)
Full time work experience after 15yrs	10.32	11.92	10.86	11.29
	(3.907)	(3.348)	(3.570)	(3.617)
Part time work experience after 15yrs	1.229	0.889	1.274	1.056
	(2.187)	(1.828)	(2.125)	(1.997)
Total log wage loss, after interruption=1yrs	-0.0968	-0.147	-0.105	-0.121
	(0.560)	(0.636)	(0.633)	(0.613)
Total log wage loss, after interruption=3yrs	-0.152	-0.253	-0.223	-0.216
	(0.604)	(0.639)	(0.619)	(0.625)
Age at first birth	27.27	28.39	25.94	27.56
	(4.138)	(3.783)	(3.517)	(3.943)
No child (%) at age 40	14.39	20.08	14.86	17.58
	(3.067)	(2.544)	(4.164)	(1.787)
One child (%) at age 40	25.00	28.92	18.92	26.15
	(3.783)	(2.879)	(4.584)	(2.063)
Two or more children (%) at age 40	60.61	51.00	66.22	56.26
	(4.269)	(3.174)	(5.536)	(2.328)

Notes: Occupation of work is defined conditional on working. Log wage growth is defined for all consecutive work spells after apprenticeship training. Total log wage loss after interruption is the change in log real daily earnings between return to work and last quarter before interruption. The total wage loss has been purged of a change in occupation, in firm size (if change of firm) and changes in hours of work. Standard deviations in parentheses

Table 2: Moments Used in the Estimations

Moments	Data Set	Nb Moments
Labor supply and occupational choice		
Proportion of full-time work, by age and initial occupation	IAB	25
Proportion of part-time work, by age and initial occupation	IAB	20
Proportion of unemployed, by age and initial occupation	IAB	20
Proportion of out of labor force, by age and initial occupation	IAB	20
Work experience, by age	IAB	5
Annual transition rate between occupation	IAB	9
Transition rates between labor market status, by occupation	IAB	48
Annual transition rate hours of work, by occupation	IAB	12
Proportion work, no child	GSOEP	5
Proportion part-time work, no child	GSOEP	5
Proportion work, with child	GSOEP	5
Proportion in each occupation, by age	IAB	6
Initial choice of occupation, by region and time period	IAB	380
Wages		
Wage by age and initial occupation	IAB	21
Average wage by age and by initial occupation	IAB	18
OLS regression of log wage on experience, by occupation	IAB	9
OLS regression of log wage on age, number of children, occup, experience	GSOEP	12
OLS regression of log wage on past and future wages	IAB	3
OLS regression of log wage for interrupted spells on duration and experience	IAB	14
OLS regression of husbands log earnings on women's characteristics	GSOEP	6
Variance of residual of log wage on occupation, age, work hours	GSOEP	1
Proportion of women with log wage residual $<$ 1 std dev	GSOEP	1
Savings		
OLS regressions savings rate on age, occupation, number of children	EVS	24
Fertility and marriage		
Proportion with no children, by age	GSOEP	5
Proportion with one child, by age	GSOEP	5
Proportion with two children or more, by age	GSOEP	5
Centiles of age at first birth	GSOEP	10
Centiles of age at second birth	GSOEP	10
Number of children at age 40	GSOEP	3
Average age at first birth, by current occupation	GSOEP	3
Proportion of childbirth within marriage	GSOEP	1
OLS regression of fertility on age and initial occupation	GSOEP	5
IV regression of fertility on age and initial occupation (instrumented)	GSOEP	5
Mean of residual of number of children on age, by wage residual	GSOEP	2
Proportion married, by age	GSOEP	5
OLS regression marriage on age, experience, past marital status occupation and fertility residual	GSOEP	15
		743

Note: IAB: Institut fuer Arbeitsmarkt-und Berufsforschung. GSOEP: German Socio-Economic Panel. EVS: Einkommens- und Verbrauchsstichprobe.

Table 3: Occupation specific parameters

Parameter	Routine	Abstract	Manual
A. Atrophy rates parameters (annual depreciation rates)			
At 3 years of uninterrupted work experience	-0.06% (1e-5%)	-0.11% (2e-5%)	-0.03%(2e-5%)
At 6 years of uninterrupted work experience	-0.50% (0.11%)	-6.90% (0.17%)	-3.45%(0.24%)
At 10 years of uninterrupted work experience	-0.61% (14.2%)	-2.65% (0.01%)	-3.08%(0.18%)
B. Wage equation parameters			
Log Wage Constant	3.39 (0.0038)	3.6 (0.0054)	3.32 (0.0059)
Years of uninterrupted work experience	0.1 (3.3e-05)	0.09 (3.6e-05)	0.123 (0.0001)
Years of uninterrupted work experience, squared	-0.00382 (3e-06)	-0.0021 (4.1e-06)	-0.00463 (6.4e-06)
C. Amenity value of occupations			
Utility of work if children	0	-0.056 (0.001)	-0.014 (0.0005)
Utility of PT work if children	0	-0.42 (0.003)	-0.08 (0.007)

Notes: The wage equation is defined as a function of skills - which corresponds to uninterrupted work experience - and not work experience. The former is allowed to depreciate when out of the labor force. Asymptotic standard errors in parenthesis.

