Long-run effects of payroll tax subsidies on maternal labor market outcomes

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(July 2021)

LASER Discussion Papers - Paper No. 130

(edited by A. Abele-Brehm, R.T. Riphahn, K. Moser and C. Schnabel)

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Abstract

This paper investigates the role of public policies for motherhood penalties. Specifically, we study the effect of subsidized employment (Minijobs) on labor market outcomes of German mothers up to 10 years after the first birth. We use rich administrative data and apply a combination of propensity score matching with an event study design to compare the long-run consequences of starting out in a Minijob employment versus unsubsidized, i.e., regular employment after birth. We find that mothers who take up a Minijob employment after the first birth earn significantly less even 10 years after the birth compared to mothers who start out in unsubsidized employment after birth. Our results imply that the high rate of subsidized Minijob employment after the first birth contributes to the large long-run child penalty for mothers.

Zusammenfassung

Die Studie untersucht die Relevanz von politischen Institutionen für die Nachteile von Müttern am Arbeitsmarkt. Insbesondere analysieren wir die Auswirkung von öffentlich unterstützter Beschäftigung (Minijobs) für die Arbeitsmarktergebnisse von deutschen Müttern bis zu 10 Jahre nach der ersten Geburt. Wir verwenden reichhaltige administrative Daten und nutzen Propensity Score Matching in Kombination mit einem Event Study Design. Wir vergleichen die langfristigen Auswirkungen der Aufnahme eines Minijobs statt regulärer sozialversicherungspflichtiger Beschäftigung. Es zeigt sich, dass Mütter die nach einer Geburt einen Minijob aufnehmen, nach 10 Jahren noch immer signifikant weniger verdienen als regulär Beschäftigte. Dies impliziert, dass das intensiv genutzte Instrument der Minijobs zu den starken Arbeitsmarktnachteilen von Müttern in Deutschland beiträgt.

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Author note

We gratefully acknowledge funding by grant CY82/1-1 of the German Research Foundation.

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This paper investigates the role of public policies for motherhood penalties. Specifically, we study the effect of subsidized employment (Minijobs) on labor market outcomes of German mothers up to 10 years after the first birth. We use rich administrative data and apply a combination of propensity score matching with an event study design to compare the long-run consequences of starting out in a Minijob employment versus unsubsidized, i.e., regular employment after birth. We find that mothers who take up a Minijob employment after the first birth earn significantly less even 10 years after the birth compared to mothers who start out in unsubsidized employment after birth. Our results imply that the high rate of subsidized Minijob employment after the first birth contributes to the large long-run child penalty for mothers.

JEL Code: J22, J13, J18

Keywords: Motherhood penalty, payroll tax subsidies, Minijob, maternal employment, labor market policy, propensity score matching, machine learning

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We gratefully acknowledge funding by grant CY82/1-1 of the German Research Foundation. We are grateful for comments by participants of the annual EALE conference 2020, IAB Conference on Labour Market Transitions: Challenges for Public Policies and Research 2020, the 2021 conference of the Society of Labor Economists, the 2021 ESPE conference, and seminars at ZEW Mannheim, Free University Berlin, and Leibniz University Hannover.

1. Introduction

Most developed countries experienced substantial gender convergence in the labor market throughout the past century (e.g., Goldin 2014, Olivetti and Petrongolo 2016). However, labor market outcomes of women still differ considerably from those of observationally equivalent men: women are less likely to participate in the labor force, work fewer hours, and earn lower wages. These differences often emerge with the onset of parenthood and persist beyond the working life into retirement when they convert into gender pension gaps. Recent contributions (e.g., Angelov et al. 2016, Bütikofer et al. 2018, Kleven et al. 2019a) point to the motherhood penalty as an increasingly important determinant of gender wage differences. Kleven et al. (2019b) argue that almost all of the remaining gender inequality can be attributed to parenthood. Most recent studies focus on Scandinavian countries with generous family policies and equal-opportunity legislations. However, research on other countries confirms that a long-run penalty for motherhood is a pervasive phenomenon (e.g., Kuziemko et al. 2018, Kleven et al. 2019a).

At the same time, there are large differences in the magnitude of remaining gender wage gaps and child penalties across countries (Olivetti and Petrongolo 2016). For example, using data from six countries (Austria, Denmark, Germany, Sweden, United Kingdom, and the United States), Kleven et al. (2019a) estimate long-run child penalties in maternal earnings of between 20 and 60 percent, where Scandinavian countries feature the lowest, and German-speaking countries the highest penalties.

The literature discusses various explanations for such patterns. Kleven et al. (2019a) consider the role of gender norms and show a striking correlation between a country-specific child penalty and conservative gender views. This descriptive evidence is in line with growing research emphasizing the importance of norms, attitudes, and culture in shaping gender gaps and motherhood penalties (see, e.g., Bertrand 2011, Boelmann et al. 2020). Alternative literature examined explanations such as differences in productivity, preferences, labor market discrimination on the one hand, and governmental policies including taxes, transfers, and family

policies such as parental leave and child care provisions (see, e.g., Olivetti and Petrongolo 2016 for a review) on the other hand.[1] Several studies show that paid leave and public child care may generate short-run effects of children on maternal earnings and employment (e.g., Lalive and Zweimüller 2009, Rossin-Slater et al. 2013, Schönberg and Ludsteck 2014, Bauernschuster and Schlotter 2015, Dahl et al. 2016, Kleven et al. 2020); however, this literature usually also concludes that family policies have a limited impact on long-run outcomes. Similarly, direct consequences of giving birth and breast feeding matter in the short run but cannot explain the persistent effects of children on maternal labor market outcomes (Kleven et al. 2021). Thus, the drivers of a long-run impact of children on observed gender inequalities in the labor market are still largely unclear.[2]

This paper makes three contributions. First, we add to the literature on the long-run impact of public policies on maternal labor market outcomes. In contrast to earlier studies investigating the role of family policies that affect mothers only in the first years following childbirth, we focus on potentially unintended effects of payroll tax subsidies that generate incentives to move down the job ladder after birth. This potentially affects maternal career prospects and wage growth in a longer run. Second, our analysis offers an evaluation of a payroll tax subsidy scheme along dimensions that have, so far, been ignored, i.e., its unintended impacts on mothers. Finally, we investigate the heterogeneity of the motherhood penalty along the dimension of maternal human capital. To our knowledge this aspect has been largely neglected in the prior literature.

Specifically, we investigate the impact of a large German payroll tax subsidy program (Minijobs, *geringfügige Beschäftigung*), which refers to employment relationships that yield less than a given amount of monthly earnings, currently 450 Euro. Introduced decades ago, the

[1] For prior discussions of the role of institutions see, e.g., Drange and Rege (2013) and Dustmann and Schönberg (2012).

[2] Hotz et al. (2018) discuss the role of family-friendly workplaces and conclude that while these workplaces yield short-term benefits, they may hinder women's long-run careers.

original purpose of Minijobs was to reduce bureaucratic burdens and to facilitate flexible minor employment relationships. Very similar programs exist in Austria and Switzerland. Minijobs are exempt from social insurance contributions and income tax obligations for employees. Instead, employers pay a fixed share of Minijob earnings to contribute to social insurances and income tax revenues. From an individual perspective, a Minijob constitutes a payroll tax subsidy, which is especially appealing to mothers seeking a limited number of working hours per week after a birth. Compared to regular part-time employment, which is subject to social security contributions and income tax, a Minijob yields higher net earnings. This monetary gain can be amplified by the high marginal taxes for secondary earners in married couples. However, a vast majority of Minijobs are in low-skill domains, which in the long-run, may limit individual earnings potentials, prevent investments in human capital, and inhibit the accumulation of pension claims.

Given these features, we expect long-run negative effects of taking up Minijob employment after birth on maternal labor market outcomes. We carefully test this hypothesis using detailed administrative data on employment biographies from German social security records. These data allow us to study the labor market outcomes of mothers who gave birth between 1999 and 2006 for up to 10 years after birth.[3] We focus on West German mothers with a full-time job subject to social security contributions before their first birth (around 80 percent of the sample). To address a potentially endogenous selection into a Minijob after birth, we apply propensity score matching which yields the causal effect under a conditional independence assumption. Specifically, we use a rich set of individual characteristics, including detailed pre-birth employment biographies and firm-level information to match our treatment

[3] In this period, relatively modest child rearing benefits were provided to recent parents conditional on a means test. In an auxiliary analysis looking at medium-run outcomes of mothers who gave birth between 2007 and 2012 (see section 4.4), we find that the results in the first years (up to 5 years) after birth are very similar to those presented here for mothers who gave birth before 2007.

group (Minijob) to several control groups (alternative employment statuses after birth). We then compare the development of long-run labor market outcomes of these groups using an event-study approach. We show that the matched samples display identical developments prior to birth, which validates our identification strategy.

We confirm staggering and persistent effects of children on maternal labor market outcomes in Germany and show that they significantly differ by Minijob status. Specifically, mothers who take up a Minijob after birth have a nearly 10 percentage points lower probability of being regularly employed ten years after birth compared to mothers who directly return to regular employment after birth. In addition, returning to the labor market as a "Minijobber" reduces earnings persistently compared to returning to regular employment. We find that the accumulation of less valuable labor market experience (i.e., in unskilled tasks) and more frequent employer switches may be plausible, though not necessarily exclusive, mechanisms behind the long-lasting detrimental consequences of Minijobs. This unintended impact of the Minijob program is of substantial policy relevance and has been disregarded so far. Our findings are consistent with the argument that public policies might contribute to the explanation of the long-run motherhood penalty if they affect new mothers permanently (Kleven et al. 2020), and especially if they affect the “experience capital” accumulated in work over time (Costa Dias et al. 2020).

These findings are of broad interest because minor employment relationships with poor job characteristics similar to the German Minijobs exist in many advanced economies (see Adams and Prassl 2018, Table 1). Moreover, “atypical” contractual arrangements are particularly widespread among women.[4] Messenger and Wallot (2015) show that in several

[4] Kalleberg et al. (2000), Kalleberg (2009), and Henly and Lambert (2014) investigate 'bad jobs' in the United States, Adams and Prassl (2018), McGovern et al. (2004), Koumenta and Williams (2019) study 'zero hours contracts' in the United Kingdom, Laß and Wooden (2020) discuss 'non-standard employment' in Australia, and OECD (2014) offers a broader international survey.

countries (Australia, Austria, Germany, Ireland, The Netherlands, UK), more than 10 percent of women in dependent employment actually work in such non-standard arrangements with low working hours and poor job characteristics. Thus, our results are relevant for various national labor market settings.

The paper proceeds as follows. We explain the relevant institutions in the next section. Section 3 describes our empirical approach and provides detail on our data. The results follow in section 4, and section 5 concludes.

2. Institutional Background

2.1 Minijobs

The Minijob program is one of the largest labor market programs in Germany. As of 2019, more than 7.5 million individuals, i.e., one-sixth of the labor force took advantage of this payroll tax subsidy (BA 2020). Legally, individuals performing Minijobs are part-time employees. They benefit from sick pay, maternity leave benefits, employment protection, and are entitled to paid vacation. At the same time, they are exempt from otherwise mandatory contributions to social insurances and income taxes. Instead, employers pay a fixed share of a worker's gross earnings to social insurance and tax authorities. Currently, the Minijob payroll tax subsidy is available if monthly earnings do not exceed 450 Euro. Labor earnings above that amount are fully taxable and subject to social insurance contributions by workers and employers (for details see e.g. Eichhorst et al. 2012, Berthold and Coban 2013).

Similar regulations existed since 1911 but over time, the rules were modified with varying objectives, e.g., to reduce the bureaucratic burden, to incentivize labor supply, to raise social insurance contributions, or to provide incentives for unsubsidized part-time employment (see, e.g., Collischon et al. 2020). In 1999, the earnings limit of Minijobs was fixed at 325 Euro and a limit of at most 15 working hours per week was set. A subsequent reform in 2003 aimed at reducing illicit employment and increasing employment opportunities for the unemployed;

Minijobs were considered a stepping stone to the unsubsidized labor market.[5] The reform abolished the limit of 15 working hours per week and allowed to work on a Minijob in addition to an unsubsidized employment contract. Also, it raised the monthly earnings limit from 325 to 400 Euro and introduced so-called Midijobs for monthly earnings between 400 and 800 Euro. Midijob employees pay regular income taxes. Their social insurance contributions are subsidized and increase on a sliding scale. In 2013, the earnings limits for Minijobs and Midijobs were shifted to 450 and 850 Euro per month.

2.2 Income Tax System

Germany uses a progressive income tax system that applies a tax splitting rule for married couples based on their joint income: if y_M and y_F are gross incomes of the two spouses and y_C is the total income of the married couple, then the progressive tax function T(.) yields that $2*T(0.5 * y_C) \leq T(y_M) + T(y_F)$. Typically, this generates a tax benefit from marriage, which is largest for couples where one spouse earns the total income: if a second earner starts to earn a taxable income - e.g., above the Minijob earnings threshold - these earnings are taxed at the marginal tax rate of the first earner. This can generate large disincentives for labor supply as, e.g., between 1999 and 2006 - our analysis period - marginal tax rates could reach up to 45 percent. **Figure A.1** in the appendix illustrates the relationship between gross and net earnings at the earnings threshold of Minijobs for three average tax rate scenarios. The figure shows that even with relatively low income tax rates, gross earnings from regular employment had to reach approximately 600 Euro in order to match similar net earnings via Minijob employment of 400 Euro. This indicates the disincentive of extending earnings beyond the Minijob threshold.

[5] Research on the effects of Minijobs evaluated its role as a stepping stone from unemployment into regular employment with mixed results (see, e.g., Freier and Steiner 2008 or Caliendo et al. 2016 or for the case of Austria, Böheim and Weber 2011). This literature is dominated by studies on unemployed men. Some studies point to unintended substitution effects (e.g., Jacobi and Schaffner 2008, Collischon et al. 2020).

Gudgeon and Trenkle (2020) and Tazhitdinova (2020) illustrate that the notch in the earnings distribution causes substantial bunching at the Minijob earnings limit, particularly among females.

2.3 Family Benefits

German family policy offers different programs aiming at the wellbeing of parents and newborns: fully paid maternity leave is available from six weeks before to eight weeks after childbirth and mothers are prohibited to work during this period. Parents can take parental leave, which provides job protection for up to three years (cf. Dustmann and Schönberg 2012).

