Working Hours and the Child Penalty in an Equilibrium Household Search Model

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Abstract

Recent research identifies parenthood as a key factor in the persistent earnings gaps between men and women, largely driven by a divergence in labor supply at both extensive and intensive margins following childbirth. To quantify the separate roles of labor-supply and labor-demand forces in this phenomenon, we develop and estimate an equilibrium labor market model that includes decision-making in single and couple households, as well as firms' hiring decisions for full-time and part-time positions. Workers decide on job acceptance, job quitting, and parental leave after childbirth, while firms anticipate the joint choices of households and adjust their hiring and wage policies accordingly. We decompose the earnings gaps in gaps in hours and wages before and after childbirth into effects related to worker skill, household preferences, and discrimination. We further use the model to analyze the impacts of parental leave and parental allowance policies.

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1 Introduction

Despite significant convergence over the last decades, women still have substantially lower employment rates and earnings than men in the developed world. Recent literature has identified parenthood as the main driver of the persistence in earnings differentials across genders (Kleven et al., 2019a,b; Adda et al., 2017). The birth of a child impacts the choices of parents in the labor market by permanently increasing both the financial need of the household and the demand for hours spent at home. To meet these needs, parents may decide to specialize in either paid work or childcare activities (Becker, 1985), which may amplify pre-existing earnings differentials: fathers of young children tend to work more hours and earn higher wages, while mothers often leave the labor force or work part-time for a prolonged time. Importantly, firms anticipate the career choices made at the household level and may decide to offer different jobs to men and women, as well as to single or couple workers.[1]

So far, there is limited literature on the role of labor demand and supply forces in shaping labor market outcomes for men and women before and after childbirth. Yet, quantifying these forces is key for identifying effective family-friendly policies aimed at reducing gender differences in labor market outcomes. Many developed countries enacted family-friendly programs to facilitate the transition of workers into parenthood, such as parental leave legislation or parental allowances. However, these programs appear to have limited or negligible beneficial effects on labor market outcomes (Albanesi et al., 2023; Kleven et al., 2020). Furthermore, recent research indicates that firms adjust their hiring and pay policies in response to family policies (Ginja et al., 2023; Fernández-Kranz and Rodríguez-Planas, 2021; Huebener et al., 2022). Therefore, it is essential to untangle the mechanisms behind both worker and employer decisions to design effective policies.

This paper quantifies the driving forces of the child penalty and analyzes the aggregate and distributional effects of family-friendly policies, taking into account hiring decisions of firms and job acceptance, parental leave and quitting decisions of workers in single and couple households. We consider a structural equilibrium model in which firms offer full-time and part-time jobs to to workers of either gender. Workers are either single or married and undergo several life-cycle stages characterized by the presence and the age of children, fertility, and retirement. Workers also differ in their initial human capital, which is accumulated during employment spells, and depreciates in periods of leave and unemployment. Jobs are created by firms which differ in productivity such that the output of a worker-firm match

[1] The idea that firms statistically discriminate in their hiring and pay policies based on perceived differences in working hours across genders also shows up in Albanesi and Olivetti (2009) and Fernández-Kranz and Rodríguez-Planas (2021).

is increasing in firm productivity, working hours, and in the human capital of the worker. Firms further differ in their costs of hiring men or women into full-time or part-time jobs, where the gender difference in these costs reflects taste discrimination on the side of employers. Firms in our model may also statistically discriminate against women when their skill distribution or their job search and quitting behavior (into parental leave, unemployment, or other jobs) differ from those of men. The matching process between workers and firms is frictional. Both unemployed and employed workers match with firms who offer wages to attract and retain their workers. We build on Burdett and Mortensen (1998), Bontemps et al. (2000) and Fang and Shephard (2019).

We estimate the model using the German Socio-Economic Panel (GSOEP) to match, among others, labor market participation, working hours, wages of single and married men and women before and after childbirth. In particular, the estimated model replicates gender gaps in wages and hours, as well as the child penalty in the labor market, so that we can use it to quantify the relevance of three factors for the observed gaps: worker skills before entering the labor market, household preferences and job search effort, and firms' taste discrimination. Equalizing all these structural parameters between men and women eliminates gender differences in our model, so that we can decompose the existing gaps before and after childbirth into these separate forces. Moreover, gender differences in initial skills, preferences and search effort take an impact on labor market outcomes due to direct supply effects and indirect demand effects arising from statistical discrimination: firms' hiring policies adjust to differences in skills, job acceptance and job quitting between men and women at different life-cycle stages, even in the absence of taste discrimination. We also quantify the magnitudes of these two effects.

We then use the model to evaluate two major policies in Germany implemented in the year 2007. Parental leave regulation permits each parent of a newborn child to leave a job for a maximum period of three years per child while maintaining the right to return to the job. Parental allowance is a transfer paid to primary caretakers of young children, where the amount is proportional to labor income prior to child births subject to upper and lower caps. Our goal is to understand how these policies may be effective in reducing the gender pay gap while accounting for joint household decisions and employer responses to these policies.

The contribution of the paper is threefold. First, we contribute to the literature on joint household search initiated by Dey and Flinn (2008), Guler et al. (2012) and Flabbi and Mabli (2018) by characterizing the equilibrium wage distribution. Existing work on labor market dynamics with joint household search leaves the labor demand side (job creation and wage setting) exogenous. One notable exception is Fang and Shephard (2019) who structurally estimate an equilibrium joint search model, yet they do not analyze gender

gaps and abstract from differences in working hours. Second, we explicitly consider lifecycle labor supply choices of couples as in e.g. Borella et al. (2018) and Guner et al. (2012), while Guner et al. (2020) examine family policies in such a framework. Our paper contributes to this literature by considering hiring and wage offer choices of firms in the presence of labor market frictions. Third, we contribute to a recent literature examining the life-cycle gender earnings gap using structural models. Adda et al. (2017) estimate a dynamic decision model of a household deciding about fertility and women labor supply, taking into account that transitions between inactivity, part-time and full- time work are subject to frictions. Morchio and Moser (2023) and Xiao (2023) build equilibrium models in which men and women search for jobs created by firms. These jobs differ in productivity and amenities, while Xiao (2023) also takes childbirth events and parental leave into account. Different from our work, both papers neither consider joint career choices of couples, nor do they allow for the prevalence of part-time work that is key for the child penalty in many countries such as Germany to which our model is calibrated (cf. Kleven et al., 2019a). The same applies to Amano-Patino et al. (2020) who consider an equilibrium model with on-the-job search of both genders which additionally includes human capital accumulation on the job.

2 Empirical Patterns

In this section we present some empirical patterns that describe the diverging career paths across men and women after parenthood, and how they change with the expansion of parental leave policies.

Diverging career paths across genders after childbirth. We compare labor market outcomes of parents of children below 3 years old using the German Socio-Economic Panel (GSOEP). Specifically, we estimate OLS regressions of labor market outcomes on binary indicators with value one if the respondent is the mother (father) of a child younger than three years old, while controlling for gender, age, tenure, number of children and fixed effects for education, state of residence, and survey year. This allows us to distinguish how the labor market outcomes of mothers of young children differ with respect to those of the fathers of young children, or to those of other women and other men (the baseline category). As reported in Table 1, earnings differentials between men and women are larger when considering parents of young children: mothers of young children have systematically lower earnings than other women, while fathers of young children have higher earnings than other men. The earnings differentials are mostly driven by the differentials in real hourly wages, but mothers of young children work on average 4.6 hours less than men, while there

is no difference in working hours between fathers of young children and other men. Mothers of young children have a lower probability to be employed. Parents of young children work less days in a week, but only mothers dedicate more time to childcare and housework, while fathers of young children spend on average less time than other men (including fathers of older children) on these activities. Finally, we find that the job search of women which is already on average lower than that of men is reduced even more when her children are young.

Transition between working hours after childbirth. We have used the GSOEP data to examine transitions in working hours schedules following childbirth. Specifically, we computed the share of workers in full-time jobs who had a child in a given year and analyzed their employment status, working hours, and whether they were employed at the same firm in the subsequent year. The estimates in Table 2 indicate that 81.3% of workers remain in full-time employment with the same employer, while 7.5% transition to full-time positions with a new employer. Additionally, 8% shift to part-time schedules within their old firm, whereas 6% move to part-time positions with a new employer. A smaller fraction, 2.6%, exits employment altogether. These figures highlight that a substantial portion of working hours adjustments occur within the same employer, possibly reflecting the German legal framework supporting the right to part-time work after childbirth. Our model explicitly accounts for these transitions across working hours schedules.

Child penalty and the expansion of parental leave. Kleven et al. (2019a,b) document the existence of child penalties, i.e. a larger impact of children on the labor market outcomes of women relative to men. It is not clear, however, the extent to which family-friendly policies can mitigate the differentiated effects across genders. To provide some suggestive evidence in this direction, we compare labor market outcomes between men and women after childbirth before and after the 2007 parental leave reform. The reform raised the duration of parental leave from 18 to 36 months per parent. It also allowed both parents to take a fraction of parental leave at the same time.

We estimate event studies of the impact of childbirth on labor market outcomes of men and women by using the longitudinal dimension of the GSOEP. We consider individuals who have their first child between the ages of 20 and 45. We estimate separately the child penalty for individuals whose child was born before and after the year of the reform expanding the parental leave policy. We restrict attention to the five years before and ten years after childbirth. We find that before the expansion of the parental leave the long-run earnings gap was around 58%, with no significant change in earnings for men. However, this gap reduces to only 10% after the expansion of the parental leave policy. Interestingly, this is driven by the appearance of an earnings decline for men. Panels C and D display again a large child penalty in hours worked. Before the reform, men were increasing the amount of

hours worked after childbirth, generating a child penalty in hours of 68%, which reduced to only 38% after 2008. There are large penalties also in participation rates and wage rates after childbirth. After the expansion of the parental leave program, the gaps in participation rates and wages declined by over a half.