Table 4: Estimated parameters: consumption decision and cost of children

Parameter	Estimate
Annual discount factor	0.959 (0.00028)
CRRA utility	1.98 (0.0021)
Weight of children in consumption equivalence scale	0.392 (0.00167)
Cost of working if children, age$\leq$ 6 (euros per day)	31.1 (0.36)
Cost of working, if children, age $>$ 6 (euros per day)	12.6 (0.24)

Notes: Asymptotic standard errors in parenthesis.

Table 5: Estimated parameters: unobserved ability and utility of children

	A. Individual type (ability / fertility)			
Parameter	LA/HC	LA/LC	HA/HC	HA/LC
Proportion in sample	0.125	0.174	0.309	0.393
	(8.05e-05)	(0.0621)	(0.00775)	(0.0621)
Log wage intercept	0	0	0.145	0.145
	-	-	(0.0026)	(0.0026)
utility of leisure	0	0	0.257	0.257
	-	-	(0.0032)	(0.0032)
Utility of one child	0.484	0.158	0.484	0.158
	(0.0056)	(0.014)	(0.0056)	(0.014)
Utility of two children	1.28	-2.04	1.28	-2.04
	(0.00026)	(1.3)	(0.00026)	(1.3)
Corr(Ability, desired fertility)	0.02			
	B. Outcome by type			
Total fertility	1.88	0.953	1.88	0.951
Prop in routine occupation	0.3	0.231	0.301	0.232
Prop in abstract occupation	0.404	0.509	0.407	0.508
Prop in manual occupation	0.296	0.26	0.292	0.26

Notes: LA: low ability, HA: high ability, LC: low taste for children, HC: high taste for children. Note that we allow ability groups to have different tastes for leisure. Asymptotic standard errors in parenthesis. Proportions in given occupation are calculated at the start of the career.

Table 6: The career cost of children - percentage loss in net present value of income at age 15, with and without fertility.

	Percentage loss compared to baseline
Total cost	-35.3%
Oaxaca decomposition of total cost	
Labor supply contribution	-27%
Wage contribution	-8.5%
Oaxaca decomposition of wage contributions	
Contribution of atrophy	-1.8%
Contribution of other factors	-6.7%
Contribution of occupation	-1.6%
Contribution of other factors	-7%

Notes: The career costs are evaluated using simulations and comparing the estimated model with a scenario where the woman knows ex-ante that she cannot have children. The costs are computed as the net present value of female incomes, including all wages, unemployment benefits and maternity benefits in the calculations. The discount factor is set to 0.95 annually. Initial occupation is the one in the no-fertility scenario.

Table 7: The career cost of children: timing and spacing of birth

Age		Age second birth				
first birth	Only 1 child	22	24	26	28	30
20	-31.4%	-36.4%	-36.6%	-36.6%	-37%	-36.9%
22	-30.2%	-	-34.6%	-34.8%	-34.8%	-35.2%
24	-28.1%	-	-	-32.2%	-32.3%	-32.3%
26	-26.0%	-	-	-	-29.8%	-29.8%
28	-24.0%	-	-	-	-	-27%

Notes: The career costs are evaluated using simulations and comparing the a scenario with no children, with a one where either one or two children are born at a given age. The costs are computed as the net present value at age 15. The discount factor is set to 0.95 annually.

Table 8: Effect of Increased Child Benefits

	Age at start of policy			
	15	25	35	45
Change, no child (in %)	-0.8%	-0.7%	0%	0%
Change, one child (in %)	-0.08%	-0.05%	-0.05%	0%
Change, two children (in %)	0.2%	0.2%	0.07%	0%
Change, age at first birth (in years)	-0.4	-0.1	-0.0005	0
Change, age at second birth (in years)	-0.04	-0.007	0.002	0
Change, skills (in %)	-0.29%	-0.11%	-0.049%	-0.0019%
Change, number of years working	-0.08	-0.03	-0.01	-0.0004
Change, number of years working PT	0.04	0.01	-0.007	-0.0003
Change, proportion routine	0.3%	0%	0%	0%
Change, proportion manual	0.07%	0%	0%	0%

Notes: The table compares two scenarios, a baseline one and one which introduces a cash transfer at birth of 6,000 euros. Changes in fertility, skills and work experience are computed at age 60. Changes in occupations are computed at age 15. Simulations performed over 12,000 individuals.

Table D1: Most Frequent Occupations and Classification

Description	Proportion	Category
Secretaries/office clerks	25.80%	Abstract
Sales person/shop assistant	12.30%	Routine
Consultation hour assistant	7.65%	Manual
Nurse	6.01%	Manual
Bank specialists/professionals	5.35%	Abstract
Hairdresser	3.92%	Manual
Stenographer	3.27%	Abstract
Wholesale and retail sales people	3.02%	Abstract
Accountant, tax advisor	1.50%	Abstract
Design draftsman	1.38%	Abstract
Insurance specialists	0.98%	Abstract
Sewer	0.94%	Routine
Bookkeeper	0.90%	Abstract
Cook	0.87%	Routine

Note: These occupations represent 73% of all occupations in our sample.