Also, parents are entitled to parental leave benefits. In the period prior to 2007, which we study here, "child-rearing benefits" (*Erziehungsgeld*) were provided. They were means-tested and paid a maximum of 300 Euro monthly for up to 24 months.[6] The means test related to family income: parents were eligible for full child-rearing benefits if their annual net income was below a specific threshold. For example, first-time parents received the maximum benefit of 300 Euro during months 1-6 after birth, if their annual income did not exceed 30,000 Euro. They received the full benefit in months 7-24 after birth if their annual income did not exceed 16,500 Euro.[7] In practice, often solely the father's income was relevant because earnings of the leave-taking parent, i.e., usually of the mother, were omitted in the means test as long as she did not work during leave-taking.[8] Generally, employment up to 30 hours per week was allowed during leave-taking but this labor income added to the means test save for Minijob earnings. For mothers who sought employment after birth, typically with a limited number of weekly

6 Alternatively, families could choose payments of 450 Euros for up to 12 months.

7 The threshold differed for single parents, it varied depending on the parity of the child and also for benefits for months 1-6 vs. 7-24 after birth. Generally, the thresholds referred to annual joint family income measured in the calendar year before the childbirth for benefits in months 1–12 and measured in the year of the childbirth for benefits in months 13–24. If net income exceeded the threshold, payouts were reduced.

8 While the law equally treated both parents, in practice, the share of fathers utilizing paid parental leave was below 2.5 percent (Cygan-Rehm et al. 2018).

hours, this Minijob exception provided an additional incentive to take up a Minijob instead of regular part-time employment.

2.4 Minijob take-up after birth

Figure 1 panel a shows that German mothers experience a sharp, immediate, and persistent increase in Minijob employment after the birth of their first child. While about 15 percent of first-time mothers take up a Minijob after birth, fathers remain essentially unaffected. There are several reasons for this pattern. First, given the still prevailing traditional gender roles within families, after birth, German mothers typically return to the labor market with only a limited number of weekly hours of work. Thus, compared to regular part-time employment, Minijobs, which are exempt from both social insurance contributions and income taxes, are very attractive. Second, once having started a Minijob, the income tax system creates strong disincentives to extend labor supply, especially for married women. This might permanently deter the lower-earning spouse, typically the female, from moving on to regular employment, and lead to dead-end jobs in low-wage occupations, instead (e.g., Eichhorst et al. 2012). Indeed, the jump in maternal Minijob employment after birth (see panel a of **Figure 1**) coincides with persistent losses in women's post-birth earnings (see panel b of **Figure 1**) suggesting that the motherhood penalty might be (at least to some extent) connected to Minijobs. However, this descriptive evidence does not have a causal interpretation and so far, there is no research on the causal impact of Minijob employment on the labor market status after birth. This is the gap we address in this study.

3. Empirical Approach and Data

3.1 Empirical Approach

Propensity score matching

The key econometric challenge in analyzing the long-run consequences of a Minijob employment shortly after birth is that mothers who take up a Minijob might differ from mothers who decide not to do so. To deal with the potentially non-random self-selection into treatment, we apply a matching strategy, more specifically, radius-caliper matching with a caliper of 0.001. We focus on first time mothers who 6 months before birth were in regular full-time employment. We split this sample into subgroups depending on maternal employment status in month 13 after birth when we capture the first employment choice after birth.[9] In particular, our main analysis compares mothers in subsidized Minijob employment (treatment group) and two alternative control groups: all regularly (full-time or part-time) employed mothers and those in low-paying regular employment (lowest earnings quartile in month 13). For completeness, in section 4.5 we also consider those without employment as a comparison group.

For the matching procedure, we use a rich set of maternal pre-birth characteristics such as age at birth (annual indicators), tenure, total employment experience, unemployment experience, Minijob experience (all measured in years), education (5 indicators), establishment size (7 indicators), and federal state main effects and interacted with year of birth indicators all measured in the last employment spell before giving birth. Furthermore, we match on daily earnings (6, 12, 18 months prior to birth), employment status (indicator 6, 12, and 18 months prior to birth), and job complexity (6 months steps prior to birth in 4 categories). Additionally, we also match on 1-digit-occupation (Blossfeld) as well as 1-digit- industry classifications (NACE) in the last job prior to giving birth. To flexibly capture any time trends, we also include a full set of indicators for the interaction terms between the year of birth dummies and quarter

[9] We chose month 13 after birth in order to ensure that the data are informative on the first employment choice after birth. In the first 12 months after birth, German mothers are typically on parental leave. However, it is still possible that pre-birth employment contracts run out or provide social security relevant payouts (e.g., bonuses or premiums at the end of calendar year) during parental leave; this would then erroneously appear like continued full-time employment in the data. In section 4.4, we offer robustness tests with respect to the choice of the cutoff of 13 months (versus, e.g., 12 or 14) after birth.

of childbirth indicators and their main effects. Thereby, our matching procedure accounts for any differences due to seasonality. Using this set of covariates, we match mothers in a Minijob in month 13 after birth (treatment group) to mothers who in month 13 after birth, are (i) regularly employed and (ii) regularly employed in low-paying jobs using separate matching procedures.

Event study analysis

To determine the causal effect of Minijob employment after a first birth on subsequent maternal labor market outcomes, we adopt a quasi-experimental approach using an event study design similar to Kleven et al. (2019b) for the matched samples. Specifically, using a balanced panel, we study the development of maternal employment status and daily earnings 5 years before and 10 years after birth. The approach provides consistent estimates under the identifying assumption that the event, i.e., the first birth, is not determined by the outcome variables. Kleven et al. (2019b) provide various checks that support the plausibility of this assumption. In the fully dynamic specification, the outcomes Y of a mother i at event time t (measured relative to birth) and calendar time s are regressed on event-time and calendar-time fixed effects, which we measure in 6-month steps. The point estimates for the post-event periods flexibly capture the average treatment effect of the birth over time. This effect is assumed to be homogenous across observations (Borusyak and Jaravel 2018, Freyaldenhoven et al. 2019, Schmidheiny and Siegloch 2019,).

However, we are not only interested in the general pattern of post-birth developments in employment and earnings, which have been studied before (see e.g., Kleven et al. 2019a). Instead, we aim at identifying the consequences of Minijob employment after birth by comparing the long-run trajectories in maternal labor market outcomes for mothers who took-up a Minijob employment shortly after birth and those who did not. Specifically, for each subgroup (g), we estimate the following equation

$$Y_{ist}^{g} = \sum_{j \neq -1} \alpha_j^g \cdot \mathbf{I}[j = t] + \sum_{y} \gamma_y^g \cdot \mathbf{I}[y = s] + \sum_{k} \beta_k^g \cdot \mathbf{I}[k = age_{is}] + \varepsilon_{ist}^{g}$$

where event time runs in 26 steps from month 60 before to month 120 after a birth covering a span of 5 years before to 10 years post birth. Since we omit the event time dummy at t = -1, the event time coefficients (α_t) measure the relative impact of the first birth on the outcome in period t relative to the outcome value in month 6 prior to birth. The group indicator g represents mothers who took up a Minijob, and the control groups of either mothers who are in regular employment or in low-pay regular employment in month 13 after birth. Data limitations do not allow us to reliably separate part-time vs. full-time employment after birth. Besides a full set of event-time and calendar-time indicators in 6-month steps, our regressions also include a full set of indicators for maternal age at time t. Thus, we control non-parametrically for underlying life-cycle patterns and time trends such as wage inflation and business cycles. We use estimation weights to account for the repeated use of control group observations based on the matching algorithm.

To depict the estimation results, we follow the literature (see Kleven et al. 2019b) and calculate the relative motherhood penalty at every event time (t) separately for each group (g). This penalty is defined as the ratio of the estimated coefficient α_t over the predicted outcome at time t when omitting the contribution of the event indicator.[10] It provides the relative difference in the outcome at time t versus the value observed in month 6 prior to birth as a percentage of the counterfactual outcome absent children.

3.2 Data

[10] The value in the denominator is calculated by first predicting the outcome for each panel observation, than deducting the coefficient α_t and, finally, averaging across the observations in the relevant group and event time cell.

We use administrative data from the Sample of Integrated Labour Market Biographies (SIAB) (Antoni et al., 2019).[11] The data offer a 2 percent random sample of all individuals registered at least once due to employment, unemployment, or take-up of other public transfers (i.e., welfare benefits) by the social security system between 1975 and 2017.

As our data report Minijob employment only since 1999, we consider West German mothers who gave birth between 1999 and 2006.[12] Unfortunately, German law prohibits combining the data with birth certificates. However, it is possible to identify first-time mothers based on the method of Müller and Strauch (2017) that uses employer-provided information on the starting day of the obligatory maternity leave (see section 2.3). Given that there are no household identifiers in SIAB and maternity leave is provided only to mothers, it is not possible to reliably identify fathers in the data and we focus on mothers.[13] Specifically, we focus on mothers with a strong labor market attachment before giving birth, i.e., those who were employed in regular full-time employment 6 months prior to birth. In case of multiple job holding at a particular time, we focus on the main employment which is determined by the highest earnings. Finally, we exclude first time mothers below age 20 given that their labor market biographies typically do not provide sufficient information to allow for reliable matching.[14]

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[11] Specifically, we use the weakly anonymous version of the SIAB 1975-2017 and accessed the data via a Scientific Use File at the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) in Nuremberg and via remote data access at the FDZ. DOI: 10.5164/IAB.FDZD.1902.en.v1

[12] These sample restrictions allow us to observe labor market outcomes of all mothers over a 10-year period after birth. We exclude East German states, which until 1990 formed the German Democratic Republic, because during our period of study, East and West Germany differed in various dimensions including female labor market participation, fertility patterns, and social norms. Many of those differences still persist (see, e.g., Bauernschuster et al. 2012, Boelmann et al. 2020).

[13] However, prior literature convincingly shows that paternal labor market outcomes remain unaffected by a childbirth, which holds in various countries and settings (Kleven at al. 2019a, 2019b, 2020, 2021).

[14] Our results are robust to including teenage mothers, which is not surprising because teenage motherhood is generally rare in West Germany (Cygan-Rehm and Riphahn 2014).

We are interested in the causal effect of taking up a Minijob after the first birth on subsequent maternal employment and earnings. To capture the initial post-birth employment choices, we use maternal employment at month 13 after birth to define the treatment. Traditionally, German mothers take relatively long employment interruptions after birth and tend to return to the labor market when the child turns one, two, or three years old.[15]

Our sample contains 21,630 first-time mothers who gave birth between 1999 and 2006. For them, we generate a balanced panel that covers 60 months (5 years) before and 120 months (10 years) after birth. As we use six-month observation intervals, this 16-year panel yields 32 observations per woman and a total sample size of 670,530 observations.[16] **Figure 2** depicts the overall development of our samples' labor force status over time: in the first two years after birth up to 18 percent of previously full-time employed mothers take up Minijob employment and the share remains at 14 percent in the long run. In contrast, in the third year after birth, about 25 percent all mothers have returned to regular employment and this share increases to 59 percent 10 years after the first birth.

Our treatment group consists of mothers who were in a Minijob as their main employment in month 13 after birth (N=3,234 or 15 percent of all mothers). Our control group contains mothers who were in regular (part-time or full-time) employment (N=4,618 or 21 percent). The remaining 64 percent of mothers (N=13,778) did not work at all 13 months after birth. Interestingly, among all mothers who are employed at month 13 after their first birth, 41 percent hold a Minijob which underlines the relevance of this labor market institution. As an

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15 Bergemann and Riphahn (2020) show that before 2006, the hazard of returning to the labor force after birth peaked in months 12, 24, and 36 after birth.

16 Given that regular and Minijob employment is registered in our data, we assume non-employment if there is no register entry for a given woman at a particular time. This introduces a measurement error if individuals became civil servants or self-employed, which is not recorded by the social security system. We checked the probability of such events using survey data from the German Socioeconomic Panel Study (SOEP) and found that among mothers who were full-time employed prior to first birth, no more than 3.5 percent shifted into either civil service or self-employment by year 10 after birth. Thus, the measurement error is relatively small and should not affect our results in important ways.

additional control group, we consider a subgroup of regular employees who are in the lowest earnings quartile 13 months after birth (N=1,151 or 5.3 percent of all mothers). We consider this group to be the most comparable to the Minijob employees because they typically work a limited number of hours per week or at moderate earnings. Mothers who temporarily worked on a Minijob before month 13 but stopped before month 13 and mothers who initiate a Minijob after month 13 are both in the control group.

Given that we do not observe fathers, we do not impose any restrictions on the relationship status of the parents. However, during the period of our analysis about 80 percent of all births in West Germany occurred to married mothers (DESTATIS 2020) although the share may be slightly lower for first births.

We focus on two main maternal labor market outcomes: the propensity to be employed in regular (i.e., non-subsidized) employment and gross daily earnings. Following Kleven et al. (2019b), we keep observations with zero earnings for those who are not in employment. In parallel analyses, we drop these observations. Unfortunately, there is no information on working hours, so that we cannot study hourly wages and focus on daily earnings instead.

Figure 3 describes the development of the outcomes for the full sample. The top left panel shows that the share of regularly employed mothers increases in the pre-birth period and (by definition) reaches 100 percent in month 6 prior to birth.[17] The share drops to about zero immediately after birth and then slowly returns to about 40 percent in year 10 after the birth, a decline by 60 percent relative to the pre-birth situation. In the top right panel, we add Minijob employment to look at the changes in overall participation rates. Now the return path to the labor force after birth is somewhat steeper and reaches employment rates of about 60 percent (or minus 40 percent) 10 years after birth. The bottom left panel describes the development of nominal average daily earnings when non-employed mothers contribute a value of zero. We see

[17] Prior to month 6 before birth, some women were not (yet) in fulltime employment, which is why the share increases over time.

that the long-run decline in earnings exceeds the long-run drop in employment. The long-run penalty of about 60 percent matches the survey-based evidence presented by Kleven et al. (2019b). The bottom right panel depicts the development of earnings when only positive earnings of employed mothers are considered. Here, the drop after birth is not as vast and the long-run penalty is slightly lower than on the left hand side, reaching about - 54 percent in the long run.

Table 1 describes the relevant subsamples and the matching quality. Overall, the treatment group of mothers who took up Minijobs after birth was on average younger at birth, had lower pre-birth earnings, longer tenure with their employer, and less pre-birth unemployment experience compared to the control groups. Mothers with Minijobs were also more likely to have vocational training, less likely to have higher education, and worked in smaller establishments pre-birth than the control groups. While we find significant differences in these characteristics in the raw data, the significant differences disappear after we apply the propensity score matching. In section 4.4, we draw on auxiliary survey data to show that we also do not find differences in other dimensions such as household composition or individual attitudes, which we cannot observe in social security records. In each of the comparison groups, our matching procedure finds appropriate matching partners for nearly all treatment observations. **Figures A.2-A.3** in the appendix depict the distribution of propensity scores and show that common support is not a concern.