Importantly, these differences do not permit a causal interpretation as they may be attributed both to selection effects and other long-term factors determining work preferences in couples.[2] Nonetheless, the findings suggest a large scope for family-friendly policies like parental leave in reducing the gender gaps in labor market outcomes, while the mechanisms through which these policies operate are unclear. To shed more light the determinants of the child penalty and on the impact of policy, we introduce and estimate an equilibrium labor market model in the following sections.

3 The Model

We consider a random search job-posting model with heterogeneous workers and firms which is based on Burdett and Mortensen (1998) and Bontemps et al. (2000). There are men and women workers who live in single and couple households that transit through family stages over the lifecycle. Firms offer jobs that differ in working hours and wages. Workers make job acceptance and job quitting decisions, and their skills appreciate (depreciate) while they are employed (non-employed). Under parental leave regulations, parents with young children have the right to leave their job for a limited time after which they are allowed to return to the job. The model is set up in continuous time and we consider a stationary equilibrium.

3.1 The Environment

Workers and Households

We consider men and women workers indexed by $j = m, f$ who are members of either single or couple households without transitions between the two. Single households are indexed by the gender of the household head, while couple households include two working-age members of opposite gender. All households transit through finitely many family states indexed by $k = 1, \ldots, K$ where $k = K$ is retirement, $k = 1$ denotes a childless fertile household, and $k = 2$ denotes a household with young children. Further states include childless prime-age households, prime-age households with older children, or older working-age households. The transition rate from state k to state k' is denoted $\Phi_k^j(k')$ for a single household of gender j

[2] Fitzenberger and Seidlitz (2022) analyze the causal effect of the 2007 reform with a dynamic treatment approach and find a positive medium-term impact on earnings and employment of mothers.

and $\Phi_k(k')$ for a couple household. Retirement is an absorbing state. To keep the working-age population constant, every retiring single or couple household is replaced by a new single or couple household in family state $k = 1$ with non-employed workers.

Household utility in retirement is normalized to zero. During working age, the utility flow of a single household of gender $j = m, f$ is

$$u^j(c, h_j) = \ln c + \psi_k^{j,s} \frac{(\bar{h} - h_j)^{1-\gamma}}{1-\gamma} ,$$

while the utility flow of a couple household is

$$u(c, h_m, h_f) = 2\ln(c/2) + \psi_k^{m,c} \frac{(\bar{h} - h_m)^{1-\gamma}}{1-\gamma} + \psi_k^{f,c} \frac{(\bar{h} - h_f)^{1-\gamma}}{1-\gamma} ,$$

where c is household consumption, h_j are working hours of gender $j = m, f$ and $\psi_k^{j,s/c}$ are leisure parameters which are allowed to vary by gender, family state and household type. Hours endowments $\bar{h}$ and utility curvature parameters γ are assumed not to vary with demographics. Households do not save so that consumption is identical to disposable household income.

Workers differ in skills $s \in \{s^1, \ldots, s^n\} \subset \mathbb{R}_{++}$ where $s^i < s^{i+1}$. Skills may either appreciate or depreciate, depending on a worker's current employment state and working hours. For an employed worker with skill $s^i < s^n$, the skill goes up to $s^+(s^i) \equiv s^{i+1}$ at transition rate π_x^+. For a non-employed worker with skill $s^i > s^1$, the skill goes down to $s^-(s^i) \equiv s^{i-1}$ with probability π_x^-. Here x is the worker's current state vector, which is formally defined below, and which includes current working hours. When reaching the upper (lower) bound of the skill set, skills cannot further appreciate (depreciate). New households entering family state $k = 1$ draw initial skills with probability $\zeta^j(s)$ for singles of gender j and with probability $\zeta(s_m, s_f)$ for couple households.

Firms

There is a fixed unit mass of firms that differ in productivity level y which is distributed with cumulative distribution function $\Gamma(.)$. Firms operate linear production technologies that sum the output of all jobs. If a job in a firm of productivity y is filled with a worker of skill s working h hours, the output is ysh. That is, worker skills and firm productivity are complementary such that ys is the hourly productivity of the match.

There are full-time and part-time jobs with hours requirements $h \in \{h_F, h_P\}$. Firms decide how many full-time and part-time jobs to create and which wage to offer to new hires where we allow firms to offer different wages to both genders. Specifically, for a given job with

hours requirement h, a firm offers hourly wages per efficiency unit to male and female hires, denoted by w^m and w^f. Firms maximize the profit value of its job offers, taking into account workers' labor supply choices as reflected in job acceptance, job quitting, parental leave and hours reductions after parental leave. While gender differences in wage offers may partly reflect firms' rational expectations about these worker choices (statistical discrimination), we also allow for the possibility of taste-based discrimination in wage offers which we model as a proportional discount in the firm's perceived productivity of a female hire.[3]

Write Δ^h for the fraction of jobs created with hours requirement h, and $F^{j,h}(w)$ for the distribution of hourly skill adjusted wage offers to workers of gender j in these jobs. These objects are determined in equilibrium.

Parental Leave, Right to Part-Time, Taxes and Transfers

In line with parental leave legislation in many countries, parents of young children have the right to leave their job for a limited time period during which the employer is required to hold the job. In our model, parental leave ends at transition rate τ which is a policy parameter. Parental leave also ends automatically when the children grow older, i.e. when the household leaves family state $k = 2$. In both cases, the worker decides to either return to the previous job or quit the job. We allow the worker to enter parental leave either upon receiving the young child or, in a couple household with young children, when the partner's parental leave spell ends. The latter reflects parental leave legislation that grants this right to both parents.

We also allow parents to request an hours reduction of their full-time job, i.e. a switch from full-time to part-time working hours, which aligns with part-time worker rights in many European countries. To keep the model tractable, we assume those part-time transitions to be permanent, i.e. the employer is not required to provide a full-time job later on. We also restrict such requests to be made upon childbirth (transition from $k = 1$ to $k = 2$) or at the end of a parental leave spell.[4]

The government maintains a tax-transfer system that determines how disposable household income depends on the labor earnings of the household's workers and on the family

[3]In line with anti-discrimination legislation in modern societies, firms are not allowed to openly discriminate when making wage offers. However, private firms retain discretionary control which worker and which wage to offer. Our model reflects these hiring and pay choices and how they respond to the policy environment. It can also account for within-firm gender pay differences which are still sizable in many countries (e.g. Hennig and Stadler, 2023).

[4]Germany introduced right-to-part-time legislation in the year 2001 which granted the right to work part-time to all workers (with or without children) employed in firms with more than 15 employees. Paule-Paludkiewicz (2024) finds that the legislation only had an effect on part-time work of mothers with young children, which justifies our assumption.

composition. Specifically, disposable income in single and couple households is given by $Y^s(x_j, k)$ and $Y^c(x_m, x_f, k)$, where $x_j \equiv (w_j, h_j, s_j, p_j)$ is the state vector of a worker of gender j. The state vector includes the current wage w_j, contractual working hours h_j (which are both zero when the worker is non-employed), worker skill s_j, and the indicator variable $p_j \in \{0, 1, 2\}$ which indicates parental leave or part-time right status. Specifically, we denote $p_j = 0$ if a worker is neither on parental leave nor did exercise the right to part-time, $p_j = 1$ for workers on parental leave,[5] and $p_j = 2$ for workers who originally were employed in a full-time job (i.e. contractual hours are $h_j = h_F$) but who requested a part-time reduction. Note that the tax-transfer schedule $Y^s(.)$ and $Y^c(.)$ depends on the family state k and on parental leave status, hence incorporates child allowance and parental allowance as further policy parameters that affect the labor market choices of parents.

Matching and Separations

We allow job-offer rates to vary with gender and with the family state in order to reflect how job search may differ between men and women with or without children. Non-employed workers meet firms at flow rate $\lambda^{j,k}$ so that a worker of gender j in family state k is offered a job with hours requirement h at flow rate $\lambda^{j,k,h} \equiv \lambda^{j,k}\Delta^h$ that comes with a wage offer w drawn from $F^{j,h}(.)$. The worker then decides whether to accept or reject the offer. Employed workers encounter outside offers at flow rates $\kappa\lambda^{j,k,h}$, where κ is a scale parameter, with wage offers drawn from the same distribution $F^{j,h}(.)$. The employed worker then decides whether or not to accept the outside offer. To simplify notation, we define the offer-arrival scale parameter $\kappa_{h,p} = 1$ whenever either $h = 0$ (non-employment) or $p = 1$ (parental leave), and $\kappa_{h,p} = \kappa$ for all employed workers.

A worker in a job with hours requirement h separates from the job into non-employment at exogenous layoff rate δ_h. Any worker is allowed to voluntarily quit into non-employment when the family status changes, when parental leave ends, or in a couple household, when the partner accepts a new job or returns from parental leave.