Table D2: Notations used in the model

	notation	range
State space	Ω_{it}	$\Re^{20}$
Own consumption, woman	c_{it}	$]0, +\infty[$
Family consumption	c_{it}^{HH}	$]0, +\infty[$
Choice of conception	b_{it}	$\{0, 1\}$
Number of children	n_{it}	$\{0, 1, 2\}$
Occupation	o_{it}	{abstract, manual, routine}
Labor market status	l_{it}	{Unemployed, out of labor force, part time, full time}
Marital status	h_{it}	$\{0, 1\}$
Assets	A_{it}	$]0, +\infty[$
Age of mother	age_{it}^{M}	$[15, 80]$
Age of youngest child	age_{it}^{K}	$[0, 80]$
Skills	x_{it}	$[0, \infty[$
Wage of the woman	w_{it}	$[0, +\infty[$
Earnings of husband	$earn_{it}^{h}$	$[0, +\infty[$
Parameters and functions		
Vector of ex ante heterogeneity	f_i	$\Re^4$
Ability	$f_i^P \in f_i$	$\Re$
Taste for children	$f_i^C \in f_i$	$\Re$
Taste for leisure	$f_i^L \in f_i$	$\Re$
Infertility	$f_i^F \in f_i$	$\Re$
Probability of layoff	δ	$[0, 1]$
Discount factor	β	$[0, 1]$
Relative risk aversion	γ_C	$]-\infty, +\infty[$
Probability of conception	$\pi(.)$	$[0, 1]$
Atrophy of skills	$\rho()$	$]-\infty, 1]$
Unconditional probability of occupation-hours of work offer	$\phi_0()$	$[0, 1]$
Conditional probability of occupation-hours of work offer	$\phi_1()$	$[0, 1]$
Shocks		
Vector of preference shocks	Υ_{it}	$\Re^8$
Shock to woman's wage	$\eta_{it} \in \Upsilon_{it}$	$]-\infty, +\infty[$
Shock to husband's earnings	$\eta_{it}^{h} \in \Upsilon_{it}$	$]-\infty, +\infty[$
Preference shock towards conception	$\eta_{it}^{C} \in \Upsilon_{it}$	$]-\infty, +\infty[$
Preference shock towards non conception	$\eta_{it}^{NC} \in \Upsilon_{it}$	$]-\infty, +\infty[$
Preference shock towards work	$\eta_{it}^{W} \in \Upsilon_{it}$	$]-\infty, +\infty[$
Preference shock towards alternative work	$\tilde{\eta}_{it}^{W} \in \Upsilon_{it}$	$]-\infty, +\infty[$
Preference shock towards unemployment	$\eta_{it}^{U} \in \Upsilon_{it}$	$]-\infty, +\infty[$
Preference shock towards out of work	$\eta_{it}^{O} \in \Upsilon_{it}$	$]-\infty, +\infty[$
Preference shock towards initial occupation	ω_{io}	$]-\infty, +\infty[$

Table D1: Goodness of Fit: Annual Transition Rate: Hours of Work

	From full time work							
	Observed				Simulated			
	Full time	Part time	Unemployed	OLF	Full time	Part time	Unemployed	OLF
Routine	0.88	0.014	0.041	0.068	0.88	0.017	0.082	0.021
	(0.002)	(0.0006)	(0.001)	(0.001)				
Abstract	0.92	0.0089	0.022	0.053	0.88	0.013	0.086	0.02
	(0.001)	(0.0003)	(0.0006)	(0.0008)				
Manual	0.89	0.014	0.034	0.065	0.87	0.017	0.097	0.016
	(0.002)	(0.0006)	(0.001)	(0.001)				
	From Part Time Work							
	Observed				Simulated			
	Full time	Part time	Unemployed	OLF	Full time	Part time	Unemployed	OLF
Routine	0.04	0.84	0.029	0.089	0.011	0.87	0.087	0.035
	(0.002)	(0.003)	(0.002)	(0.003)				
Abstract	0.035	0.88	0.018	0.069	0.016	0.85	0.094	0.039
	(0.002)	(0.003)	(0.001)	(0.002)				
Manual	0.041	0.86	0.023	0.077	0.013	0.87	0.095	0.02
	(0.002)	(0.004)	(0.002)	(0.002)				
	From Unemployment							
	Observed				Simulated			
	Full time	Part time	Unemployed	OLF	Full time	Part time	Unemployed	OLF
Routine	0.18	0.059	0.6	0.16	0.29	0.13	0.47	0.11
	(0.005)	(0.003)	(0.006)	(0.004)				
Abstract	0.25	0.05	0.53	0.16	0.37	0.13	0.41	0.089
	(0.006)	(0.003)	(0.007)	(0.004)				
Manual	0.28	0.056	0.5	0.17	0.35	0.16	0.42	0.074
	(0.009)	(0.004)	(0.01)	(0.006)				
	From out of labor force							
	Observed				Simulated			
	Full time	Part time	Unemployed	OLF	Full time	Part time	Unemployed	OLF
Routine	0.031	0.026	0.027	0.92	0.028	0.018	0	0.95
	(0.0007)	(0.0008)	(0.0009)	(0.001)				
Abstract	0.053	0.037	0.028	0.88	0.058	0.037	0	0.9
	(0.001)	(0.001)	(0.0009)	(0.002)				
Manual	0.044	0.031	0.023	0.9	0.022	0.011	0	0.97
	(0.001)	(0.0009)	(0.001)	(0.002)				

Note: Data source: IAB. Observed transition rates based on 925,602 observations. Simulated moments based on 10,000 replications. OLF: out of labor force.