4. Results

4.1 Baseline results

Our main analysis compares mothers who start out in Minijobs to mothers in regular employment. Panel A of **Table 2** shows our main results for the estimated effects on the probability of being in regular employment and on daily earnings 2, 5, and 10 years after birth relative to the situation 6 months prior to birth. Specifically, the first two rows show the

estimated coefficients on the relevant event time dummies and the corresponding standard errors. The results imply that for mothers who returned to regular employment after birth, the probability of being in regular employment 10 years after birth decreases by 43.2 percent compared to 6 month before birth. The corresponding decrease for Minijobbers is by 51.3 percent, so that the difference between the two groups after 10 years is 8.2 percentage points, which is substantial and statistically significant. This absolute difference implies that after 10 years, Minijobbers experience nearly 20 percent larger decreases in the probability to be regularly employed than the comparison group. The magnitudes of the absolute and relative differences in earnings losses 10 years after birth are similar (see next rows of panel A).

To shed more light on the dynamics over the entire 10-year period, we use a graphical representation of the estimation results. In particular, we plot the change in outcomes over time compared to the situation 6 months prior to birth as a percentage of the counterfactual outcome without a birth. **Figure 4.1** graphically presents our baseline results for the treatment group of mothers who picked up a Minijob after birth in comparison to those matched observations who returned to regular employment after birth. For all outcomes, we observe identical developments for the treatment and the control group until childbirth and sharp differences post-birth. For example, in the top left panel, we see that mothers in Minijobs have a significantly and substantially reduced propensity to return to regular employment for many years after birth but they seem to catch up in the long run. Specifically, 9 to 10 years after birth, their regular employment probability is still below that of mothers who returned to regular employment after birth by nearly 10 percentage points but this difference is statistically not significant. When we add Minijobs to look at 'any employment' (see top right panel), the differences between the two groups disappear. This is an important finding because it suggests that our results are not driven by differences in labor force participation at the extensive margin. Instead, our results imply that for a long time, mothers starting out with a Minijob after birth have a substantially reduced probability of returning to regular employment ('Minijob trap').

Not surprisingly, this disadvantage extends to earnings: the bottom left panel depicts the motherhood penalty in daily earnings when we consider non-employed mothers with a value of zero earnings. The bottom right panel exclusively considers the earnings of employed mothers. The motherhood earnings penalty is rampant for all mothers: they never catch back up to their pre-birth earnings. Additionally, we find a substantial and durable disadvantage for the treatment group of mothers in Minijobs relative to those taking up regular employment after birth: even 10 years after birth, the difference in child penalties between the groups reaches 10 percentage points, which (although not clearly visible in the figure) is statistically significant.

In **Figure 4.2**, we compare the outcomes of mothers who took up a Minijob after birth to those of mothers who returned to regular employment, instead, but with earnings in the bottom quartile of the earnings distribution in month 13 after birth. These are either full-time jobs with low daily earnings or part-time employments. The results are similar to those in **Figure 4.1**: mothers starting out in low-paid regular employment after birth have a significantly higher propensity of regular employment even 8 years after birth (see top left panel) than those taking up Minijob employment early on. However, the differences decline over time and by year 10 are no longer statistically significant. In the first six years after birth, there is also a significant gap in child penalties in earnings (see bottom row), which in the longer run reduces to approximately 6-7 percentage points and turns insignificant.

To show how these earnings losses accumulate over time, **Figure 5** shows the development of cumulative earnings over ten years after the first birth. The left panel implies that by year 10, mothers who started out with a Minijob after birth, accumulate not even one-half of the total labor income of mothers who returned to regular employment after birth. This long-run difference is smaller but still substantial in the right panel, which considers mothers who started out with a low-paid regular job after birth as a comparison group. Over time these differences translate into considerable pension gaps. Overall, we find that taking up a Minijob employment after birth causes long-run disadvantages in earnings and pension claims. This

holds even when we compare mothers who take up Minijobs to those in the bottom quartile of the earnings distribution in month 13 after birth.

4.2 Transmission mechanisms

Several mechanisms may explain the substantially larger and persistent losses in earnings for mothers taking up Minijob employment after birth compared to mothers who return to regular (even if low-paid) employment instead. For example, given that firms typically use Minijobs for low-skill tasks, Minijobbers accumulate a qualitatively different work experience over time. Generally, the work experience accumulated over the life cycle might play an important role in explaining maternal earnings losses after first birth (Costa Dias et al. 2020). We illustrate this in **Figures 6.1** and **6.2** using an event study approach similar to our main analysis. Here, the outcome variables represent the labor market experience in jobs with different types of complexity. Our data report occupation-specific job complexity in four categories: unskilled (level 1), skilled (level 2), complex (level 3), and highly complex (level 4). The vast majority of jobs (about 80 percent) falls into the skilled (level 2) category. To ease interpretation, we focus on labor market experience in unskilled and complex (combined levels 3 and 4) jobs.

Both panels of **Figure 6.1** show that mothers who start out in a Minijob after birth experience significantly more accelerated growth in unskilled labor market experience after birth compared to the control groups.[18] This disadvantage emerges shortly after birth and increases over time. **Figure 6.2** shows the reverse pattern for labor market experience in complex jobs. Note that the accumulation of complex job experience appears to cease after birth

[18] Given the low incidence of unskilled jobs in our data, in **Figure 6.1** we extend the earnings threshold for the definition of low-paid regular employment from the bottom quartile to 40th earnings percentile. Here, using the first-quartile threshold (as in the other figures) leads to implausible and outlying relative effects in the right panel of **Figure 6.1**. For comparability, we also use the 40th percentile when defining low-paid employment in **Figure 6.2** on experience in complex jobs. Nevertheless, **Figure 6.2** looks nearly identical if we use the 25th percentile, which makes us confident that the sensitivity of the results for unskilled jobs (**Figure 6.1**) is solely due to limited outcome variation in the data.

for all mothers. However, this problem is exacerbated by taking up a Minijob after birth. Although statistically insignificant, the gap between Minijobbers and control groups is large in magnitude and widens over time. If experience in more complex jobs yields higher earnings, the pattern can explain the long run earnings disadvantages of Minijobbers. Importantly, we showed in section 4.1 that these results are not driven by labor force participation differences between the treatment and the control groups.

Another potential explanation for the substantially larger long-run earnings penalty for Minijobbers might be connected to differences in the accumulation of firm-specific human capital. This may follow if mothers who take up a Minijob after birth are more likely to change employers than mothers who start out in regular employment post-birth; the latter may be more likely return to their previous employers. In this situation, we expect to observe more volatile employment biographies and more frequent job switches for the Minijobbers. We investigate this issue in **Figures 7.1** and **7.2** again using event study designs.

The outcome in **Figure 7.1** is the probability of having a different employer than the one a mother had six months prior to birth, which we determine using unique establishment identifiers. In this analysis, we exclude mothers who are not employed because they do not have an establishment ID. Both panels confirm that Minijobbers are more likely to leave their pre-birth employer shortly after birth compared to mothers who start out in regular (even if low-paid) employment after birth. However, to some extent, the control groups catch up over time as they also start to leave their pre-birth employers after birth, though somewhat later than the Minijobbers. Consequently, the difference between the treatment and the control groups declines over time. While the gap persists in the long run, it is statistically no longer significant. We extend this analysis to subsequent employer switches in **Figure 7.2** where the outcome variable is the cumulative number of main employers starting 5 years before birth. Generally, we observe a larger number of employers for the Minijobbers. Although the differences are

statistically significant only in the first four years after birth, the gap seems to increase in magnitude over time.

Overall, entering a Minijob employment shortly after birth is closely associated with a long-run disadvantage in the accumulation of qualitatively valuable labor market experience. Minijobbers also experience more volatile employment biographies after birth due to the relatively higher mobility across employers compared to mothers returning to regular employment after birth. These are likely determinants of Minijobbers' larger long-run labor market penalties after childbirth.

4.3 Heterogeneity by prior earnings

Next, we investigate whether the effect of Minijob employment after birth varies by pre-birth earnings reflecting differences in maternal human capital. We group all mothers in three terciles based on their position in the pre-birth earnings distribution. We expect that women with higher human capital suffer higher opportunity costs of not working in a regular job and therefore return to regular employment faster. We also expect that the relative decline in earnings is larger at the upper end of the earnings distribution because human capital depreciation may not be relevant for unskilled employment in the bottom tercile. With respect to the effects of taking up a Minijob instead of regular employment, we expect that Minijobs generate greater earnings losses for previous high earners. However, that group may then leave Minijobs faster in order to return to regular employment than those with low human capital and low earnings before birth.

Figures 8.1 and **8.2** depict the regular employment and earnings outcomes for mothers in Minijobs versus regular employment by pre-birth earnings tercile. **Figure 8.1** indeed shows that those with previously higher earnings are most likely to return to regular employment. At the same time **Figure 8.2** shows that the relative motherhood earnings penalty when regularly employed is highest for those with the highest pre-birth earnings which confirms findings for

the United States (England et al. 2016).[19] While the magnitude of the motherhood penalties differs across the pre-birth earnings distribution, there are no clear patterns with respect to the difference between Minijob and regular employments.

4.4 Robustness checks

To investigate the sensitivity of our estimates, we return to **Table 2** showing the estimated coefficients of the event time dummies for mothers taking up regular employment vs. those in Minijobs. Panel A presents the baseline estimation results as used for the calculation of the relative child penalties depicted in **Figure 4.1**.

Panel B shows the results after using the nearest neighbor instead of radius caliper matching. The estimates hardly differ from those in panel A, with the Minijob penalties being identical.[20] In panel C, we aim to reduce the impact of extreme outliers in our matching procedure by dropping 5 percent of the matched control observations at the tails of the propensity score distributions. Again, the estimated penalties change little. In panel D, we match mothers in Minijobs to mothers in regular employment both measured 18 months after birth instead of defining the treatment in month 13 after birth. The results hardly respond to this change. Next, we inspect whether our results are driven by potential differences in subsequent childbearing. In panel E, we present the estimates after omitting the observations for mothers after their second birth from the sample. The resulting relative disadvantages of Minijob vs. regular employment are now even slightly larger than in our baseline sample. Finally, we consider a sample of mothers who gave birth after the paid parental leave reform in 2007 (see panel F). Due to the time window of the data, we can only evaluate their motherhood penalties

[19] Appendix **Figure A.4** shows the tercile specific results when the outcome measure considers zero valued earnings.

[20] This result is not surprising as mainly the matched control observations change (mothers in regular employment) whereas the group of treated observations (Minijobbers) remains unchanged.

in the first 5 years after birth. However, the patterns of significantly larger employment and earnings penalties with Minijob vs. regular employment are confirmed in this sample as well. In sum, our approach is robust to alternative matching procedures and sample restrictions.

It is also worth noting that all performed sensitivity tests suggest that our main approach yields very conservative results. For example, when looking at the absolute differences in the penalties between Minijobbers and regular employees 10 years after birth, we observe that the 10 percentage point difference in earnings in our baseline approach (see panel A) increases to approximately 13 to 15 percentage points in panels B through D. We observe similar patterns for the employment penalty.

A remaining issue is that the administrative data we use for our estimations do not provide any information on household composition or individual attitudes. Thus, our results would be potentially biased if the treatment and control groups differed in these dimensions. To evaluate the relevance of this issue, we study a similarly defined sample of first-time mothers in survey data from the German Socioeconomic Panel (SOEP). The sample sizes are much smaller, which is an important disadvantage compared to our primary data source. Nevertheless, the SOEP includes relevant information on a woman's household composition and wealth, her attitudes with respect to occupational success, family and children, overall life satisfaction, and the number of subsequent children. Thus, the SOEP allows us to investigate whether mothers who take up a Minijob shortly after birth differ in these characteristics from other mothers**.** Reassuringly, **Figure A.5** shows that this is not the case.[21] Neither the probability of single motherhood nor the household income and wealth, or maternal attitudes differ across the groups. Even the total number of children is almost identical until the first child reaches the age

[21] Given the small sample size, we use an unbalanced panel for **Figure A.5**. The patterns are less smooth but qualitatively similar when we use a reduced sample after balancing the panel.

of 6 and differs only slightly by year 10 after the first birth. Overall, this auxiliary analysis supports the causal interpretation of our main estimates.

4.5 Comparing mothers in Minijob employment to those not employed

So far, we considered (low-paid) regular employment as the relevant alternative to a Minijob employment after birth. Nevertheless, the vast majority of mothers in our data are neither in regular nor in Minijob employment at month 13 after their first birth. Thus, in this section, we complete the picture by extending the main analysis to the matched sample of mothers who start out in a Minijob after birth and those who remain non-employed.

Figure A.6 in the Appendix depicts the baseline results for this control group.[22] We find that over time, Minijob employees are not substantially more likely to subsequently take up regular employment than mothers who are not employed in month 13 after birth (top panels). We also do not observe large long-run differences in earnings (bottom panels**)**. Thus, while the comparison group of initially non-employed mothers, on average, stay out the labor force for longer than Minijobbers, they do not suffer significantly larger earnings losses.

In sum, compared to the large group of mothers who do not return to employment by month 13 after birth, Minijobbers do not enjoy advantages in earnings and regular employment. Therefore, Minijobs do not seem to be a stepping stone to employment for recent mothers who would otherwise remain out of the labor force.

5. Conclusions

The literature documents significant and persistent motherhood penalties, which are particularly large for German mothers (e.g., Kleven et al. 2019a). In this study, we investigate the role of public policy instruments as potential drivers of the motherhood effect for female labor market

[22] **Figure A.7** shows the distribution of the corresponding propensity scores.

outcomes. In particular, we focus on the impact of a large labor market program, the German Minijobs, which refers to subsidized employment relationships where workers earn no more than an upper monthly earnings threshold (400 Euro in our data). The payroll tax subsidy amounts to between 20 and 40 percent of gross earnings, depending on the individual income tax situation. This makes a Minijob more attractive than regular part-time employment over a wide range of gross earnings beyond the Minijob treshold. Although intended as a stepping-stone to regular employment for the unemployed, Minijobs might trap some individuals in unskilled jobs with low earnings (e.g., Blömer and Peichl 2020). This applies especially to mothers who typically reduce their working hours after birth. Surprisingly, so far, there is no research on the unintended and potentially adverse effects of Minijobs for the development of maternal labor market outcomes after birth.