3.2 Household Decisions

We denote by $V(x_m, x_f, k)$ the value function of a couple where the state of a worker of gender j is $x_j = (w_j, h_j, s_j, p_j)$, as explained before, and k is the joint family state. With abuse of notation, we also write $V(x_j, x_{-j}, k)$ for generic gender j so that $-j$ is the opposite

[5] In line with parental leave regulation, $p_j = 1$ is only permitted when the household has young children, i.e. $k = 2$.

gender of the partner. The Bellman equation of the couple household is[6]

$$
\begin{aligned}
D(x_m, x_f, k)V(x_m, x_f, k) = u(Y^c(x_m, x_f, k), h_m, h_f) + \sum_{k'} \Phi_k(k')\bar{V}(x_m, x_f, k') \qquad (1)\\
+ \sum_{j=m,f} \Big\{ \pi^+_{x_j} V(x^+_j, x_{-j}, k) + \pi^-_{x_j} V(x^-_j, x_{-j}, k)\\
+ \sum_{\hat{h}=h_F,h_P} \kappa_{h_j,p_j} \lambda^{j,k,\hat{h}} \int \max\left[V(x_j, x_{-j}, k), V(\hat{x}_j, x_{-j}, k), V(\hat{x}_j, x^n_{-j}, k)\right] dF^{j,\hat{h}}(\hat{w}\\
+ \mathbb{I}_{p_j=1}\tau \bar{V}^e(x_j, x_{-j}, k)\\
+ \delta_{h_j} V(x^n_j, x_{-j}, k) \Big\}
\end{aligned}
$$

where $D(x_m, x_f, k) \equiv \rho + \sum_{k'} \Phi_k(k') + \sum_j \{\pi^+_{x_j} + \pi^-_{x_j} + \sum_{\hat{h}} \kappa_{h_j,p_j} \lambda^{j,\hat{h}} + \mathbb{I}_{p_j=0}\tau + \delta_{h_j}\}$. The first line includes the continuation utility after a change of the family state, denoted $\bar{V}$ and further described below. The second line of equation (1) indicates value changes following skill appreciation or depreciation, where we use shortened notation for the worker's continuation states $x^+ = (w, h, s^+(s), p)$ (skill appreciation) and $x^- = (w, h, s^-(s), p)$ (skill depreciation). In the third line, $\hat{x} = (\hat{w}, \hat{h}, s, 0)$ is the continuation state after accepting a new job $(\hat{w}, \hat{h})$ which also erases any potential parental leave status of the previous job. These transitions, as shown in the third line, also allow for the possibility that the partner quits to non-employment where we use $x^n = (0, 0, s, 0)$ to denote the continuation state of a newly non-employed worker with skill level s inherited from the previous state x. The fourth line shows the transitions after a parental leave spell of worker j ends, which happens when $p_j = 1$ at transition rate τ. In this case, continuation utility is denoted $\bar{V}^e$ and further described below.

Consider continuation utility after a change of the family state denoted $\bar{V}$. If that transition occurs from $k = 1$ into state $k' = 2$ (young children), either one of the two partners may take parental leave which dominates an outright quit or an hours reduction, as parental leave comes together with parental allowance payments and entails the option of returning to the previous job and while still permitting the search for other jobs. A transition to any other family state may induce a quit to non-employment for either of the two workers. Further, a transition from $k = 2$ into $k = 3$ (household with older children) may entail a return from parental leave (current state $x = (w, h, s, 1)$) to the previous job with the same hours, as indicated by the continuation state $x^r = (w, h, s, 0)$, or a return to the same job at lower hours (if the former job was a full time job $h = h_F$) with continuation

[6]The Bellman equation applies to all employment states of the two workers. To simplify notation, we set $\delta_{h=0} = 0$ because non-employed workers cannot separate from a job.

state $x^l = (w, h, s, 2)$, and in both cases the partner may or may not quit the job. As any partner (potentially) has the option to return to the job (same or lower hours) or to quit the job, we generically denote the continuation state $x_j^{(r,l,n)}$, and the couple makes an optimal choice about several combinations of continuation states as indicated by the super-indices (r, l, n). Taken together, the continuation utility is

$$\bar{V}(x_j, x_{-j}, k) = \begin{cases} \max\left[V(x_j, x_{-j}, k), V(x_j^p, x_{-j}, k), V(x_j, x_{-j}^p, k)\right] & \text{if } k = 2 \ , \\ \max\left[V(x_j^{(r,l,n)}, x_{-j}^{(r,l,n)}, k)\right] & \text{if } k = 3 \ , \\ \max\left[V(x_j, x_{-j}, k), V(x_j^n, x_{-j}, k), V(x_j, x_{-j}^n, k)\right] & \text{if } k \neq 2, 3, K \ , \\ 0 & \text{if } k = K \ . \end{cases}$$

Finally, consider continuation utility after the end of parental leave of worker j denoted $\bar{V}^e(x_j, x_{-j}, k)$. Here worker j may either return to the previous job at the same hours with continuation state $x^r = (w, h, s, 0)$ or, if the previous job was a full-time job, return at lower hours with continuation state $x^l = (w, h, s, 2)$, or quit the job to non-employment with continuation state $x^n = (0, 0, s, 0)$. When the worker returns to the previous job (at same or lower hours), the partner may also take parental leave where $x^p = (w, h, s, 1)$ is the state of a worker entering parental leave from state $x = (w, h, s, 0)$. Note that these transitions are all conditional on the household including young children ($k = 2$) which is implied by $p_j = 1$.[7] Consequently we have

$$\bar{V}^e(x_j, x_{-j}, k) = \max\left[V(x_j^r, x_{-j}, k), V(x_j^l, x_{-j}, k), V(x_j^r, x_{-j}^p, k), V(x_j^l, x_{-j}^p, k), V(x_j^n, x_{-j}, k)\right] \ .$$

All decisions about job acceptance, quitting, entering parental leave, or exercising the right to return to the previous job (at the same or reduced hours) involve binary policy functions where we use the notation

$$\Omega\left((x_j^0, x_{-j}^0); (x_j^i, x_{-j}^i)_{i=1}^I; k\right) = \begin{cases} 1 & \text{if } V(x_j^0, x_{-j}^0, k) > V(x_j^i, x_{-j}^i, k) \text{ for all } i = 1, \ldots, I \ , \\ 0 & \text{else} \ , \end{cases}$$

to indicate that (x_j^0, x_{-j}^0) is preferred over any of the alternatives (x_j^i, x_{-j}^i), $i > 0$. In the numerical solution of the model, we smooth out these discrete choices by adding small taste shocks which simply add noise to the household decisions. All our results are not sensitive to the inclusion of these taste shocks. In this modification, the above function Ω indicates *the proportion of households* that prefer (x_j^0, x_{-j}^0) over the stated alternatives. The Appendix

[7] Alternating, repeated spells of parental leave of the same worker are permitted in this model framework. They are also in line with German law as long as children are young and the total duration of parental leave does not exceed three years.

contains further details about this extension and it also presents the Bellman equation for single households with value and policy functions V^j, Ω^j.

3.3 Stationary Household Distribution

In a stationary equilibrium, let $g^j(x_j, k)$, $j = m, f$, and $g(x_m, x_f, k)$ denote the measures of single and couple households in the respective states (x_j, k), (x_m, x_f, k). Again with abuse of notation, we also write $g(x_j, x_{-j}, k)$ for couple households with generic gender j. We solve for the stationary measures by equating the inflows and outflows to/from a given household state.

Consider a couple household in state (x_m, x_f, k). The outflow from this state is equal to

$$\mathcal{O}(x_m, x_f, k) \equiv g(x_m, x_f, k)\Bigg[\underbrace{\sum_{k'} \Phi_k(k')}_{\text{family state change}} + \sum_{j=m,f} \Big\{ \underbrace{\pi^+_{x_j} + \pi^-_{x_j}}_{j\text{'s skill adjustment}}$$

$$+ \underbrace{\sum_{\hat{h}} \kappa_{h_j,p_j} \lambda^{j,k,\hat{h}} \int \left[1 - \Omega((x_j, x_{-j}); (\hat{x}_j, x_{-j}), (\hat{x}_j, x^n_{-j}); k)\right] dF^{j,\hat{h}}(\hat{w})}_{j \text{ accepts new job}} + \underbrace{\mathbb{I}_{p_j=1}\tau}_{j \text{ exits parental leave}} + \underbrace{\delta_{h_j}}_{j \text{ is laid off}} \Big\}\Bigg].$$

Note that outflows due to voluntary quits to non-employment or entry into parental leave are already included in this expression, either as a consequence of a change of family state, or job acceptance of the partner, or the partner's return from parental leave.

Regarding the inflow into state (x_m, x_f, k), consider a household without young children ($k \neq 2$) where both members are non-employed ($h_m = h_f = 0$). The inflow into this state can involve skill depreciation, change of the family state with or without job quitting, layoffs, or the entry of new households into the first family state $k = 1$:

$$\mathcal{I}(x_m, x_f, k) \equiv \underbrace{\sum_{j=m,f} \pi^-_{x^+_j} g(x^+_j, x_{-j}, k)}_{\text{skill depreciation}} + \sum_{k_0} \Phi_{k_0}(k) \Bigg\{ \underbrace{g(x_m, x_f, k_0)}_{\substack{\text{family state change} \\ \text{without job quitting}}}$$

$$+ \underbrace{\sum_{\hat{h}} \int g(\hat{x}_m, x_f, k_0)\Omega((x_m, x_f); (\hat{x}_m, x_f); k) + g(x_m, \hat{x}_f, k_0)\Omega((x_m, x_f); (x_m, \hat{x}_f); k) d\hat{w}}_{\text{family state change where one partner quits job } (\hat{w}, \hat{h})} \Bigg\}$$

$$+ \underbrace{\sum_{\hat{h}} \delta_{\hat{h}} \int g(\hat{x}_m, x_f, k) + g(x_m, \hat{x}_f, k) d\hat{w}}_{\text{one partner is laid off from job } (\hat{w}, \hat{h})} + \underbrace{\mathbb{I}_{k=1} N \zeta(s_m, s_f)}_{\text{entry of new couple households}}.$$

In the last line, N denotes the total inflow of couple households per unit time of which fraction $\zeta(s_m, s_f)$ enter with skills (s_m, s_f). The inflow expressions for the other couple households, as well as the inflow and outflow identities for single households are all presented in the Appendix. In a stationary equilibrium, inflows are equal to outflows, $\mathcal{I}(x_m, x_f, k) = \mathcal{O}(x_m, x_f, k)$ for all household states (x_m, x_f, k).

3.4 Firm Decisions

Firms choose how many jobs with hours requirements $h = h_F, h_P$ to create and the skill-adjusted wages they offer to workers of gender $j = m, f$ when encountering those workers. Firms anticipate that better paid jobs attract and retain more workers, as in Burdett and Mortensen (1998). In addition, they anticipate how wage policies change parental leave take-up and the option to switch from a full-time to a part-time job for parents of young children when parental leave ends.

While firms' wage-offer policies take into account the distinct labor supply behavior of the two genders (statistical discrimination), we also allow for the possibility that firms directly discriminate against female job applicants which we model as a discount to the perceived productivity of a female worker. Specifically, a firm with productivity y perceives that the flow output of a male worker is identical to y while a female worker is perceived to have lower productivity $y\eta$ where $\eta \leq 1$ is a taste-discrimination parameter.