Table D2: Goodness of Fit: Hours of Work by Age

Age	Full time		Part time		Unemployed		OLF	
	Observed	Simulated	Observed	Simulated	Observed	Simulated	Observed	Simulated
20	0.769 (0.001)	0.78	0.0401 (0.0008)	0.0378	0.0836 (0.0006)	0.182	0.107 (0.001)	0
25	0.615 (0.001)	0.558	0.0588 (0.0007)	0.0706	0.0639 (0.0005)	0.11	0.263 (0.001)	0.261
30	0.375 (0.001)	0.371	0.109 (0.0007)	0.107	0.0588 (0.0005)	0.0673	0.457 (0.001)	0.455
35	0.26 (0.001)	0.277	0.181 (0.0008)	0.173	0.0536 (0.0006)	0.0638	0.506 (0.001)	0.486
40	0.254 (0.002)	0.269	0.245 (0.001)	0.233	0.0492 (0.0008)	0.0672	0.452 (0.002)	0.431

Note: Data source: IAB. Observed moments based on 81,343 observations. Simulated moments based on 10,000 replications. OLF: out of labor force.

Table D3: Goodness of Fit: Annual Transition Rate between Occupation

Occupation	Observed			Simulated		
	Routine	Abstract	Manual	Routine	Abstract	Manual
Routine	0.98 (0.001)	0.012 (0.0009)	0.005 (0.0006)	0.99	0.0026	0.0031
Abstract	0.0058 (0.0005)	0.99 (0.0005)	0.0023 (0.0003)	0.0035	0.99	0.0043
Manual	0.007 (0.0008)	0.0055 (0.0007)	0.99 (0.001)	0.0027	0.0022	1

Note: Data source: IAB. Simulated moments based on 10,000 replications.

Table D4: Goodness of Fit: Number of Children by Age

Age	No children		One child		Two or more	
	Observed	Simulated	Observed	Simulated	Observed	Simulated
20	0.981 (0.008)	1	0.0178 (0.007)	0	0.0009 (1e+03)	0
25	0.65 (0.02)	0.654	0.255 (0.01)	0.23	0.0946 (0.009)	0.116
30	0.315 (0.03)	0.283	0.305 (0.01)	0.387	0.38 (0.02)	0.33
35	0.16 (0.02)	0.122	0.266 (0.02)	0.49	0.574 (0.04)	0.388
40	0.14 (0.03)	0.0657	0.259 (0.03)	0.536	0.601 (0.05)	0.399

Note: Data source: GSOEP. Simulated moments based on 10,000 replications.

Table D5: Goodness of Fit: Spacing of Births

Decile	Age at first birth		Age at second birth	
	Observed	Simulated	Observed	Simulated
10	21.1 (0.26)	21.5	23 (0.33)	23
20	22.6 (0.26)	23	24.9 (0.36)	24
30	24.2 (0.26)	24.5	26.1 (0.26)	25
40	25.2 (0.2)	25	27.1 (0.28)	26
50	26.4 (0.18)	26	28.3 (0.38)	27
60	27.4 (0.15)	27.5	29.5 (0.31)	27.5
70	28.5 (0.31)	28.5	30.6 (0.26)	28.5
80	30.3 (0.23)	30.5	31.8 (0.36)	29.5
90	32.3 (0.36)	33	33.5 (0.43)	31
100	39.7 (0.36)	40	41.2 (0.43)	40

Note: Data source: GSOEP. Simulated moments based on 10,000 replications.

Table D6: Goodness of Fit: Wages

	Routine		Abstract		Manual	
	Obs.	Simul.	Obs.	Simul.	Obs.	Simul.
Wages by age and initial occupation						
20	40.8 (0.09)	40.9	47.3 (0.08)	49.7	39.5 (0.09)	40.9
25	50 (0.08)	49.6	60.5 (0.07)	60.6	51.4 (0.07)	50.5
30	50.8 (0.09)	51.6	66.1 (0.07)	65.4	52.3 (0.08)	52.6
35	47.6 (0.1)	47.1	60.9 (0.09)	60.9	48.8 (0.1)	49.2
40	47.8 (0.2)	46	58.8 (0.1)	57.1	48.9 (0.2)	45.7
Log wage regressions						
Experience	0.0574 (0.0005)	0.0558	0.0503 (0.0003)	0.0574	0.0616 (0.0006)	0.0687
Experience^2	-0.00157 (2e-05)	-0.00178	-0.00132 (1e-05)	-0.0014	-0.00192 (3e-05)	-0.00221
Constant	3.43 (0.003)	3.45	3.7 (0.002)	3.65	3.48 (0.004)	3.41
Dynamic wage regression. Dependent variable: log wage						
	Observed				Simulated	
Lagged wage	0.5344 (0.00039)				0.5128	
Lead Wage	0.4564 (0.00039				0.4834	

Note: Data source: IAB. Simulated moments based on 10,000 replications. Wages are expressed in euros per day, deflated by CPI index with a base in 1995. Regression done on 213,832, 497,245 and 190,198 observations respectively. Simulated moments based on 10,000 replications. Experience is real experience, defined as the number of years worked.