This study uses detailed administrative data on employment biographies to compare the long-run labor market outcomes for mothers who take up Minijob employment after first birth versus those who do not. To address the possibility of endogenous selection into Minijobs after birth, we apply propensity score matching based on a rich set of pre-birth characteristics. Using the matched samples, we then follow the different groups of mothers up to 10 years after birth within an event time study to test whether Minijobs contribute to the long-run motherhood penalties in Germany.

Generally, we confirm the vast child penalties in Germany with maternal post-birth earnings declining by about 60 percent in the long run. This loss is partly due to a persistent 40 percent drop in labor force participation. However, even if within the group of mothers who return to the labor market shortly after birth, the long-run penalty is somewhat lower, we find significant differences depending on the initial job type. Specifically, when we compare the penalties of mothers who start out in a subsidized Minijob employment to observationally identical mothers who return to regular unsubsidized employment after a birth, we find that for

many years, Minijobbers suffer substantially larger motherhood penalties. This applies to both the propensity of regular employment and earnings.

Among mothers who initially take up a Minijob after birth, the long-run earnings penalty after 10 years is 60 percent. For those starting out in regular employment it reaches 50 percent. This absolute difference of 10 percentage points is statistically and economically significant, and implies that Minijobbers experience long-run earnings penalties which are 21 percent larger than for the comparison group. Our robustness tests yield that these are conservative estimates. Consequently, in the long-run, mothers who started out with a Minijob after birth, accumulate only one-half of the labor income of mothers who returned to regular employment after birth. This has considerable implications for maternal pension claims. In line with our results, Germany displays one of the highest gender pension gaps in international comparison (OECD 2021).

When investigating the potential mechanisms behind the negative consequences of Minijobs, we find that the lower earnings and employment opportunities are potentially due to worse job characteristics and losses in firm-specific human capital. Specifically, mothers taking up a Minijob after birth are more likely to accumulate additional labor market experience in unskilled jobs and are less likely to gain experience in complex jobs compared to those who return to regular employment after birth. Minijobbers also more frequently switch employers, which yields more volatile employment biographies.

A comparison against the control group of initially non-employed mothers suggests that Minijob employment does not serve as a stepping stone to the regular labor market for recent mothers. Therefore, we argue that the incentives connected to the Minijob subsidy and their effects on subsequent labor supply choices cause unintended welfare losses for the affected mothers and for society at large.

Overall, our results indicate adverse unintended labor market effects of a payroll tax subsidy program for mothers. The Minijob program seems to fail not only as a stepping stone

into regular employment but it also harms maternal labor market outcomes, increases the aggregate child penalty, and impedes the availability and the continued development of a qualified workforce. Similar public policy programs exist in numerous countries. Therefore, it is important to understand and acknowledge their contribution to motherhood penalties in order to limit their unintended harmful consequences and to facilitate gender convergence in the labor market.

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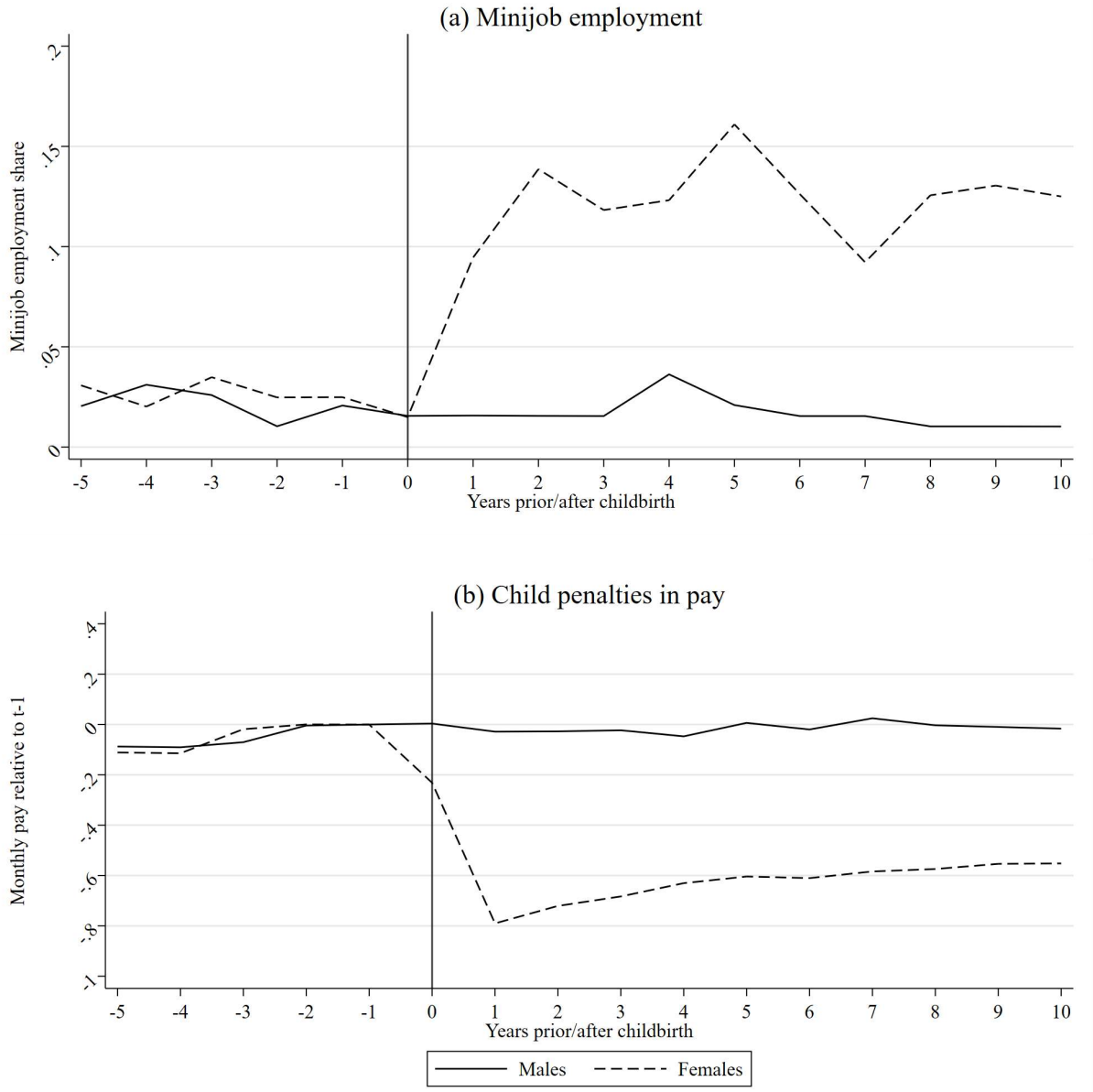
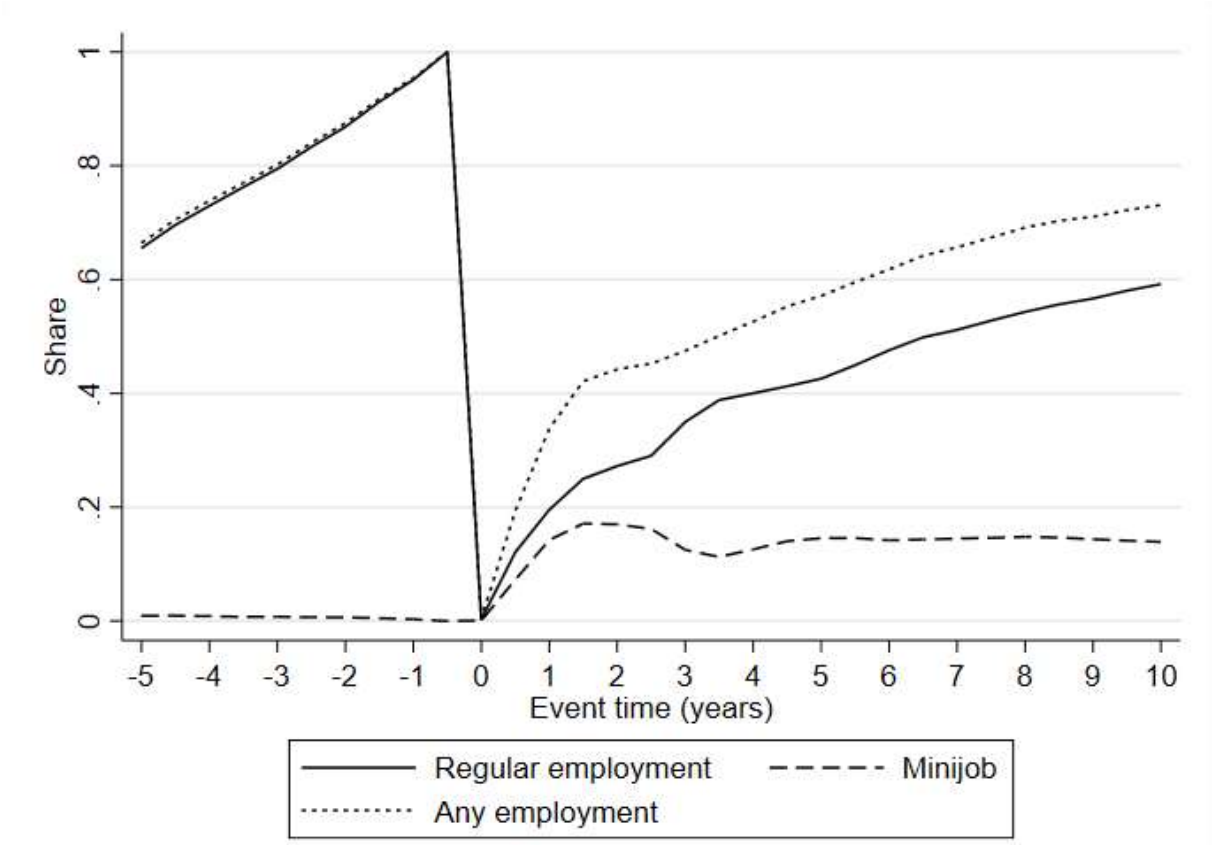
Figure 1 Minijob employment around birth and the motherhood earnings penalty



Note: The Minijob employment share in panel (a) describes the share of Minijob employees among all mothers and fathers. Panel (b) shows the estimated child penalties using the methodology by Kleven et al. (2019b). Thus, it replicates the results for Germany presented in Figure 3 in Kleven et al. (2019a) using a slightly different sample.

Source: SOEP (1984-2018, v35, DOI: 10.5684/soep-core.v35i). The sample contains first-time parents of children born between January 1999 and December of 2006 where the parents are observed every year between 5 years before having their first child and 10 years thereafter. Only individuals in West Germany are considered.

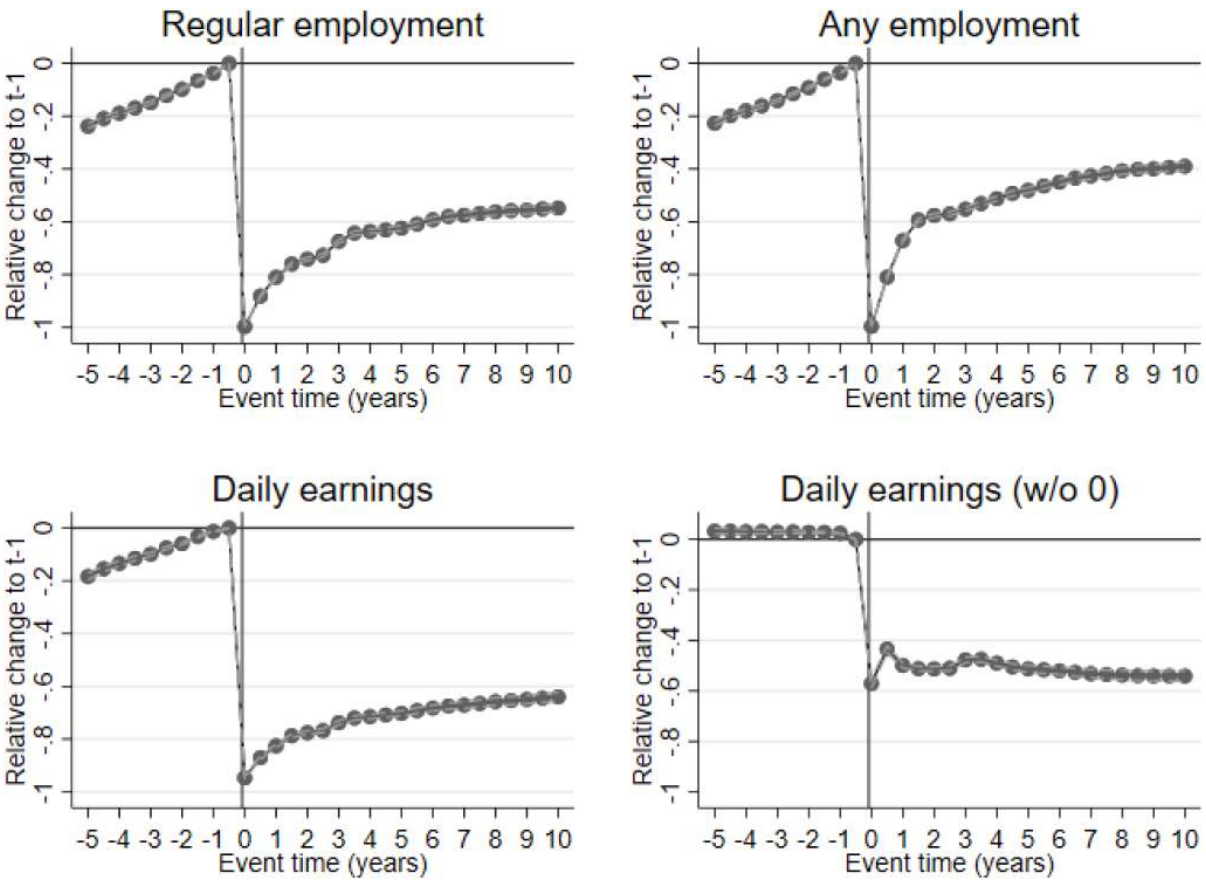
Figure 2 Development of labor force status of sampled mothers over time



Note: The x-axis shows the time relative to the event of first childbirth (indexed to 0). Regular employment refers to full-time and part-time jobs subject to social security contributions and income tax. Minijobs are exempt from these, otherwise mandatory, contributions. Any employment provides the sum of regular employment and Minijobs.