If a firm with productivity y and a job with hours requirement h offers wage w_m to male workers and w_f female workers, the perceived profit value of these job offers can be written

$$(y - w_m)\ell(m, h, w_m) + (y\eta - w_f)\ell(f, h, w_f) \ , \tag{2}$$

where $\ell(j, h, w_j)$, $j = m, f$, are the total efficiency units of labor of both genders that the firm expects to employ. To take parental leave (state $p = 1$) and the option of part-time requests (state $p = 2$) into account, the actual working hours of a worker are

$$H_p(h) \equiv \begin{cases} h & \text{if } p = 0 \ , \\ 0 & \text{if } p = 1 \ , \\ h_P & \text{if } p = 2 \text{ and } h = h_F \ . \end{cases}$$

The "labor supply" of gender j to the job offer (h, w_j) can be calculated by dividing total

efficiency units of labor in those jobs in relation to the total number of offers (h, w_j):

$$\ell(j,h,w_j) = \frac{\sum\limits_{k,s,p} sH_p(h) \left[g^j(w_j,h,s,p,k) + \sum\limits_{h_{-j},s_{-j},p_{-j}} \int g((w_j,h,s,p),(w_{-j},h_{-j},s_{-j},p_{-j}),k) dw_{-j} \right]}{\Delta^h f^{h,j}(w_j)} , \tag{3}$$

with wage-offer density $f^{h,j}(w_j) \equiv dF^{j,h}(w_j)/dw$.

We break down the firm's decision into two steps. First, the firm chooses how many jobs with hours requirement h to create, and second, the firm chooses the skill-adjusted hourly wages w_j that it offers to both genders in these jobs.

Beginning with the second step, let $w_{j,h}(y)$ denote the optimal wage offer of firm y to worker j which maximizes the profit value in equation (2), so that the expected perceived profit of a job with hours requirement h and optimal wage offers is

$$\pi_h(y) \equiv (y - w_{m,h}(y))\ell(m,h,w_{m,h}(y)) + (y\eta - w_{f,h}(y))\ell(f,h,w_{f,h}(y)) . \tag{4}$$

Given these profit values, firm y decides which jobs h to offer. The job creation costs for job with h required hours have two components: a common component $\bar{\varepsilon}_h$ and an idiosyncratic component ε_h which follows a type-I extreme value distribution with parameter σ. A firm with productivity y chooses required hours to maximize

$$\max_h \{\pi_h(y) - \bar{\varepsilon}_h - \varepsilon_h\} ,$$

so that the proportion of productivity-y firms choosing $h = h_F, h_P$ is equal to

$$\Delta^h(y) = \frac{\exp[\sigma(\pi_h(y) - \bar{\varepsilon}_h)]}{\exp[\sigma(\pi_{h_F}(y) - \bar{\varepsilon}_{h_F})] + \exp[\sigma(\pi_{h_P}(y) - \bar{\varepsilon}_{h_P})]} . \tag{5}$$

The total fraction of job offers with $h = h_F, h_P$ is then calculated as

$$\Delta^h = \int \Delta^h(y) \, d\Gamma(y) ,$$

such that $\Delta^{h_F} + \Delta^{h_P} = 1$. We verify in numeric solutions of our model that wage offers $w_{j,h}(y)$ are monotonically increasing in firm productivity y. Therefore, the fraction of wage offers in jobs (j,h) below or equal to $w_{j,h}(y)$ is equal to the fraction of job offers (j,h) in firms with productivity y or less,

$$F^{j,h}(w_{j,h}(y)) = \frac{1}{\Delta^h} \int^y \Delta^h(y') \, d\Gamma(y') ,$$

which determines the equilibrium wage-offer distributions in jobs (j, h).

3.5 Stationary Equilibrium Definition

A stationary equilibrium is defined by value and policy functions for single and couple households, V^j, V, Ω^j, Ω, stationary distributions of single and couple households over labor market and family states, g^j and g, job creation strategies $\Delta^h(y)$ and wage offers $w_{j,h}(y)$ for all firms such that:

1. Households make optimal job acceptance, job quitting, parental leave and part-time request decisions.
2. Firms make optimal job offer decisions.
3. The household distributions are stationary.

4 Estimation

4.1 Data

We estimate our model using moments obtained from the German Socio-Economic Panel (GSOEP), a longitudinal survey that follows a representative sample of households in Germany throughout their life cycles. This dataset is particularly suitable for our study as it includes information on household composition and the labor market outcomes of adult household members. We use GSOEP data from 2007 to 2019, covering the period following the reform to parental leave and parental allowance policies. Appendix B provides further details on the data analysis.

4.2 External Calibration

We set the annual discount rate ρ to 5%. Since demographic transition is purely exogenous, we estimate the transition rates $(\Phi_k(k'),\ \Phi_k^j(k'))$ directly from the data. For each type of household (married, single man and single woman), we compute the average transition probability between each pair of demographic states.[8] Fertile households are those below age 45 and young children are those below age 8. To ensure that the household distribution is stationary, the entry flow for each household type (N for couples and N^j for singles of

[8]Our definition of "single" includes individuals who are not married because unmarried people are treated like singles for tax purposes even if they live in cohabitation.

gender j) must be equal to the flow into the state of retirement ($k = K$) of that household type.

We assume that the set of required working hours H_+ includes two levels $\{h_{PT}, h_{FT}\}$, corresponding to part-time and full-time employment. The hours are calibrated to the average working hours of each type of employment in GSOEP. Hours endowments $\bar{h}_k^{j,s/c}$ are time available for market work and leisure; workers who spend more time on childcare and household work will have a lower time endowment. We will use the time use data from GSOEP to calibrate these time endowment parameters.

The parental leave exit rate τ is a policy parameter calibrated to the inverse of the maximum parental leave duration (36 months since 2007). We parametrize the tax-transfer functions Y^c and Y^s with a log-linear specification (Heathcote et al., 2017) plus parental allowance. For singles, we assume that

$$Y^s(x_j, k) = \mathbb{I}_{\{p_j=0\}} \tau_0^s Y_g(x_j)^{1-\tau_1^s} + \mathbb{I}_{\{p_j=1\}} Y_p^s(x_j, k) \ , \tag{6}$$

where $Y_g(x_j) = w_j h_j s_j$ is the gross income excluding parental allowance, and $Y_p^s(x_j, k)$ is the parental allowance for a single parent with demographic type k. For couples, we assume that

$$Y^c(x_m, x_f, k) = \tau_0^c \left[\sum_{j=m,f} \mathbb{I}_{\{p_j=0\}} Y_g(x_j) \right]^{1-\tau_1^c} + \sum_{j=m,f} \mathbb{I}_{\{p_j=1\}} Y_p^c(x_j, k) \ , \tag{7}$$

reflecting joint income taxation at the household level. The parameters of the tax-transfer functions $\tau_0^s, \tau_1^s, \tau_0^c, \tau_1^c$ can be directly estimated from GSOEP by regressing log net income on log gross income, while excluding parental allowance (see Appendix B for further details).

Table 3 summarizes the externally set parameter values.

4.3 Two-Step Estimation

The remaining parameters are estimated in a two-step estimation procedure following Bontemps et al. (2000) and Fang and Shephard (2019).

4.3.1 Step 1: Estimation of Supply-Side Parameters

On the labor-supply side, we estimate parameters governing labor supply, including utility function parameters ($\psi_k^{j,s/c}$, $\bar{h}_k^{j,s/c}$, γ^j), initial skill distribution (ζ^j, ζ), skill appreciation/depreciation probabilities (π_x^+, and π_x^-), and matching and separation rates (λ^j, κ, δ_h).

We also parametrize the offer distribution and estimate its parameters. That is, for each

$j \in \{m, f\}$ and $h \in H^+$, the conditional wage distribution $F^{j,h}(w)$ follows a beta distribution with parameters $\left\{\alpha^{j,h}, \beta^{j,h}\right\}$. We estimate these parameters and $\{\Delta^{j,h}\}_{j\in\{m,f\},h\in H^+}$.

We estimate these parameters using the simulated method of moments. Below is a summary of the identification strategy of supply-side parameters:

- $\psi_k^{j,s/c}$ are identified from the difference in the employment rate by gender, demographic type, and household type.
- γ is identified from the distribution of working hours by gender, demographic type, and household type.
- We fix the skill grid to be between 0 and 1. The initial distribution over the skill grid (ζ^j, ζ) is identified from the employment rate and the observed wage and hour distribution in the first year of households' working life.
- π_x^+ and π_x^- can be identified from the observed wage growth by wage level and hours and the wage decline after non-employment spells.
- λ^j, κ, δ_h can be identified from observed labor force transition rates from non-employment to employment, from job to job, and from each type of employment to non-employment.
- Finally, the wage-offer distribution parameters $\left\{\alpha^{j,h}, \beta^{j,h}\right\}$ and $\Delta^{j,h}(p)$ can be identified from the observed wage distribution conditional on hours and gender.

After the supply side parameters are estimated, we can compute the labor supply function $\ell(j, h, w)$ using equation (3).

4.3.2 Step 2 - Estimation of Demand-Side Parameters

On the demand side, we need to estimate the taste discrimination parameter η, the common job setup costs $\bar{\varepsilon}_h$ and the Gumbel parameter σ. To estimate these parameters, we follow Fang and Shephard (2019) and construct a theoretical hours choice function $\Delta^h(p)$ and an observed one $\widehat{\Delta}^h(p)$. We look for parameters that minimize the distance between the two. The theoretical function is derived from firms' optimal job-posting decisions given estimated labor supply from step 1, while the observed choice is the one that is consistent with the estimated offer distribution from step 1. In other words, we look for demand-side parameters such that, when firms make optimal job-posting decisions, the resulting offer distribution is the one uncovered in step 1.