Table D7: Goodness of Fit: Log Wage Change Regression for Interrupted Spells

	Observed		Simulated.
Duration of interruption	-0.0062	(0.003)	-0.0017
Experience 5-8 years	-0.047	(0.01)	3.2e-05
Experience >8 years	-0.068	(0.02)	0.026
Abstract	0.026	(0.01)	-0.0025
Manual	0.045	(0.01)	-0.0021
Abstract, exp 5-8 years	-0.085	(0.02)	-0.064
Manual, exp 5-8 years	-0.083	(0.02)	-0.04
Abstract, exp > 8 years	-0.096	(0.02)	-0.036
Manual, exp > 8 years	-0.12	(0.02)	-0.037
Part time to full time	0.37	(0.01)	0.59
Full time to part time	-0.41	(0.006)	-0.59
Duration, exp [5-8] years	-0.019	(0.004)	-0.0042
Duration, exp >8 years	-0.03	(0.004)	-0.017
Constant	-0.026	(0.02)	0.0011

Note: Data source: IAB: Regression done on 52,958 observations. Simulated moments based on 10,000 replications. Experience is defined as the number of years worked.

Table D8: Goodness of Fit: Log Wage, Children and Occupation

Variable	Observed		Simulated
	Coeff	s.e.	Coeff
Age	0.16	(0.008)	0.13
Age square	-0.0022	(0.0001)	-0.0018
Children = 1	-0.15	(0.02)	-0.085
Children $\geq$ 2	-0.39	(0.03)	-0.18
Abstract	0.14	(0.01)	0.22
Manual	-0.024	(0.02)	0.0095
Abstract * child=1	0.057	(0.03)	0.037
Manual * child=1	0.031	(0.04)	0.051
Abstract * child$\geq$ 2	0.12	(0.03)	-0.083
Manual * child$\geq$ 2	0.16	(0.04)	-0.034
Part time	-0.72	(0.01)	-0.63
Constant	1.1	(0.1)	1.8

Note: Data source: GSOEP. Simulated moments based on 10,000 replications.

Table D9: Goodness of Fit: Occupational Choices

Occupation	Observed		Simulated
	All Periods		
Routine	24.5	(0.12)	24.8
Abstract	51.4	(0.15)	46.7
Manual	24.1	(0.11)	28.5
	At age 15		
Routine	25.8	(0.93)	26.2
Abstract	45.8	(0.88)	46.4
Manual	28.4	(0.81)	27.5

Note: Data source: IAB. Proportion for all ages based on 248,023 observations. Proportion at age 15 based on 27,979 observations. Standard deviation calculated through bootstrap in parenthesis. Simulated moments based on 4,000 replications.

Table D10: Goodness of Fit: Savings Rate

Variable	Observed		Simulated
	Coeff	s.e.	Coeff
Age 19-25	0.029	(0.011)	-0.0071
Age 26-30	0.036	(0.0072)	0.0043
Age 31-35	0.029	(0.0064)	-0.015
Age 36-40	0.023	(0.0058)	-0.0068
Age 41-45	0.0099	(0.0059)	-0.012
One child	-0.018	(0.0043)	-0.0087
Two children	-0.00099	(0.0038)	0.018
Constant	0.098	(0.0067)	0.081

Note: Data source: EVS. Regression based on 28,503 observations. Simulated moments based on 10,000 replications.

Table D1: Parameter estimates: husband's earning, marriage and divorce

Earnings of husband		Probability of marriage		Probability of divorce	
Age	2.4 (0.015)	Age 15-19	0.0198 (0.28)	Age 25-29	0.004 (0.0051)
Age square	-0.0137 (0.00027)	Age 20-24	0.13 (0.0018)	Age 30-34	0.0069 (0.0058)
Occupation Abstract	10.3 (0.32)	Age 25-29	0.328 (0.0013)	Age 35-39	0.0131 (0.0066)
Occupation Manual	4.95 (0.54)	Age 30-34	0.203 (0.071)	Age $\geq$ 40	0.005 (0.0074)
High ability	1.44 (0.43)	Age 35-39	0.16 (0.27)	Number of children	-0.0038 (0.0015)
Constant	13.9 (0.21)	Age $\geq$ 40	0.103 (0.0061)	Occupation Abstract	-0.0016 (0.0032)
		Skills	-0.00187 (5.3e-05)	Occupation Manual	-0.0062 (0.0039)
		High desired fertility	0.0279 (0.014)	Constant	0.0237 (0.0065)

Note: Earnings are daily earnings in Euros. Asymptotic standard errors displayed in parenthesis.