Source: SIAB (1999-2017) and own calculations.

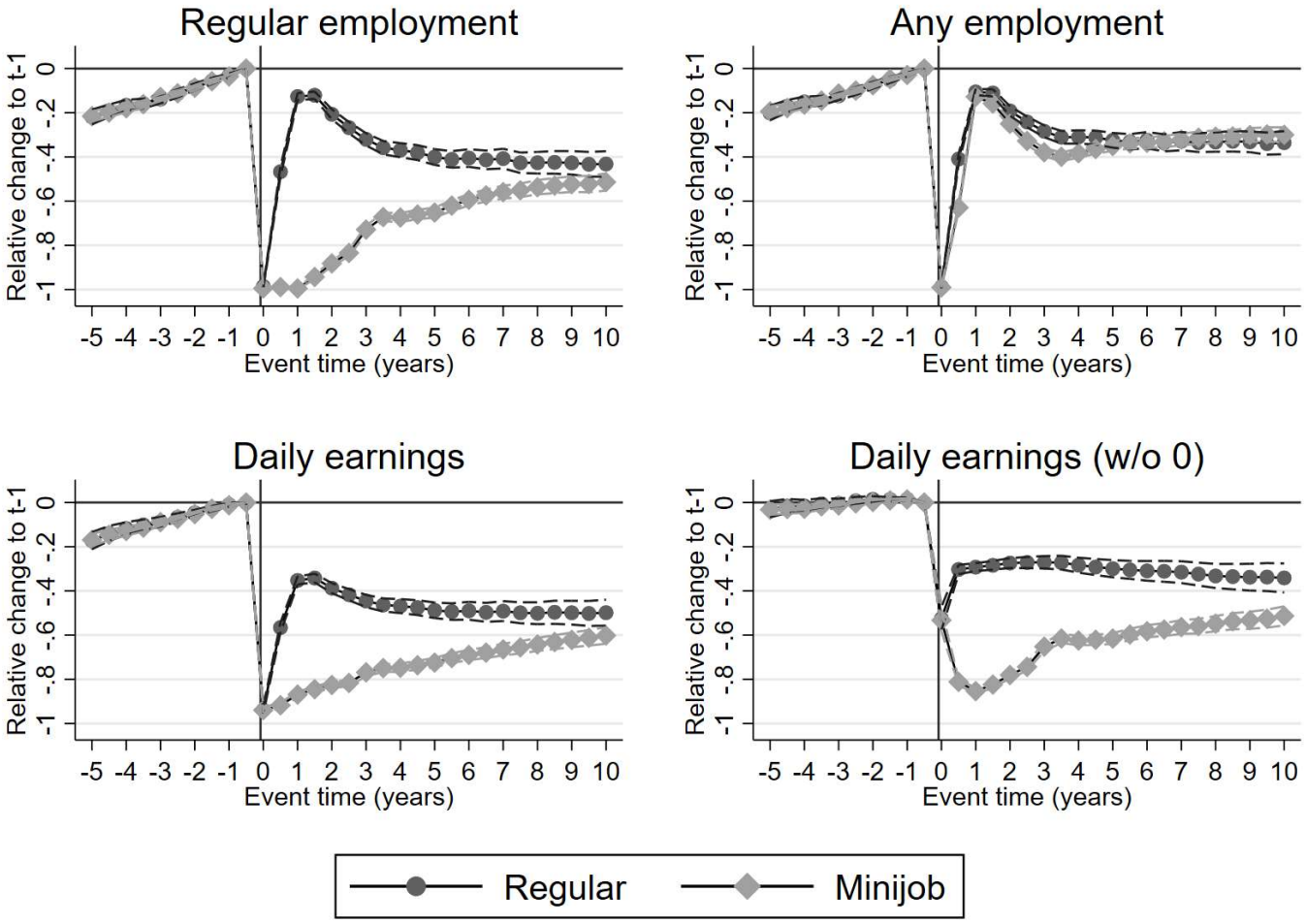
Figure 3 Development of outcome measures for the full sample



Note: The x-axis shows the time relative to the event of first childbirth (indexed to 0). The dots depict the employment status and pay at child's age t relative to the respective outcome 6 months prior to birth and net of age and year-specific effects. The shaded areas represent 95 percent confidence intervals, which turn out to be rather narrow. The estimation samples cover the period from 60 months prior to 120 months post birth.

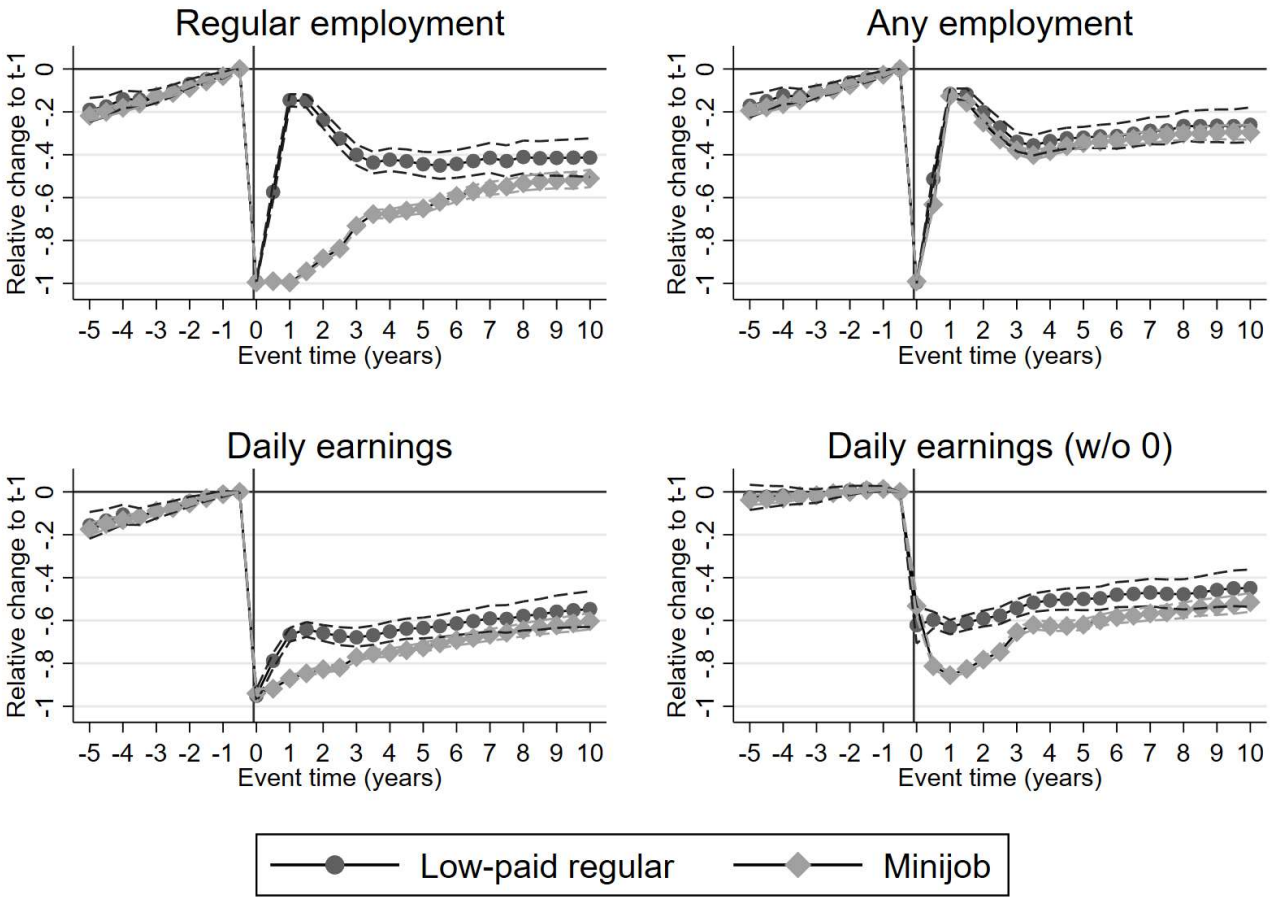
Source: SIAB (1999-2017) and own calculations.

Figure 4.1 Motherhood penalties for mothers starting out in Minijob (treatment) versus in regular employment after birth (control) for four outcomes



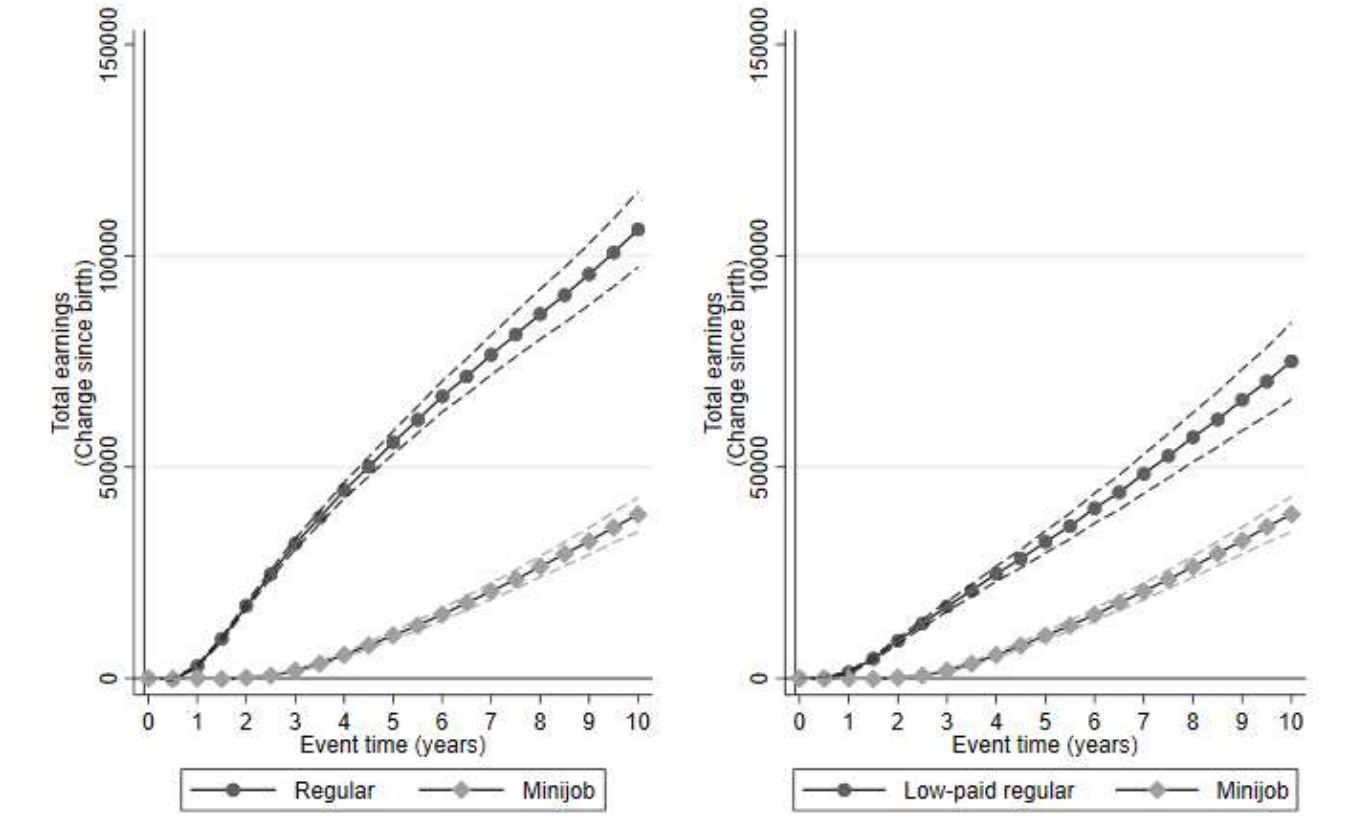
Note: The x-axis is indexed to 0 in the month of birth. The figures show the employment status and pay at child's age t relative to the respective outcome 6 months prior to birth. The estimation samples are a result of a matching of the treatment group (Minijob) to the control group of regularly employed mothers. The figures show 95 percent confidence intervals and cover the period from 60 months prior to 120 months post birth.
Source: SIAB (1999-2017) and own calculations.

Figure 4.2 Motherhood penalties for mothers starting out in Minijob (treatment) versus low-paid regular employment after birth (control) for four outcomes



Note: The x-axis is indexed to 0 in the month of birth. The figures show the employment status and pay at child's age t relative to the respective outcome 6 months prior to birth. The estimation samples are a result of a matching of the treatment group (Minijob) to the control group of low-paid regularly employed mothers (bottom earnings quartile). The figures show 95 percent confidence intervals and cover the period from 60 months prior to 120 months post birth.
Source: SIAB (1999-2017) and own calculations.

Figure 5 Post-birth cumulative earnings for mothers starting out in Minijob versus regular employment (left panel) and versus low-paid regular employment (right panel) after birth



Note: The x-axis is indexed to 0 in the month of birth. The figures show the sum of post-birth earnings (in 2010 EUR) at child's age t net-of age and year-specific effects. The samples are a result of a matching of the treatment group (Minijob) to the two alternative groups. The figures show 95 percent confidence intervals and cover the period from 60 months prior to 120 months post birth.

Source: SIAB (1999-2017) and own calculations.