We construct the two versions of the hours choice function as follows. Given $\ell(j, h, w)$, we can compute the inverse wage function for each j and h using the first-order condition of

firms' wage-posting problem,

$$y \equiv w_{j,h}^{-1}(w) = \frac{1}{\eta_j} \frac{\ell(j,h,w) + w\frac{\partial \ell(j,h,w)}{\partial w}}{\frac{\partial \ell(j,h,w)}{\partial w}} \ . \tag{8}$$

where $\eta_m = 1$ and $\eta_f = \eta$. We verify in numerical solutions that the inverse wage function is monotonically increasing. Given the wage function, we can compute the expected profit associated with posting jobs given h using equation (4). Then, we can compute the "theoretical" choice function $\Delta^h(y)$ using equation (5). We refer to this as the theoretical choice because the choice is optimal given the labor supply function $\ell(j,h,w)$ and demand-side parameters.

Next, we construct the "observed" choice function $\widehat{\Delta}^h(y)$. To do so, we note that the offer distribution that derives from $\widehat{\Delta}^h(y)$ is

$$F^{j,h}(w_{j,h}(y)) = \frac{\int_{\underline{y}}^{y} \widehat{\Delta}^h(x)\, d\Gamma(x)}{\Delta^h} \ . \tag{9}$$

Differentiating equation (9) with respect to y and rearranging, we have

$$\widehat{\Delta}^h(y) = \frac{\Delta^h f^{j,h}(w_{j,h}(y))\, w'_{j,h}(y)}{\gamma(y)} \ . \tag{10}$$

To obtain $\gamma(y)$, the probability density of the firm productivity distribution, we sum both sides of equation (10) over h and use the fact that $\sum_{h\in\{PT,FT\}} \widehat{\Delta}^h(y) = 1$. This gives

$$\gamma(y) = \sum_{h\in\{PT,FT\}} \Delta^h f^{j,h}(w_{j,h}(y))\, w'_{j,h}(y) \ . \tag{11}$$

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Tables

Table 1: Labor market differences for men and women with or without young children

Dependent variable	(1) Earnings	(2) Log real hourly wage	(3) Hours	(4) Employment	(5) Days worked per week	(6) Child care hours per week	(7) Housework hours	(8) Job search
Mother of a child ≤3 y.o.	-274.3***	-0.0759***	-4.594***	-0.029***	-0.187***	3.071***	0.372***	-0.127***
	(52.15)	(0.0277)	(0.554)	(0.007)	(0.024)	(0.167)	(0.0669)	(0.036)
Father of a child ≤3 y.o.	129.6**	0.0654***	0.507	-0.005	-0.037**	-0.824***	-0.215***	0.005
	(51.81)	(0.0243)	(0.482)	(0.006)	(0.015)	(0.129)	(0.0578)	(0.036)
Woman	-731.2***	-0.154***	-10.09***	0.002	-0.453***	0.978***	1.412***	-0.140***
	(28.52)	(0.0164)	(0.364)	(0.003)	(0.011)	(0.0837)	(0.0393)	(0.016)
Age	-7.369***	0.00149*	-0.241***	0.001***	-0.008***	-0.115***	0.0152***	-0.003***
	(1.134)	(0.000859)	(0.0185)	(0.000)	(0.001)	(0.00456)	(0.00221)	(0.001)
Household Size	-9.025	0.0170***	-1.373***	0.025***	-0.052***	0.456***	0.251***	-0.065***
	(8.096)	(0.00611)	(0.129)	(0.001)	(0.005)	(0.0381)	(0.0162)	(0.005)
Observations	15,983	15,306	13,006	12,3947	68,792	14,981	15,561	20,443
R-squared	0.316	0.166	0.262	0.064	.078	0.327	0.334	0.135

Note: Linear probability models with robust standard errors in parentheses. Controls include age, tenure, current household size, number of children and fixed effects for schooling level categories, state, survey year. *,**,*** denote statistical significance at the 10, 5 and 1 percent level.

Table 2: Transition across Working Hours

	Transition rate
Full time old firm to full time old firm	0.813
Full time old firm to full time new firm	0.075
Full time old firm to part time old firm	0.080
Full time old firm to part time new firm	0.060
Full time old firm to non-employment	0.026

Note: Share of workers in full time jobs having a child at t, by employment, working hours, and employer the next year $t+1$. Own computation using GSOEP data using respondents observed in the year before and after childbirth. The estimates are robust when using a three years lag but the sample is reduced.

Table 3: External parameters

Parameter	Description	Value	Target
Preference parameters:			
γ	Labor supply elasticity	2	
$\bar{h}$	Time constraint (hours/week)	80	
ρ	Discount rate	0	
Labor market transitions:			
$\lambda_{m,k,h}$	NE search intensity, Men	$0.25^{\dagger}$	Search intensity(PASS)
$\lambda_{f,k,h}$	NE search intensity, Women	$0.20^{\dagger}$	
Skills:			
s_H	High skill	1	
s_L	Low skill	0.64	Glitz and Wissmann (2021)
Offer distribution:			
w_F^m	Wage offer distribution FT, Men	$2.88^{\dagger}$	Distribution of log hourly wages (GSOEP)
w_P^m	Wage offer distribution PT, Men	$2.36^{\dagger}$	
w_F^f	Wage offer distribution FT, Women	$2.70^{\dagger}$	
w_F^f	Wage offer distribution PT, Women	$2.48^{\dagger}$	
Demographic Transitions:			
$\phi_{4,1}$	Retirement rate when in $k = 4$	0.03	1/(65-34)
$\phi_{1,2}$	Transition rate from $k = 1$ to $k = 2$	0.10	1/(30-20)
$\phi_{2,3}$	Transition rate from $k = 2$ to $k = 3$	0.10	1/(41-31)
$\phi_{3,4}$	Transition rate from $k = 3$ to $k = 4$	0.10	1/(51-41)
$\phi_{1,4}$	Transition rate from $k = 1$ to $k = 4$	0.10	$\phi_{1,2}\times$childless rate/(1- childless rate) (GSOEP)
Weekly hours:			
h_F	Weekly hours in FT	43.259	Mean weekly hours full time (GSOEP)
h_P	Weekly hours in PT	20.397	Mean weekly hours part time (GSOEP)
Policy parameters:			
b_m	NE benefit, Men	919.02	Median monthly unemployment benefit, Men (GSOEP)
b_f	NE benefit, Women	699.06	Median monthly unemployment benefit, Women (GSOEP)
$\tau_{0,k}$	Tax function, Level	80.60	Tax regressions (GSOEP), Table A.1
$\tau_{1,k}$	Tax function, Curvature	0.41	
	Parental leave expiration rate	0.5	1/max legal duration of parental leave per parent
	Parental leave benefits	0.67	Replacement rate (GSOEP)
	Minimum parental leave	18	Statutory policy duration
	Maximum parental leave	36	

This table reports the parameters externally computed using GSOEP, 2007-2019, and PASS Survey data. † indicates that we are reporting the mean of the distribution. NE, PT, and FT refer to non-employment part-time and full-time respectively. Monetary values are expressed in 2015 euro.

Table 4: Calibrated Moments

Parameter	Description	Target	Data
$\psi_{m,k}$	Preference for leisure, Men	NE rate by demographic status, Men	$0.150^{\dagger}$
$\psi_{f,k}$	Preference for leisure, Women	NE rate by demographic status, Women	$0.259^{\dagger}$
δ_{FT}	Exogenous separation rate FT	Monthly transition rate from FT to NE	0.005
δ_{PT}	Exogenous separation rate PT	Monthly transition rate from PT to NE	0.009
κ	Search intensity of the employed rel. to the NE	Job-to-job transitions/NE-to-employment	0.311
ζ_m	Initial skill distribution:Low-skilled share, Men	Wage distribution of young men, FT	$2.409^{\dagger}$
ζ_f	Initial skill distribution:Low-skilled share, Women	Wage distribution of young women, FT	$2.442^{\dagger}$
$\pi_{FT,+}$	Skill growth rate in full time	Annual wage growth, FT	0.021
$\pi_{PT,+}$	Skill growth rate in part time	Annual wage growth, PT	0.014
π_{-}	Skill depreciation rate in NE	Re-employment wage loss per month of NE	0.008
$F(w)_{m,FT}$	Wage offer distribution, Men, FT	Hourly wage distribution, Men, FT	$2.884^{\dagger}$
$F(w)_{m,PT}$	Wage offer distribution, Men, PT	Hourly wage distribution, Men, FT	$2.356^{\dagger}$
$F(w)_{f,FT}$	Wage offer distribution, Women, FT	Hourly wage distribution, Women, FT	$2.697^{\dagger}$
$F(w)_{f,PT}$	Wage offer Beta distribution	Hourly wage distribution, Women, PT	$2.476^{\dagger}$
$\Delta_{m,k,FT}$	Offer distribution, Men, FT	Share of FT employment, Men	$0.784^{\dagger}$
$\Delta_{m,k,PT}$	Offer distribution, Men, PT	Share of PT employment, Men	$0.065^{\dagger}$
$\Delta_{f,k,FT}$	Offer distribution, Women, FT	Share of FT employment, Women	$0.380^{\dagger}$
$\Delta_{f,k,PT}$	Offer distribution, Women, PT	Share of PT employment, Women	$0.361^{\dagger}$

This table reports the estimated moments and their data counterpart. † indicates that we are reporting the mean of the distribution. Data moments are computed from GSOEP, 2007-2019, except for the re-employment wage loss per month of non-employment which is taken from Schmieder et al. (2016). Distributions are calibrated by matching the 25th, 50th, and 75th percentiles. NE, PT, and FT refer to non-employment part-time and full-time respectively.