Table D2: Parameter estimates: utility function

Parameter	Estimate
Utility out of labor force	-0.295 (0.0038)
Utility of PT work	0.0956 (0.003)
Utility of Unemployment	-5.07 (0.1)
Utility of Occupation if Children, Routine	0 (-)
Utility of Occupation if Children, Abstract	-0.0577 (0.00071)
Utility of Occupation if Children, Manual	-0.0137 (0.00046)
Utility of Unemployement if children	-4.79 (0.73)
Utility of PT work and children, Routine	0.533 (0.0059)
Utility of PT work and children, Abstract	0.117 (0.0032)
Utility of PT work and children, Manual	0.453 (0.0069)
Utility of PT work and age child ≤ 3	0.218 (0.046)
Utility of PT work and age child $\in]3,6]$	0.238 (0.06)
Utility of PT work and age child $\in]6,10]$	2.36 (0.0041)

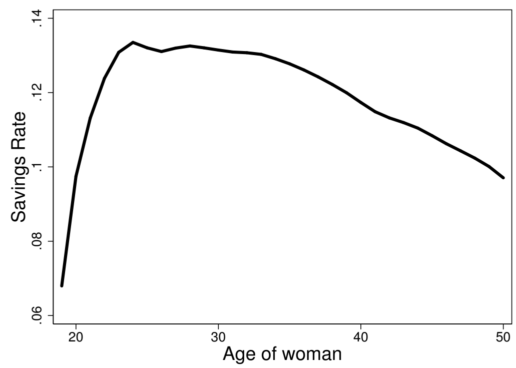
Note: Asymptotic standard errors displayed in parenthesis.

Table D3: Estimated parameters: probability of occupation and hours of work offers

	Routine		Abstract		Manual	
Previous status	PT	FT	PT	FT	PT	FT
Routine job PT	0.95	0.0051	0.0051	0.039	0.00021	0.00021
	(0.00025)	(7.3e-05)	(7.3e-05)	(0.00021)	(3.2e-06)	(3.2e-06)
Routine job FT	0.0051	0.95	0.0051	0.00021	0.039	0.00021
	(4.2e-05)	(0.00022)	(4.2e-05)	(2.1e-06)	(0.00021)	(2.1e-06)
Abstract job PT	0.0051	0.0051	0.95	0.00021	0.00021	0.039
	(9.2e-05)	(9.2e-05)	(0.00028)	(4e-06)	(4e-06)	(0.00021)
Abstract job FT	0.04	0.00021	0.00021	0.95	0.0051	0.0051
	(0.00021)	(3.3e-06)	(3.3e-06)	(0.00026)	(7.3e-05)	(7.3e-05)
Manual job PT	0.00021	0.04	0.00021	0.0051	0.95	0.0051
	(2.1e-06)	(0.00021)	(2.1e-06)	(4.2e-05)	(0.00023)	(4.2e-05)
Manual job FT	0.00021	0.00021	0.04	0.0051	0.0051	0.95
	(4e-06)	(4e-06)	(0.00021)	(9.2e-05)	(9.2e-05)	(0.00028)

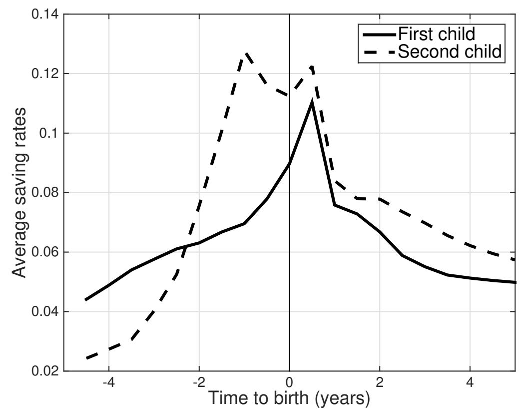
Note: Semi-annual offer rates. PT, FT: part-time and full-time job. Asymptotic standard errors in parenthesis.

Figure 1: Savings rates and age: evidence from EVS dataset



Notes: computed from EVS data, by pooling the waves 1993-2008.

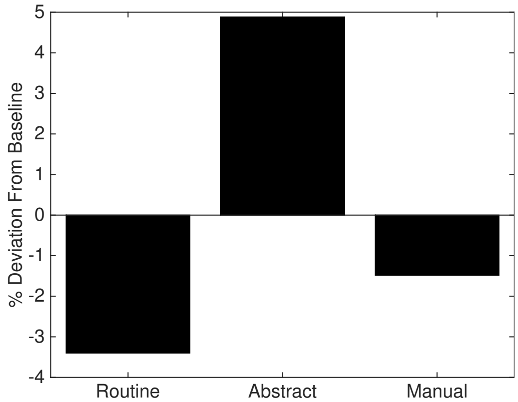
Figure 2: Savings rates around first and second births, model prediction



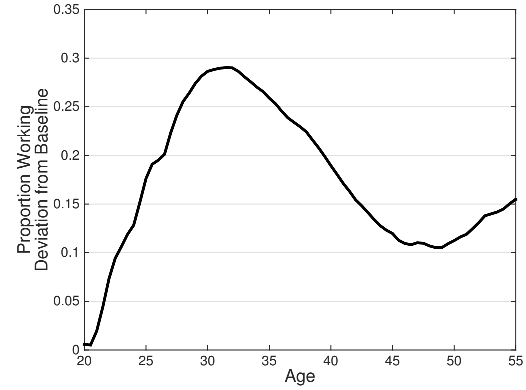
Notes: Computed through simulations of the model, involving 12,000 draws.