Figure 6.1 Labor market experience in unskilled jobs for mothers starting out in Minijob versus those in regular (left panel) and low-paid regular employment (right panel) after birth

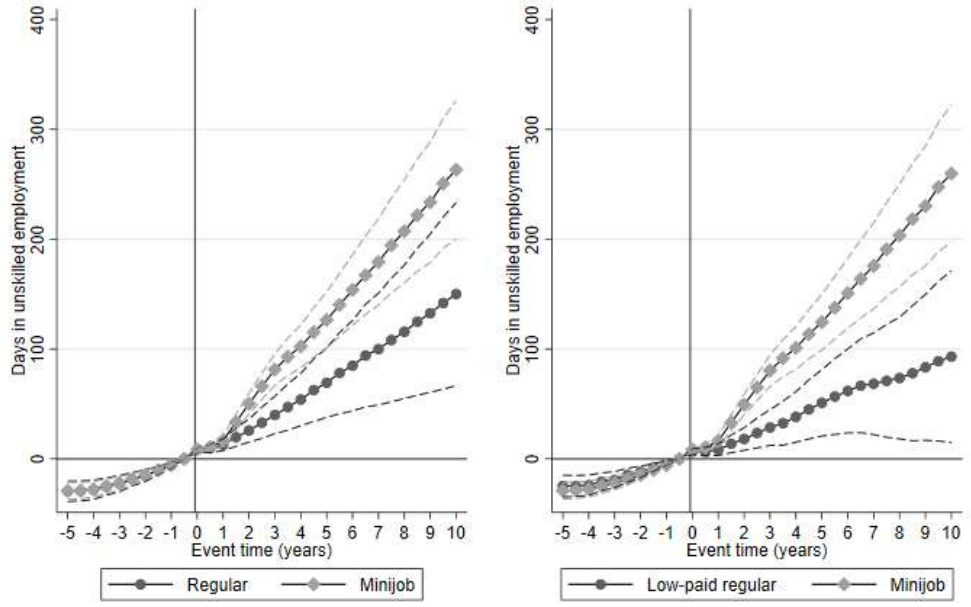
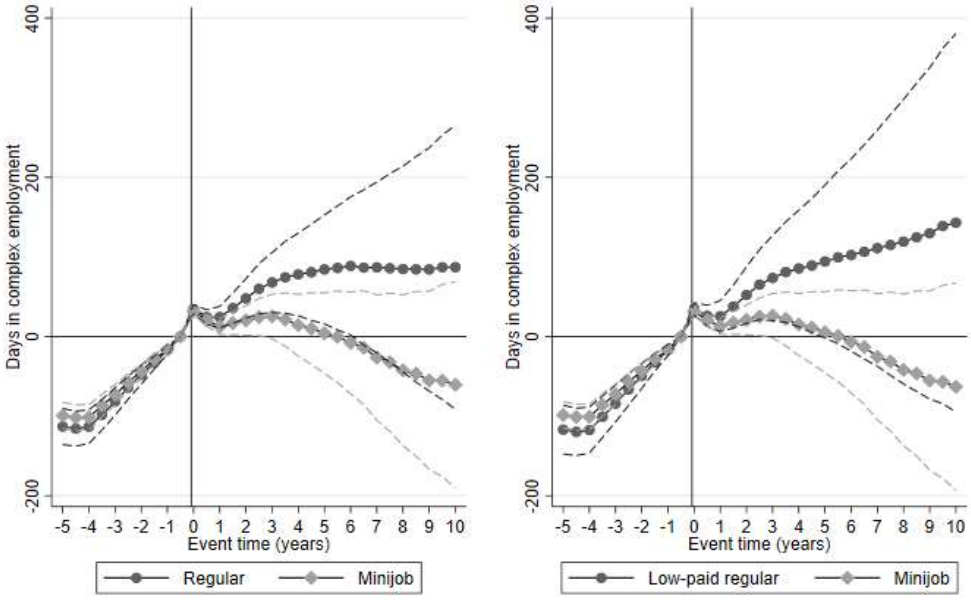


Figure 6.2 Labor market experience (in days) in complex jobs for mothers starting out in Minijob versus those in regular employment (left panel) and low-paid regular employment (right panel) after birth



Note: The x-axis is indexed to 0 in the month of birth. The x-axis is indexed to 0 in the month of birth. The figures show maternal labor market experience by job complexity at child's age t. The estimation samples are a result of a matching of the treatment group (Minijob) to the two alternative groups. The figures show 95 percent confidence intervals and cover the period from 60 months prior to 120 months post birth.
Source: SIAB (1999-2017) and own calculations.

Figure 7.1 Change of the pre-birth employer for mothers starting out in Minijob versus those in regular employment (left panel) and low-paid regular employment (right panel) after birth

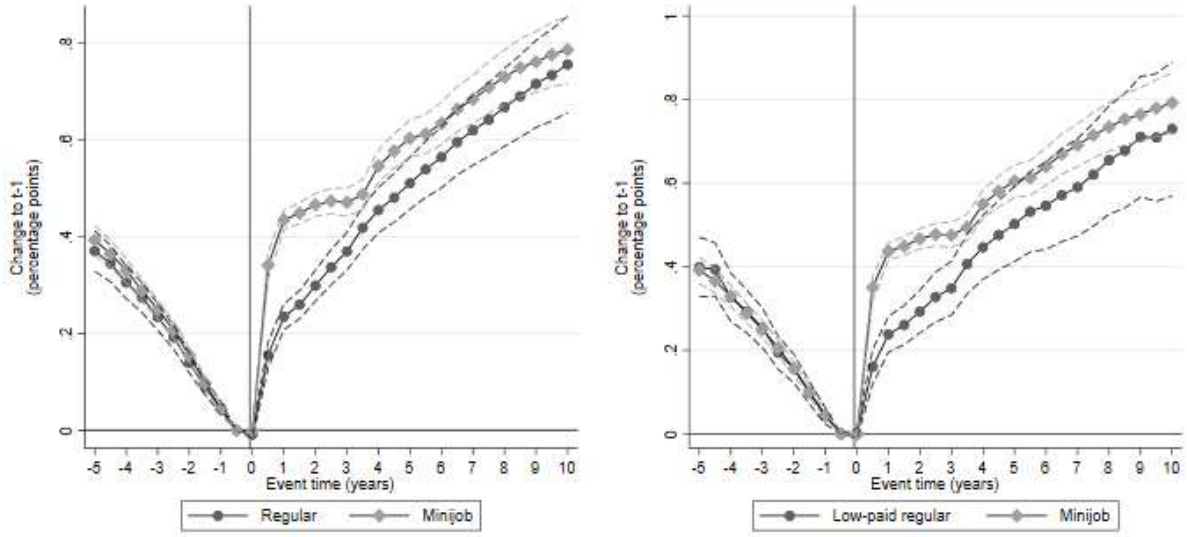
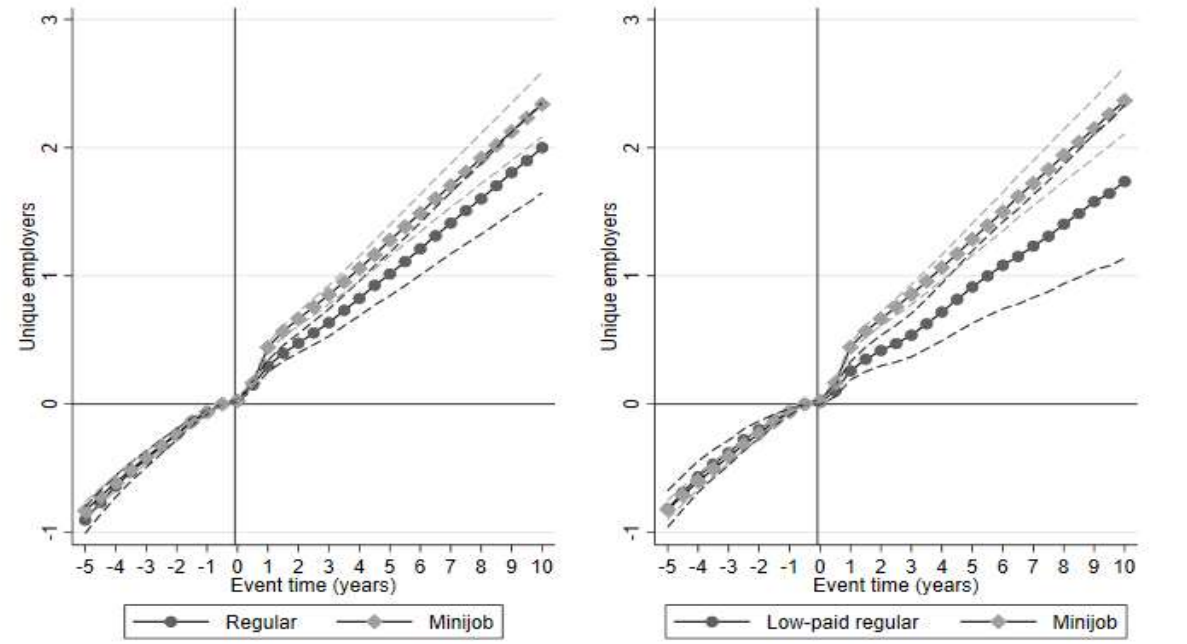


Figure 7.2 Number of employers for mothers starting out in Minijob versus those in regular employment (left panel) and low-paid regular employment (right panel) after birth



Note: The x-axis is indexed to 0 in the month of birth. **Figure 7.1** shows the probability of a change in the establishment number at child's age t compared to the establishment number 6 months prior to birth. **Figure 7.2** shows the cumulative number of unique employers starting 5 years before birth and up to a child's age t. The estimation samples are a result of a matching of the treatment group (Minijob) to the two alternative groups. The figures show 95 percent confidence intervals and cover the period from 60 months prior to 120 months post birth.
Source: SIAB (1999-2017) and own calculations.

Figure 8.1 Baseline results for the probability of regular employment by pre-birth earnings (Minijob vs. regular employment)

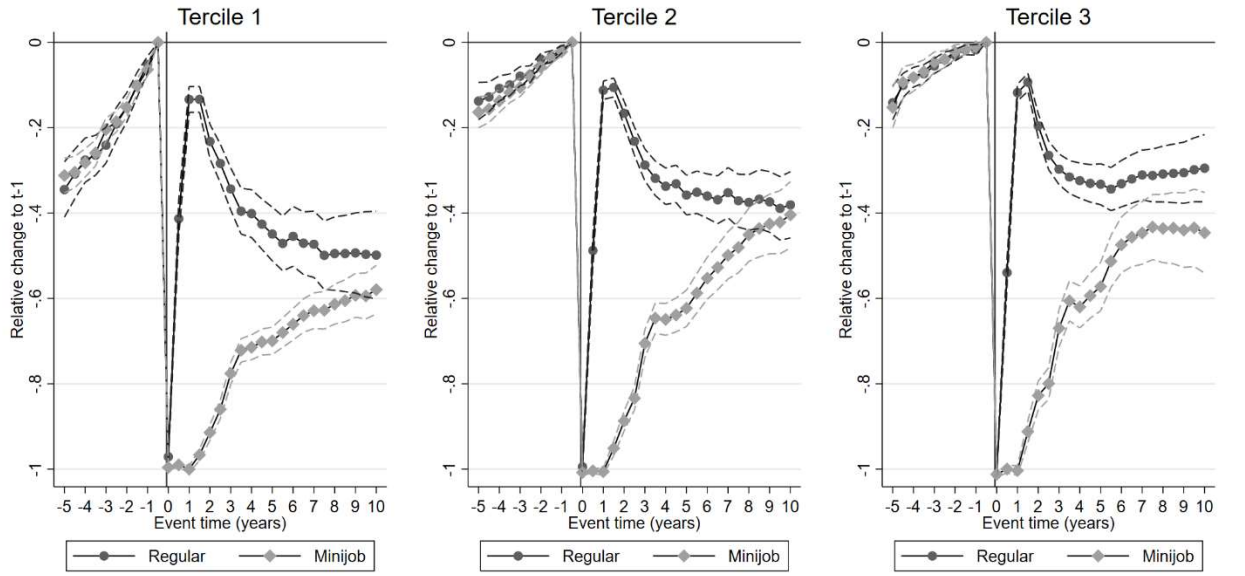
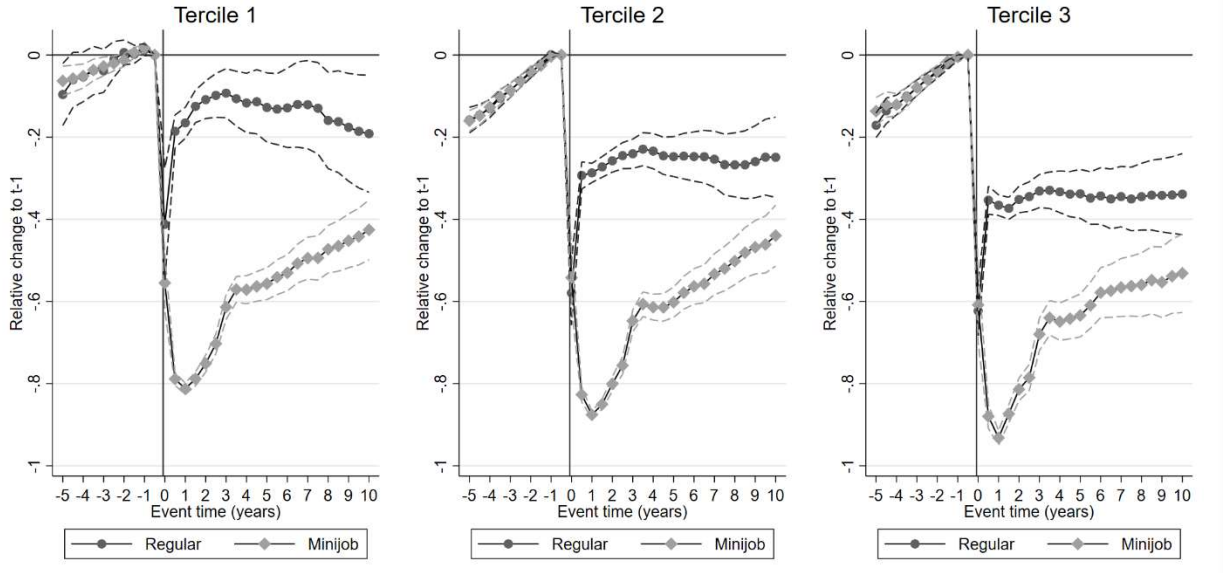


Figure 8.2 Baseline results for earnings excluding zero values by pre-birth earnings (Minijob vs. regular employment)



Note: Terciles are defined based on the earnings distribution 6 months prior to birth. Tercile 1 reflects the lowest and tercile 3 the highest earning mothers. The x-axis is indexed to 0 in the month of birth. The figures show the employment status (top) and pay (bottom) at child's age t relative to the respective outcome 6 months prior to birth. The estimation samples are a result of a matching of the treatment group (Minijob) to the control group of regularly employed mothers. The figures show 95 percent confidence intervals and cover the period from 60 months prior to 120 months post birth.

Source: SIAB (1999-2017) and own calculations.