Appendix

A Model: Further Details

A.1 Household Decisions

A.1.1 Single Households

We denote by $V^j(x,k)$ the value function of a single household with gender j where $x = (w,h,s,p)$ is the worker state vector and k is the family state. The Bellman equation of the household is

$$D^j(x,k)V^j(x,k) = u(Y^s(x,k),h) + \sum_{k'} \Phi_k(k')\bar{V}^j(x,k') + \pi_x^+ V^j(x^+,k) + \pi_x^- V^j(x^-,k)$$

$$+ \sum_{\hat{h}\in H_+} \kappa_{h,p}\lambda^{j,\hat{h}} \int \max\left[V^j(x,k), V^j(\hat{x},k)\right] dF^{j,\hat{h}}(\hat{w}) \tag{A.1}$$

$$+ \mathbb{I}_{p=1}\tau \max\left[V^j(x^r,k), V^j(x^n,k)\right] + \delta_h V^j(x^n,k)$$

where $D^j(x,k) \equiv \rho + \sum_{k'} \Phi_k(k') + \pi_x^+ + \pi_x^- + \sum_{\hat{h}} \kappa_{h,p}\lambda^{j,\hat{h}} + \mathbb{I}_{p=0}\tau + \delta_h$. We use the same shortened notation for the continuation states of the worker as defined in the main text: $x^+ = (w,h,s^+(s),p)$ and $x^- = (w,h,s^-(s),p)$ denote skill adjustment, $\hat{x} = (\hat{w},\hat{h},s,0)$ is the continuation state after accepting a new job $(\hat{w},\hat{h})$, $x^n = (0,0,s,0)$ is non-employment, and $x^r = (w,h,s,0)$ is return from parental leave.

The first line of Bellman equation (A.1) includes the continuation utility after a change of the family state. As explained for couple households in the main text, the worker may quit the job (when $k \neq 2$), enter parental leave which dominates quitting when $k = 2$, may return from parental leave or quit the job when children grow older ($k = 3$), or enter retirement when $k = K$. Therefore,

$$\bar{V}^j(x,k) = \begin{cases} \max\left[V^j(x,k), V^j(x^p,k)\right] & \text{if } k = 2\ , \\ \max\left[V^j(x^{(r)},k), V^j(x^n,k)\right] & \text{if } k = 3\ , \\ \max\left[V^j(x,k), V^j(x^n,k)\right] & \text{if } k \neq 2,3,K\ , \\ 0 & \text{if } k = K\ . \end{cases}$$

Decisions about job acceptance, quitting, or entering parental leave involve binary policy

functions where we use the notation

$$\Omega^j\left(x^0;(x^i)_{i=1}^I;k\right)=\begin{cases}1 & \text{if } V^j(x^0,k)>V^j(x^i,k) \text{ for all } i=1,\ldots,I\ ,\\ 0 & \text{else}\ ,\end{cases}$$

to indicate that x^0 is preferred over any of the alternatives (x^i), $i>0$.

A.1.2 Taste Shocks

In our Bellman equations, we use household discrete choices over alternatives $\boldsymbol{z}=(z^i)_{i=0}^I$ where $z^i=(x^i_j,x^i_{-j})$ for couple households and $z^i=x^i$ for single households, with continuation utilities

$$\tilde{V}(\boldsymbol{z},k)=\max\left(V(z^0,k),V(z^1,k),\ldots,V(z^I,k)\right)\ .$$

We also define the binary policy function indicating the choice of z^0 over the alternatives $(z^i)_{i=1}^I$:

$$\Omega\left(z^0;(z^i)_{i=1}^I;k\right)=\begin{cases}1 & \text{if } V(z^0,k)>V(z^i,k) \text{ for all } i=1,\ldots,I\ ,\\ 0 & \text{else}\ .\end{cases}$$

In the numerical implementation of the model, we smooth out these discrete choices by adding idiosyncratic taste shocks α^i to continuation utilities where α^i is type-I extreme-value distributed with parameter σ_α. Given a realization of taste shocks $\boldsymbol{\alpha}=(\alpha^i)_{i=0}^I$, the household's continuation utility is

$$\tilde{V}_{\boldsymbol{\alpha}}(\boldsymbol{z},k)=\max\left(V(z^0,k)+\alpha^0,V(z^1,k)+\alpha^1,\ldots,V(z^I,k)+\alpha^I\right)\ ,$$

so that the ex-ante continuation utility is

$$\tilde{V}(\boldsymbol{z},k)=\mathbb{E}_{\boldsymbol{\alpha}}\tilde{V}_{\boldsymbol{\alpha}}(\boldsymbol{z},k)=\frac{1}{\sigma_\alpha}\ln\left\{\sum_{i=0}^I\exp\left[\sigma_\alpha V(z^i,k)\right]\right\}\ .$$

The proportion of households choosing z^0 becomes

$$\Omega\left(z^0;(z^i)_{i=1}^I;k\right)=\frac{\exp\left[\sigma_\alpha V(z^0,k)\right]}{\sum_{i=0}^I\exp\left[\sigma_\alpha V(z^i,k)\right]}\ .$$

We choose a large value of parameter σ_α such that the modified model approximates the original model without taste shocks well and such that alternative (large) values of parameter σ_α do not alter our model estimation and results.

A.2 Stationary Distributions

Here we present the remaining expressions for inflows and outflows to/from household states which are used to calculate stationary distributions.

A.2.1 Couple Households

The outflow from an arbitrary state $(x_j, x_{-j}, k$ has been shown in the main text. Likewise, the main text presents the inflow into household states where both workers are non-employed ($h_j = h_{-j} = 0$) and where no young children are present ($k \neq 2$). Here we show the inflows into all other household states (x_j, x_{-j}, k). All inflows contain the same terms indicating skill adjustment which are omitted from the following expressions. These inflows due to skill adjustment are equal to

$$\sum_{j=m,f} \pi^{+}_{x_j^-} g(x_j^-, x_{-j}, k) + \pi^{-}_{x_j^+} g(x_j^+, x_{-j}, k) \ ,$$

where the appreciation (depreciation) probabilities are set to zero for non-employed (employed) workers. The remaining inflow terms differ between household types as follows.

1. $h_j = h_{-j} = 0$ and $k = 2$

Consider a couple with non-employed workers and young children. The inflow into this state is equal to

$$\underbrace{\Phi_1(2) g(x_j, x_{-j}, 1)}_{\text{family state change}} + \underbrace{\sum_{\hat{h},\hat{p}} \delta_{\hat{h}} \int g(\hat{x}_j, x_{-j}, 2) + g(x_{-j}, \hat{x}_j, 2) d\hat{w}}_{\text{one partner is laid off from job } (\hat{w},\hat{h},\hat{p})}$$

$$+ \underbrace{\sum_{\hat{h}} \tau \int g(\hat{x}_j^p, x_{-j}, 2)\Omega((x_j, x_{-j}); (\hat{x}_j^r, x_{-j}); 2) + g(x_j, \hat{x}_{-j}^p, 2)\Omega((x_j, x_{-j}); (x_j, \hat{x}_{-j}^r); 2) d\hat{w}}_{\text{quit after end of parental leave from job } (\hat{w},\hat{h})} .$$

2. $h_j > 0$, $h_{-j} = 0$ and $k \neq 2$

Consider a couple where worker j is employed, worker $-j$ is non-employed and there are no

young children. The inflow into this state is equal to

$$\sum_{k_0} \Phi_{k_0}(k) \Bigg\{ \underbrace{g(x_j, x_{-j}, k_0)\Omega((x_j, x_{-j}); (x_j^n, x_{-j}); k)}_{\substack{\text{family state change} \\ \text{without job quitting}}}$$

$$+ \underbrace{\sum_{\hat{h}} \int g(x_j, \hat{x}_{-j}, k_0)\Omega((x_j, x_{-j}); (x_j, \hat{x}_{-j}), (x_j^n, \hat{x}_{-j}); k) d\hat{w}}_{\text{family state change where } -j \text{ quits job } (\hat{w}, \hat{h}) \text{ and } j \text{ does not quit}} \Bigg\}$$

$$+ \underbrace{\sum_{\hat{h}} \delta_{\hat{h}} \int g(x_j, \hat{x}_{-j}, k) d\hat{w}}_{-j \text{ is laid off from job } (\hat{w}, \hat{h})} + \underbrace{\sum_{\hat{h}} \kappa_{\hat{h},0} \lambda^{j,h_j} f^{j,h_j}(w_j) \int g(\hat{x}_j, x_{-j}, k)\Omega((x_j, x_{-j}); (\hat{x}_j, x_{-j}); k) d\hat{w}}_{\text{EE transition of } j \text{ from job } (\hat{h}, \hat{w})}$$

$$+ \underbrace{\lambda^{j,h_j} f^{j,h_j}(w_j) g(x_j^n, x_{-j}, k)\Omega((x_j, x_{-j}); (x_j^n, x_{-j}); k)}_{\text{UE transition of } j}$$

$$+ \underbrace{\sum_{\hat{h}_j} \kappa_{\hat{h}_j,0} \lambda^{j,h_j} f^{j,h_j}(w_j) \sum_{\hat{h}_{-j}} \int \int g(\hat{x}_j, \hat{x}_{-j}, k)\Omega((x_j, x_{-j}); (\hat{x}_j, \hat{x}_{-j}), (x_j, \hat{x}_{-j}); k) d\hat{w}_{-j} d\hat{w}_j}_{\text{EE transition of } j \text{ from job } (\hat{h}_j, \hat{w}_j) \text{ and } -j \text{ quits from job } (\hat{h}_{-j}, \hat{w}_{-j})}$$

$$+ \underbrace{\lambda^{j,h_j} f^{j,h_j}(w_j) \sum_{\hat{h}_{-j}} \int g(x_j^n, \hat{x}_{-j}, k)\Omega((x_j, x_{-j}); (x_j^n, \hat{x}_{-j}), (x_j, \hat{x}_{-j}); k) d\hat{w}_{-j}}_{\text{UE transition of } j \text{ and } -j \text{ quits from job } (\hat{h}_{-j}, \hat{w}_{-j})}$$

$$+ \underbrace{\mathbb{I}_{k=3} \Phi_2(3) g(x_j^p, x_{-j}, 2)\Omega((x_j, x_{-j}); (x_j^n, x_{-j}); 3)}_{j\text{'s parental leave ends and no quit}}$$

$$+ \underbrace{\mathbb{I}_{k=3} \Phi_2(3) \sum_{\hat{h}} \int g(x_j, \hat{x}_{-j}^p, 2)\Omega((x_j, x_{-j}); (x_j, \hat{x}_{-j}^r), (x_j^n, \hat{x}_{-j}^r); 3) d\hat{w}}_{-j\text{'s parental leave ends, } -j \text{ quits and } j \text{ does not quit}} .$$