Figure 3: Effect of no fertility

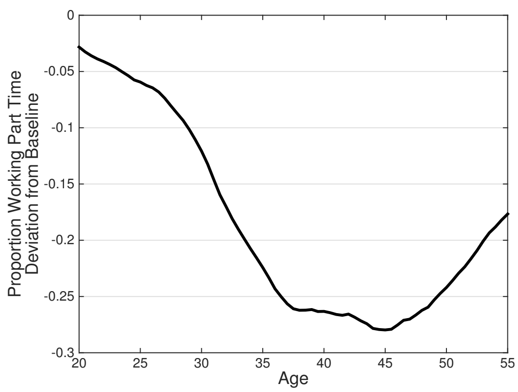
(a) Occupational choice at age 15



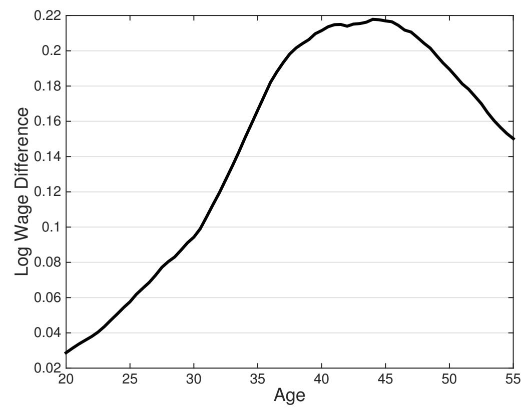
(b) Proportion working



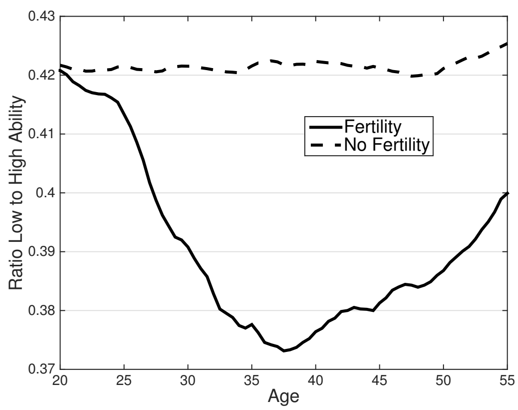
(c) Proportion working part-time



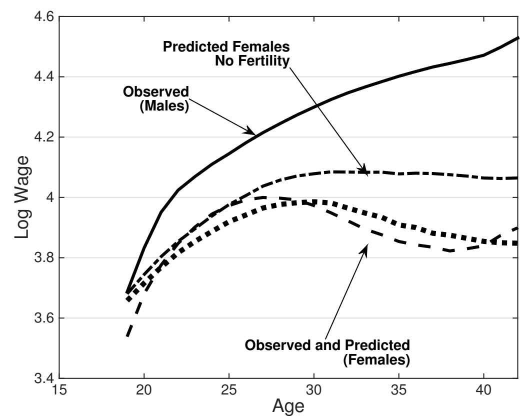
(d) Wages



(e) Ratio of low to high ability, conditional on working



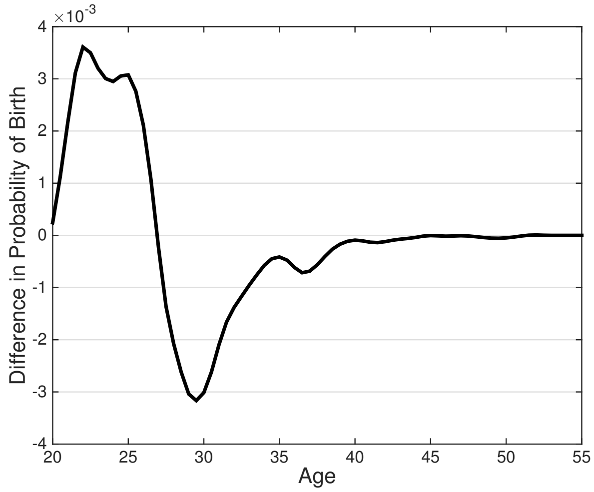
(f) Effect on gender wage gap



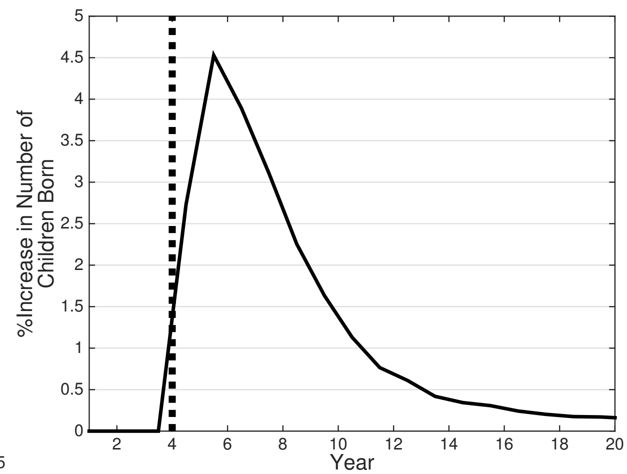
Notes: The different panels display the difference in outcomes between a baseline scenario and a one where a woman knows that she is infertile.