Table 1 Balancing of covariates

		Minijob	Low-paid regular		Minijob	Regular employee		Minijob	Not employed	
		Mean	Mean	Diff	Mean	Mean	Diff	Mean	Mean	Diff
Age at birth	U	28.351	28.993	-0.642 ***	28.351	30.305	-1.954 ***	28.351	29.262	-0.911 ***
	M	28.405	28.412	-0.007	28.380	28.481	-0.101	28.362	28.339	0.023
Daily earnings 6 ms pre-birth	U	66.614	73.621	-7.007 ***	66.614	88.786	-22.172 ***	66.614	73.148	-6.534 ***
	M	67.280	66.903	0.377	67.274	66.767	0.507	66.683	66.186	0.497
Reg. employed 12 ms pre birth	U	0.958	0.948	0.010	0.958	0.964	-0.006	0.958	0.945	0.013 **
	M	0.958	0.963	-0.005	0.967	0.959	0.008	0.957	0.960	-0.003
Labor Market Experience										
Tenure pre-birth (years)	U	4.740	4.500	0.240 +	4.740	4.590	0.150 +	4.740	4.501	0.239 **
	M	4.714	4.566	0.148	4.710	4.652	0.058	4.733	4.694	0.039
Experience pre-birth (years)	U	9.607	9.268	0.339 **	9.607	9.795	-0.188 +	9.607	9.477	0.130
	M	9.614	9.500	0.114	9.574	9.578	-0.004	9.607	9.575	0.032
Unemploym. exp. pre-birth (years)	U	0.212	0.220	-0.008	0.212	0.229	-0.017 ***	0.212	0.282	-0.070 ***
	M	0.214	0.221	-0.007	0.214	0.214	0.000	0.213	0.219	-0.006
Minijob exper. pre-birth (years)	U	0.052	0.062	-0.010	0.052	0.047	0.005	0.052	0.045	0.007
	M	0.054	0.046	0.008	0.052	0.057	-0.005	0.052	0.050	0.002
Education										
No vocational Training	U	0.052	0.059	-0.007	0.052	0.051	0.001	0.052	0.079	-0.027 ***
	M	0.050	0.048	0.002	0.054	0.055	-0.001	0.052	0.053	-0.001
Vocational Training	U	0.745	0.652	0.093 ***	0.745	0.557	0.188 ***	0.745	0.645	0.100 ***
	M	0.742	0.737	0.005	0.740	0.724	0.016	0.744	0.748	-0.004
Upper Secondary	U	0.032	0.037	-0.005	0.032	0.043	-0.011 **	0.032	0.037	-0.005
	M	0.033	0.030	0.003	0.032	0.040	-0.008	0.032	0.031	0.001
Upper Secondary + voc training	U	0.109	0.153	-0.044 ***	0.109	0.153	-0.044 ***	0.109	0.133	-0.024 ***
	M	0.112	0.119	-0.007	0.109	0.118	-0.009	0.109	0.107	0.002
Tertiary degree	U	0.062	0.100	-0.038 ***	0.062	0.196	-0.134 ***	0.062	0.105	-0.043 ***
	M	0.062	0.066	-0.004	0.064	0.064	0.000	0.053	0.061	-0.008
Establishment size										
1 to 9	U	0.292	0.205	0.087 ***	0.292	0.130	0.162 ***	0.292	0.194	0.098 ***
	M	0.287	0.288	-0.001	0.278	0.281	-0.003	0.291	0.291	0.000
10 to 19	U	0.159	0.117	0.042 ***	0.159	0.095	0.064 ***	0.159	0.111	0.048 ***
	M	0.157	0.151	0.006	0.157	0.159	-0.002	0.157	0.159	-0.002
20 to 49	U	0.159	0.133	0.026 *	0.159	0.129	0.030 ***	0.159	0.127	0.032 ***
	M	0.160	0.175	-0.015	0.162	0.159	0.003	0.159	0.157	0.002
50 to 99	U	0.106	0.107	-0.001	0.106	0.108	-0.002	0.106	0.113	-0.007
	M	0.107	0.110	-0.003	0.108	0.110	-0.002	0.106	0.107	-0.001
100 to 199	U	0.086	0.083	0.003	0.086	0.102	-0.016 *	0.086	0.116	-0.030 ***
	M	0.085	0.080	0.005	0.088	0.086	0.002	0.086	0.085	0.001
200 to 499	U	0.088	0.140	-0.052 ***	0.088	0.159	-0.071 ***	0.088	0.140	-0.052 ***
	M	0.091	0.096	-0.005	0.091	0.094	-0.003	0.088	0.089	-0.001
more than 500	U	0.111	0.215	-0.104 ***	0.111	0.277	-0.166 ***	0.111	0.199	-0.088 ***
	M	0.114	0.100	0.014	0.115	0.111	0.004	0.112	0.112	0.000
Job complexity										
Unskilled job	U	0.027	0.028	-0.001	0.027	0.026	0.001	0.027	0.031	-0.004
	M	0.025	0.022	0.003	0.028	0.028	0.000	0.027	0.028	-0.001
Skilled job	U	0.835	0.789	0.046 ***	0.835	0.734	0.101 ***	0.835	0.823	0.012
	M	0.834	0.817	0.017 +	0.831	0.823	0.008	0.839	0.840	-0.001
Complex job	U	0.050	0.051	-0.001	0.050	0.055	-0.005	0.050	0.050	0.000
	M	0.051	0.064	-0.013 *	0.051	0.056	-0.005	0.050	0.051	-0.001
Highly complex job	U	0.088	0.133	-0.045 ***	0.088	0.185	-0.097	0.088	0.095	-0.007
	M	0.091	0.097	-0.006	0.090	0.093	-0.003	0.084	0.082	0.002
Number of mothers	U	3,234	1,151		3,234	4,618		3,234	13,778	
	M	2,964	1,078		3,124	4,179		3,214	13,731	

Note: U and M stand for unmatched and matched. In addition to the shown covariates, our matching procedure also uses federal state at birth (dummies), quarter of birth of child (dummies), year of birth of child (dummies), daily earnings prior to birth (dummies), labor force participation prior to birth (dummies).

Source: SIAB (1999-2017) and own calculations.

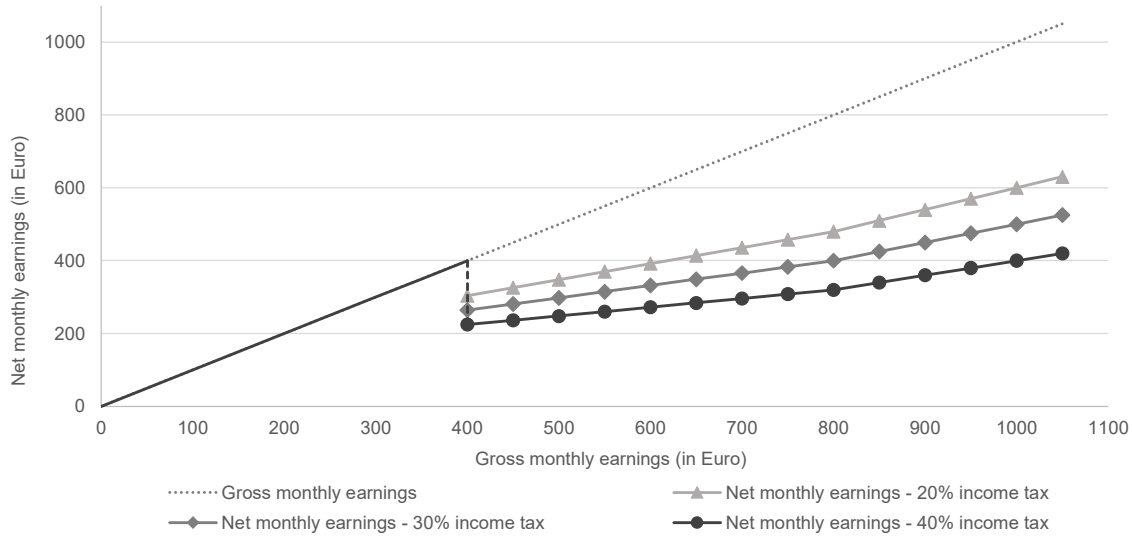
Table 2 Estimation results

		2 Years after birth		5 Years after birth		10 Years after birth	
		b	se	b	se	b	se
(A) Baseline							
Regular Employment	Regular	-0.207***	(0.011)	-0.400***	(0.018)	-0.432***	(0.030)
	Minijob	-0.882***	(0.007)	-0.651***	(0.012)	-0.513***	(0.020)
	Absolute Diff.	0.675***	(0.013)	0.251***	(0.022)	0.082***	(0.036)
	Relative Diff.	-327%		-63%		-19%	
Daily Earnings (incl. 0)	Regular	-0.387***	(0.012)	-0.488***	(0.017)	-0.498***	(0.030)
	Minijob	-0.825***	(0.007)	-0.724***	(0.011)	-0.602***	(0.019)
	Absolute Diff.	0.438***	(0.014)	0.237***	(0.020)	0.103***	(0.036)
	Relative Diff.	-113%		-49%		-21%	
(B) 1 Nearest Neighbor matching, caliper 0.001							
Regular Employment	Regular	-0.216***	(0.014)	-0.388***	(0.021)	-0.376***	(0.034)
	Minijob	-0.882***	(0.007)	-0.651***	(0.012)	-0.513***	(0.020)
	Absolute Diff.	0.665***	(0.016)	0.263***	(0.024)	0.137***	(0.040)
Daily Earnings (incl. 0)	Regular	-0.398***	(0.015)	-0.488***	(0.023)	-0.468***	(0.039)
	Minijob	-0.825***	(0.007)	-0.724***	(0.011)	-0.602***	(0.019)
	Absolute Diff.	0.427***	(0.017)	0.236***	(0.025)	0.134***	(0.043)
(C) Drop bottom and top 5% of matching weights							
Regular Employment	Regular	-0.204***	(0.009)	-0.377***	(0.015)	-0.391***	(0.025)
	Minijob	-0.882***	(0.007)	-0.651***	(0.012)	-0.513***	(0.020)
	Absolute Diff.	0.678***	(0.012)	0.274***	(0.019)	0.122***	(0.032)
Daily Earnings (incl. 0)	Regular	-0.394***	(0.010)	-0.480***	(0.016)	-0.472***	(0.026)
	Minijob	-0.825***	(0.007)	-0.724***	(0.011)	-0.602***	(0.019)
	Absolute Diff.	0.432***	(0.013)	0.245***	(0.019)	0.129***	(0.032)
(D) Matching 18 months after birth							
Regular Employment	Regular	-0.155***	(0.010)	-0.378***	(0.018)	-0.383***	(0.029)
	Minijob	-0.925***	(0.006)	-0.658***	(0.012)	-0.515***	(0.021)
	Absolute Diff.	0.770***	(0.012)	0.280***	(0.022)	0.132***	(0.036)
Daily Earnings (incl. 0)	Regular	-0.355***	(0.011)	-0.460***	(0.019)	-0.448***	(0.032)
	Minijob	-0.841***	(0.008)	-0.729***	(0.011)	-0.606***	(0.019)
	Absolute Diff.	0.486***	(0.014)	0.269***	(0.022)	0.158***	(0.037)
(E) Dropping mothers after identified second birth							
Regular Employment	Regular	-0.142***	(0.009)	-0.244***	(0.017)	-0.287***	(0.034)
	Minijob	-0.883***	(0.007)	-0.606***	(0.013)	-0.524***	(0.023)
	Absolute Diff.	0.741***	(0.011)	0.362***	(0.022)	0.237***	(0.041)
Daily Earnings (incl. 0)	Regular	-0.384***	(0.010)	-0.366***	(0.019)	-0.370***	(0.037)
	Minijob	-0.827***	(0.007)	-0.695***	(0.012)	-0.595***	(0.022)
	Absolute Diff.	0.443***	(0.012)	0.329***	(0.022)	0.225***	(0.043)
(F) Births 2007-2012							
Regular Employment	Regular	-0.183***	(0.012)	-0.321***	(0.020)	-	
	Minijob	-0.758***	(0.013)	-0.560***	(0.023)	-	
	Absolute Diff.	0.575***	(0.018)	0.239***	(0.031)	-	
Daily Earnings (incl. 0)	Regular	-0.370***	(0.013)	-0.428***	(0.023)	-	
	Minijob	-0.752***	(0.013)	-0.646***	(0.021)	-	
	Absolute Diff.	0.381***	(0.018)	0.217***	(0.032)	-	

Note: In each panel, the first two rows show the estimated coefficients on selected event time dummies (i.e., 2, 5, and 10 years after birth). Each row comes from a separate linear estimation

of equation 1 in the matched samples of mothers who returned to regular employment after birth and those who took up a Minijob after birth, respectively. The third row in each panel shows the absolute difference in the estimates between the two groups. The fourth row in panel A provides the ratio of the absolute difference over the coefficient of regular employment.
Source: SIAB (1999-2017) and own calculations.

Figure A.1 Tax schedule in the Minijob earnings range (as of 2003)



Note: Own presentation based on actual total social insurance contributions of 20 percent and assumed average tax rates of 20, 30, and 40 percent.