3. $h_j > 0$, $h_{-j} = 0$ and $k = 2$, $p_j = 0$

Consider a couple where worker j is employed, not on parental leave, worker $-j$ is non-

employed and there are young children. The inflow into this state is equal to

$$\underbrace{\Phi_1(2)g(x_j,x_{-j},1)\Omega((x_j,x_{-j});(x_j^p,x_{-j});2)}_{\text{family state change and } j \text{ does not take parental leave}}$$
$$+\underbrace{\sum_{\hat{h},\hat{p}}\delta_{\hat{h}}\int g(x_j,\hat{x}_{-j},2)d\hat{w}}_{-j \text{ is laid off from job } (\hat{w},\hat{h},\hat{p})}+\underbrace{\sum_{\hat{h},\hat{p}}\kappa_{\hat{h},\hat{p}}\lambda^{j,h_j}f^{j,h_j}(w_j)\int g(\hat{x}_j,x_{-j},2)\Omega((x_j,x_{-j});(\hat{x}_j,x_{-j});2)d\hat{w}}_{\text{EE transition of } j \text{ from job } (\hat{h},\hat{w},\hat{p})}$$
$$+\underbrace{\lambda^{j,h_j}f^{j,h_j}(w_j)g(x_j^n,x_{-j},2)\Omega((x_j,x_{-j});(x_j^n,x_{-j});2)}_{\text{UE transition of } j}$$
$$+\underbrace{\sum_{\hat{h}_j,\hat{p}_j}\kappa_{\hat{h}_j,\hat{p}_j}\lambda^{j,h_j}f^{j,h_j}(w_j)\sum_{\hat{h}_{-j},\hat{p}_{-j}}\int\int g(\hat{x}_j,\hat{x}_{-j},2)\Omega((x_j,x_{-j});(\hat{x}_j,\hat{x}_{-j}),(x_j,\hat{x}_{-j});2)d\hat{w}_{-j}d\hat{w}_j}_{\text{EE transition of } j \text{ from job } (\hat{h}_j,\hat{w}_j,\hat{p}_j) \text{ and } -j \text{ quits from job } (\hat{h}_{-j},\hat{w}_{-j},\hat{p}_{-j})}$$
$$+\underbrace{\lambda^{j,h_j}f^{j,h_j}(w_j)\sum_{\hat{h}_{-j},\hat{p}_{-j}}\int g(x_j^n,\hat{x}_{-j},2)\Omega((x_j,x_{-j});(x_j^n,\hat{x}_{-j}),(x_j,\hat{x}_{-j});2)d\hat{w}_{-j}}_{\text{UE transition of } j \text{ and } -j \text{ quits from job } (\hat{h}_{-j},\hat{w}_{-j},\hat{p}_{-j})}$$
$$+\underbrace{\tau g(x_j^p,x_{-j},2)\Omega((x_j,x_{-j});(x_j^n,x_{-j});2)}_{j\text{'s parental leave ends and no quit}}$$
$$+\underbrace{\tau\sum_{\hat{h}}\int g(x_j,\hat{x}_{-j}^p,2)\Omega((x_j,x_{-j});(x_j,\hat{x}_{-j}^r),(x_j^p,\hat{x}_{-j}^r);2)d\hat{w}}_{-j\text{'s parental leave ends, } -j \text{ quits and } j \text{ does not take parental leave}}.$$

4. $h_j > 0$, $h_{-j} = 0$ and $k = 2$, $p_j = 1$

Consider a couple where worker j is on parental leave, worker $-j$ is non-employed and there are young children. The inflow into this state is equal to

$$\underbrace{\Phi_1(2)g(x_j,x_{-j},1)\Omega((x_j,x_{-j});(x_j^r,x_{-j});2)}_{\text{family state change and } j \text{ takes parental leave}}+\underbrace{\sum_{\hat{h}_{-j},\hat{p}_{-j}}\delta_{\hat{h}_{-j}}\int g(x_j,\hat{x}_{-j},2)d\hat{w}_{-j}}_{-j \text{ is laid off from job } (\hat{w}_{-j},\hat{h}_{-j},\hat{p}_{-j})}.$$

5. $h_j > 0$, $h_{-j} > 0$ and $k \neq 2$

Consider a couple where both genders are employed and there are no young children. The

inflow into this state is equal to

$$\underbrace{\sum_{k_0} \Phi_{k_0}(k) g(x_j, x_{-j}, k_0) \Omega((x_j, x_{-j}); (x_j^n, x_{-j}), (x_j, x_{-j}^n); k)}_{\text{family state change and no partner quits}}$$

$$+ \sum_{j=m,f} \Bigg\{ \underbrace{\sum_{\hat{h}} \kappa_{\hat{h},0} \lambda^{j,h_j} f^{j,h_j}(w_j) \int g(\hat{x}_j, x_{-j}, k) \Omega((x_j, x_{-j}); (\hat{x}_j, x_{-j}), (x_j, x_{-j}^n); k) d\hat{w}}_{\text{EE transition of } j \text{ from job } (\hat{h}, \hat{w}) \text{ and } -j \text{ does not quit}}$$

$$+ \underbrace{\lambda^{j,h_j} f^{j,h_j}(w_j) g(x_j^n, x_{-j}, k) \Omega((x_j, x_{-j}); (x_j^n, x_{-j}), (x_j, x_{-j}^n); k)}_{\text{UE transition of } j \text{ and } -j \text{ does not quit}}$$

$$+ \underbrace{\mathbb{I}_{k=3} \Phi_2(3) g(x_j^p, x_{-j}, 2) \Omega((x_j, x_{-j}); (x_j^n, x_{-j}), (x_j, x_{-j}^n); 3)}_{j\text{'s parental leave ends and neither } j \text{ nor } -j \text{ quit}} \Bigg\}.$$

6. $h_j > 0$, $h_{-j} > 0$ and $k = 2$, $p_j = p_{-j} = 0$

Consider a couple where both workers are employed and there are young children. The inflow into this state is equal to

$$\underbrace{\Phi_1(2) g(x_j, x_{-j}, 1) \Omega((x_j, x_{-j}); (x_j^p, x_{-j}), (x_j, x_{-j}^p); k)}_{\text{family state change and no worker takes parental leave}}$$

$$+ \sum_{j=m,f} \Bigg\{ \underbrace{\sum_{\hat{h},\hat{p}} \kappa_{\hat{h},\hat{p}} \lambda^{j,h_j} f^{j,h_j}(w_j) \int g(\hat{x}_j, x_{-j}, 2) \Omega((x_j, x_{-j}); (\hat{x}_j, x_{-j}), (x_j, x_{-j}^n); 2) d\hat{w}}_{\text{EE transition of } j \text{ from job } (\hat{h}, \hat{w}, \hat{p}) \text{ and } -j \text{ does not quit}}$$

$$+ \underbrace{\lambda^{j,h_j} f^{j,h_j}(w_j) g(x_j^n, x_{-j}, 2) \Omega((x_j, x_{-j}); (x_j^n, x_{-j}), (x_j, x_{-j}^n); 2)}_{\text{UE transition of } j \text{ and } -j \text{ does not quit}}$$

$$+ \underbrace{\tau g(x_j^p, x_{-j}, 2) \Omega((x_j, x_{-j}); (x_j^n, x_{-j}), (x_j, x_{-j}^p); 2)}_{j\text{'s parental leave ends, } j \text{ does not quit and } -j \text{ does not take parental leave}} \Bigg\}.$$

7. $h_j > 0$, $h_{-j} > 0$ and $k = 2$, $p_j = 1$, $p_{-j} = 0$

Consider a couple with young children where one worker is on parental leave and the other

is employed. The inflow into this state is equal to

$$\underbrace{\Phi_1(2)g(x_j,x_{-j},1)\Omega((x_j,x_{-j});(x_j^r,x_{-j}),(x_j^r,x_{-j}^p);k)}_{\text{family state change and partner } j \text{ takes parental leave}}$$

$$+\underbrace{\sum_{\hat{h}_{-j},\hat{p}_{-j}}\kappa_{\hat{h}_{-j},\hat{p}_{-j}}\lambda^{-j,h_{-j}}f^{-j,h_{-j}}(w_{-j})\int g(x_j,\hat{x}_{-j},2)\Omega((x_j,x_{-j});(x_j,\hat{x}_{-j}),(x_j^n,x_{-j});2)d\hat{w}_{-j}}_{\text{EE transition of } -j \text{ from job } (\hat{h}_{-j},\hat{w}_{-j},\hat{p}_{-j}) \text{ and } j \text{ does not quit}}$$

$$+\underbrace{\lambda^{-j,h_{-j}}f^{-j,h_{-j}}(w_{-j})g(x_j,x_{-j}^n,2)\Omega((x_j,x_{-j});(x_j,x_{-j}^n),(x_j^n,x_{-j});2)}_{\text{UE transition of } -j \text{ and } j \text{ does not quit}}$$

$$+\underbrace{\tau g(x_j^r,x_{-j}^p,2)\Omega((x_j,x_{-j});(x_j^r,x_{-j}),(x_j^r,x_{-j}^n);2)}_{-j\text{'s parental leave ends, } j \text{ takes parental leave and } -j \text{ does not quit}} .$$

A.2.2 Single Households

Let $g^j(x,k)$ denote the measure of single households in family state k where the worker has gender j and state vector $x=(w,h,s,p)$.