Figure 4: Effect of child premium

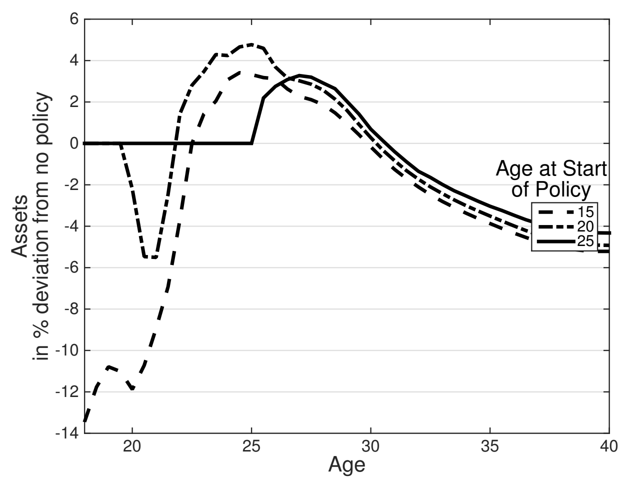
(a) Difference in probability of birth by age, policy vs baseline



(b) Number of children per year, compared to baseline

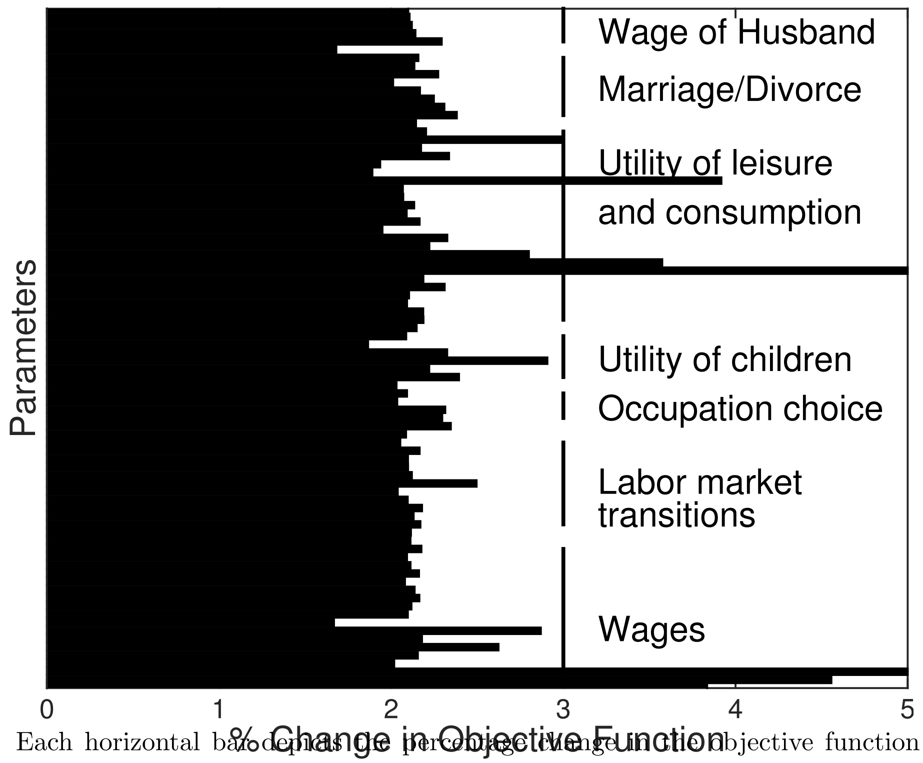


(c) Assets by age and birth cohort, compared to baseline



Notes: Panel (a) shows the effect of the policy (cash transfer of 6,000 euros at birth) by age on the probability of giving birth, comparing the policy to the baseline. In the policy scenario, women learn at age 15 about the policy. Panel (b) depicts the aggregate effect of the policy, by year, in an overlapping generation economy. The graph aggregates each year the behaviour of women of age 15 to 60. Each year a new cohort of 15 year olds enters the economy and the cohort who is 60 exits. The policy starts in Year 4. Panel (c) displays the percentage change in assets as a function of age, compared to a baseline without transfer. The birth cohort who is 15 at the start of the policy can adjust right away their behavior. The cohorts who are 20 or 25 when the policy starts do not anticipate the policy.

Figure B1: Sensitivity of the objective function with respect to model parameters



Notes: Each horizontal bar depicts the percentage change in the objective function with respect to a one percent change in a given parameter of the model. Parameters are color coded and grouped by categories, for instance, the label "Wages" corresponds to parameters determining female wages. The graph is truncated on the right at 3%.