The outflow from this state is equal to

$$g^j(x,k)\Bigg[\underbrace{\sum_{k'}\Phi_k^j(k')}_{\text{family state change}}+\underbrace{\pi_x^+ + \pi_x^-}_{\text{skill adjustment}}$$

$$+\underbrace{\sum_{\hat{h}}\kappa_{h,p}\lambda^{j,\hat{h}}\int\Omega^j(\hat{x};x;k)dF^{j,\hat{h}}(\hat{w})}_{\text{worker accepts new job}}+\underbrace{\mathbb{I}_{p=1}\tau}_{\text{worker exits parental leave}}+\underbrace{\delta_h}_{\text{worker is laid off}}\Bigg] .$$

Note again that we set $\delta_0=0$ so that this equation applies to both employed and non-employed households.

Regarding inflows into state (x,k), we again need to distinguish different cases. Common to all is the inflow due to skill adjustment which is omitted from all following expressions and which is equal to

$$\pi_{x^-}^+ g^j(x^-,k)+\pi_{x^+}^- g^j(x^+,k) .$$

1. $h=0$ and $k\neq 2$

Consider a single household without young children where the worker is non-employed. The

inflow into this state is equal to

$$\sum_{k_0} \Phi^j_{k_0}(k) \Bigg\{ \underbrace{g^j(x,k_0)}_{\substack{\text{family state change} \\ \text{without job quitting}}} + \underbrace{\sum_{\hat{h}} \int g^j(\hat{x},k_0)\Omega^j(x;\hat{x};k)d\hat{w}}_{\text{family state change where worker quits job } (\hat{w},\hat{h})} \Bigg\}$$
$$+ \underbrace{\sum_{\hat{h}} \delta_{\hat{h}} \int g^j(\hat{x},k)d\hat{w}}_{\text{worker is laid off from job } (\hat{w},\hat{h})} + \underbrace{\mathbb{I}_{k=1} N^j \zeta^j(s)}_{\text{entry of new single households}} .$$

In the last line, N^j denotes the total inflow of single households where the worker has gender j. Among those households, fraction $\zeta^j(s)$ enter with skill s.

2. $h = 0$ and $k = 2$

Consider a single household with young children and a non-employed worker. The inflow into this state is equal to

$$\underbrace{\Phi^j_1(2)g^j(x,1)}_{\text{family state change}} + \underbrace{\sum_{\hat{h}} \delta_{\hat{h}} \int g^j(\hat{x},2)d\hat{w}}_{\text{worker is laid off from job } (\hat{w},\hat{h})} + \underbrace{\sum_{\hat{h}} \tau \int g^j(\hat{x}^p,2)\Omega^j(x;\hat{x}^r;2)d\hat{w}}_{\text{quit after end of parental leave from job } (\hat{w},\hat{h})} .$$

3. $h > 0$ and $k \neq 2$

Consider a single household without young children and an employed worker. The inflow into this state is equal to

$$\underbrace{\sum_{k_0} \Phi^j_{k_0}(k) g^j(x,k_0)\Omega^j(x;x^n;k)}_{\substack{\text{family state change} \\ \text{without job quitting}}} + \underbrace{\sum_{\hat{h}} \kappa_{\hat{h},0} \lambda^{j,h} f^{j,h}(w) \int g^j(\hat{x},k)\Omega^j(x;\hat{x};k)d\hat{w}}_{\text{EE transition from job } (\hat{h},\hat{w})}$$
$$+ \underbrace{\lambda^{j,h} f^{j,h}(w) g^j(x^n,k)\Omega^j(x;x^n;k)}_{\text{UE transition}} + \underbrace{\mathbb{I}_{k=3}\Phi_2(3)g^j(x^p,2)\Omega^j(x;x^n;3)}_{\text{parental leave ends and no quit}} .$$

4. $h > 0$ and $k = 2$, $p = 0$

Consider a single household with young children and an employed worker. The inflow into

this state is equal to

$$\underbrace{\Phi_1^j(2)g^j(x,1)\Omega^j(x;x^p;2)}_{\substack{\text{family state change}\\ \text{without entering parental leave}}} + \underbrace{\sum_{\hat{h},\hat{p}} \kappa_{\hat{h},\hat{p}} \lambda^{j,h} f^{j,h}(w) \int g^j(\hat{x},2)\Omega^j(x;\hat{x};2)d\hat{w}}_{\text{EE transition from job } (\hat{h},\hat{w},\hat{p})}$$
$$+ \underbrace{\lambda^{j,h} f^{j,h}(w) g^j(x^n,2)\Omega^j(x;x^n;2)}_{\text{UE transition}} + \underbrace{\tau g^j(x^p,2)\Omega^j(x;x^n;2)}_{\text{parental leave ends and no quit}} .$$

5. $h > 0$ and $k = 2$, $p = 1$

Consider a single household with young children and a worker in parental leave. The inflow into this state is equal to changes of family states where an employed worker enters parental leave:

$$\Phi_1^j(2)g^j(x^r,1)\Omega^j(x;x^r;2) .$$

B Estimation of Moments

We obtain all statistics for model estimation from the German Socio-Economic Panel (GSOEP), a representative household survey conducted by DIW Berlin since 1984. Each year, around 30,000 individuals from 15,000 households are surveyed, providing information on household composition, labor market status, employment history, working hours, earnings, transfers, and other income sources, along with various personal and household characteristics. We use GSOEP wave 37 and data from the survey years 2007 to 2019. We do not include earlier years, as the parental leave reforms central to our benchmark model took effect in January 2007. Later years are excluded because the COVID-19 pandemic has impacted the labor market behavior of workers in unprecedented ways.

Sample and definitions. We define working-age individuals as those who are 20 years or older. We limit our analysis to households where the head is between 20 and 65 years old, categorizing them into the following household types:

- *Single household - Man*: The household head is a man, with no other working-age individuals present.
- *Single household - Woman*: The household head is a woman, with no other working-age individuals present.
- *Couple household*: A married couple (a man and a woman) is present, both aged 20-65, with no other working-age individuals in the household.

We exclude all households that do not satisfy these definitions, including cohabiting or same-sex couples, singles or couples with working-age children, and households with one spouse over 66 and the other below 65.[9] For all three household types, we define the following demographic groups:

- *Childless fertile*: In single households, the head is under 40. In couple households, the woman is under 40.
- *Young kids*: The household has children, with the youngest being at most 7 years old.
- *Old kids*: The household has children, with the youngest being 8 years or older.

[9]If one individual identifies as married and cohabiting, but other members aged 20-65 have missing marital status, we impute the closest-aged individual as the spouse. We exclude households with missing age or gender for any member, as this would prevent accurate identification of household heads, children, and demographic groups.

- *Childless infertile*: The household has no co-habitating children (if there were, they must have moved out). In single households, the head is 40 or older. In couple households, the woman is 40 or older.

The final sample includes 570,799 observations, corresponding to 110,243 unique workers and 40,655 unique households.

Employment and wages. Workers are classified as full-time employed if their weekly working hours (*pgtatzeit*) exceed 30, part-time employed if their weekly working hours are between 8 and 30, or non-employed otherwise. On average, full-time employees work 43 hours each week, while part-time employees work about 20 hours per week (Table 3).

We calculate the hourly wage of employed workers as current gross labor income (*pglabgro*) divided by monthly hours (4.3 times the weekly working hours). We deflate all wages using the OECD Consumer Price Index for Germany with a base year of 2015 as reported in the FRED database. We compute the distribution of log weekly wages based on gender and work schedule. On average, women earn 92% of men's hourly wages when working full time (2.65 vs 2.87 log euro per hour). However, average hourly wages are nearly the same between genders in part-time roles. Men working part-time men earn about 91% of those working full-time, while part-time women earn approximately 98% of full-time women's wages. Additionally, we examine wage distribution by gender at the start of a worker's career, focusing on employees under 28 years old in full-time positions. The average log wage during the first job spell, compared to the average log wage over the course of a working life, is 85% for men and 92% for women.

Taxes and Transfers. We estimate the parameters of the tax functions for single and couple households (equations (6) and (7), respectively), following the approach of Kaas et al. (2021). Specifically, we use CPI-adjusted income data from the GSOEP's *pequiv* module. We log-transform each equation and estimate it using Ordinary Least Squares for the combined data set, with separate estimations for each household type and demographic group. We define net annual household income as gross annual income minus taxes plus transfers (including child allowances). We then regress net log income on gross log income separately for single and couple households (pooling genders), while controlling for year fixed effects. The estimated constant and slope are used as parameters for the tax functions of the two household types. The parameter τ_0, calculated as 1 minus the constant, reflects the net tax revenue and represents the average level of taxation. The parameter τ_1, derived as the exponential of the slope parameter, determines the progressivity of the tax and transfer system. When $\tau_1 > 0$, marginal tax rates exceed average tax rates, indicating a progressive tax system. In contrast, negative values of τ_1 indicate a regressive system, while a value of zero implies a flat tax rate.

The estimated coefficients are reported in Table A.1, and the implied parameters of the tax function parameters are presented in Table 3. The large positive estimate of τ_1 suggests that the German tax and transfer system is highly redistributive.

Table A.1: Tax function by household type and demographic group

	Dependent variable: Log net income			
Sample:	Couple Households			
Demographic group:	1	2	3	4
Log gross income	0.766***	0.436***	0.565***	0.612***
	(0.020)	(0.012)	(0.016)	(0.049)
Constant	2.467***	6.169***	4.754***	4.157***
	(0.223)	(0.134)	(0.180)	(0.540)
R-squared	0.949	0.718	0.825	0.793
N. observations	963	27,127	15,669	1,792
Sample:	Single Households			
Demographic group:	1	2	3	4
Log gross income	0.539***	0.506***	0.512***	0.576***
	(0.013)	(0.013)	(0.013)	(0.012)
Constant	4.687***	5.070***	5.004***	4.254***
	(0.139)	(0.134)	(0.132)	(0.121)
R-squared	0.686	0.647	0.656	0.693
N. observations	17,971	20,453	24,400	22,395

This table reports the estimates of the logarithm of the gross income on the net income, both computed excluding the child and parental allowance. The first and the second column report the estimates for the sample of couple and single households, respectively. Standard errors are reported in parentheses. *, **,*** denote statistical significance at the 10, 5, 1 percent level.