Figure A.2 Propensity score distributions when matching mothers starting out in Minijob (treatment) and regular employment after birth

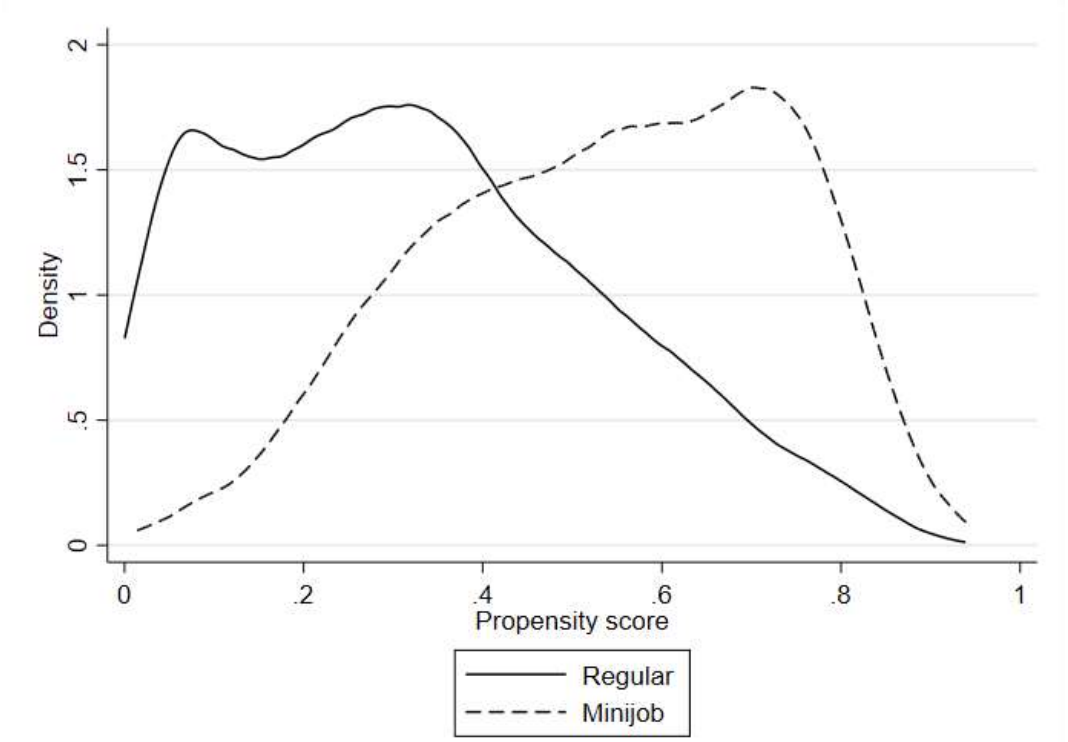
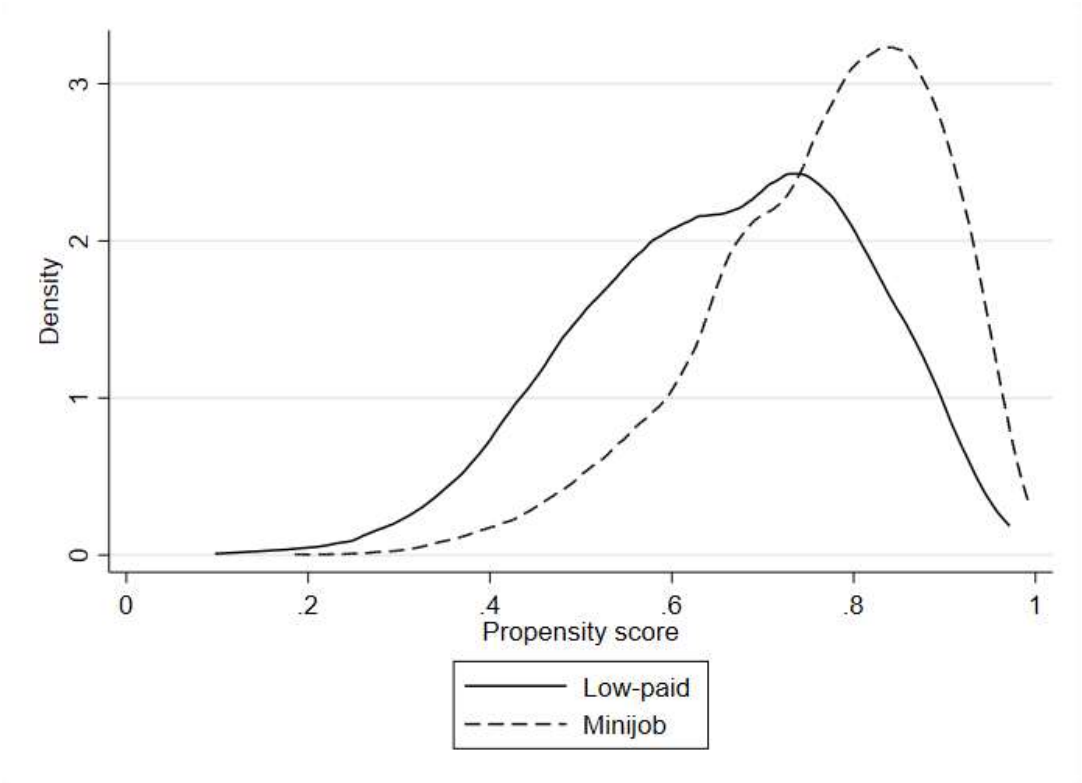
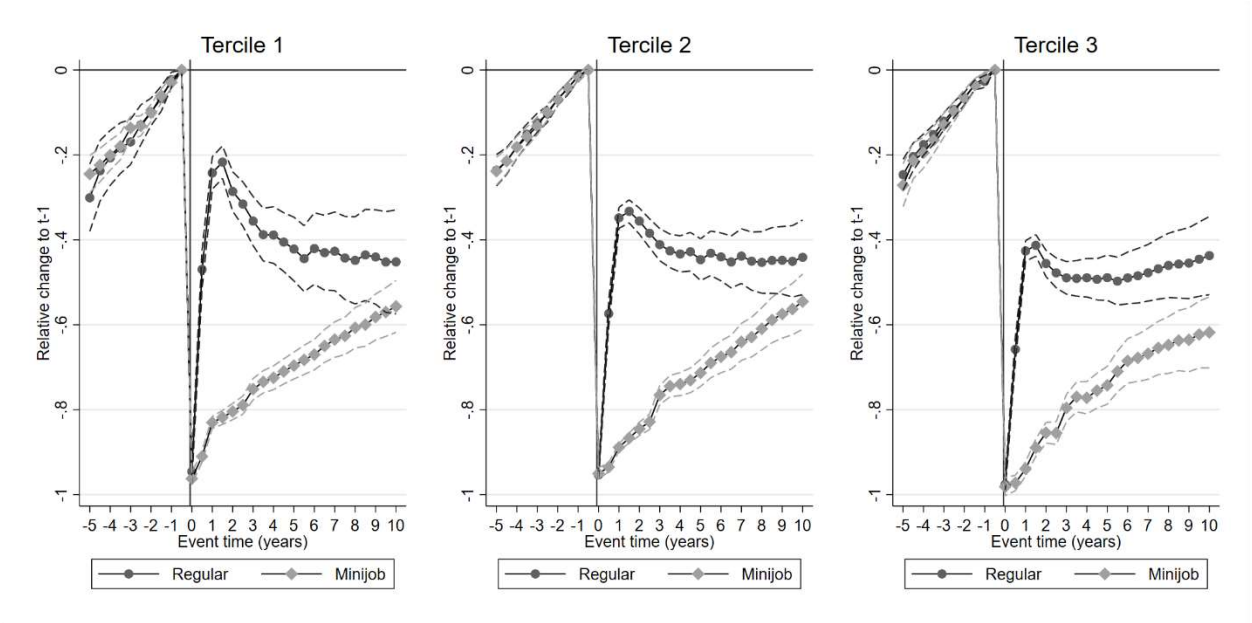


Figure A.3 Propensity score distributions when matching mothers starting out in Minijob (treatment) and low-paid regular employment after birth



Source: SIAB (1999-2017) and own calculations.

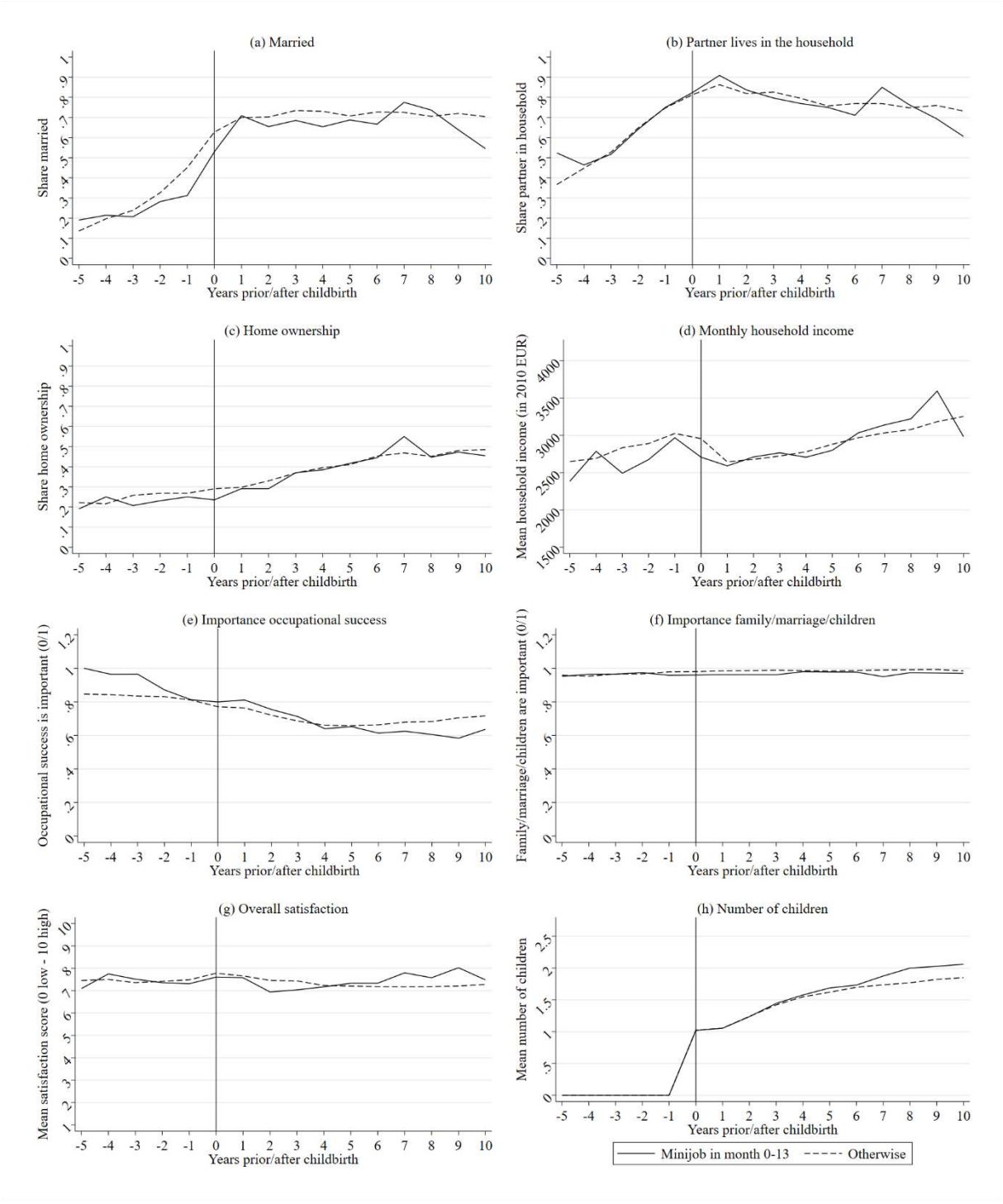
Figure A.4 Baseline results for earnings including zero values by pre-birth earnings (Minijob vs. regular employment)



Note: Terciles are defined based on the earnings distribution 6 months prior to birth. Tercile 1 reflects the lowest and tercile 3 the highest earning mothers. The x-axis is indexed to 0 in the month of birth. The figures show the employment status (top) and pay (bottom) at child's age t relative to the respective outcome 6 months prior to birth. The estimation samples are a result of a matching of the treatment group (Minijob) to the control group of regularly employed. The figures show 95 percent confidence intervals and cover the period from 60 months prior to 120 months post birth.

Source: SIAB (1999-2017) and own calculations.

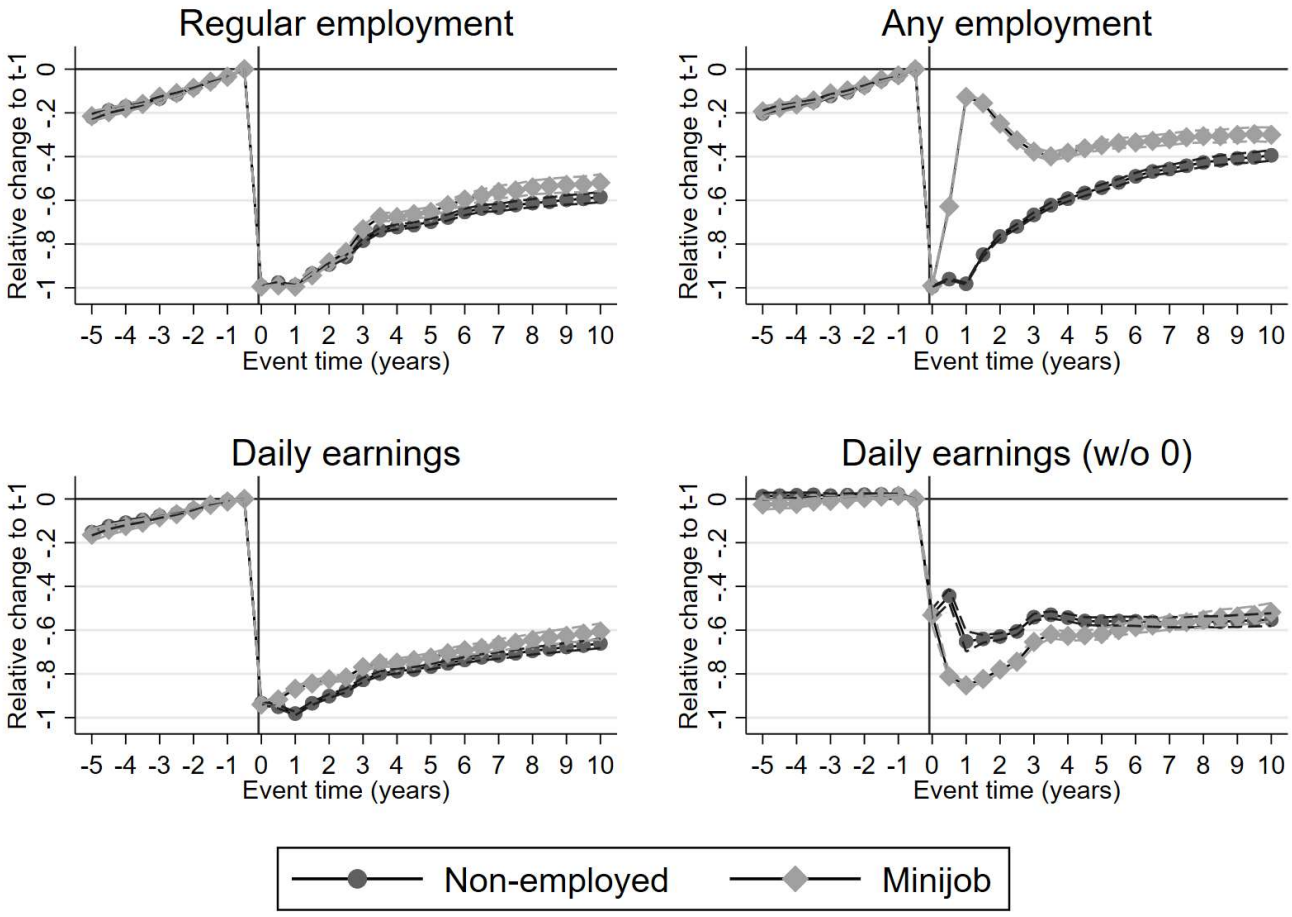
Figure A.5 Household characteristics and attitudes around birth for mothers starting out in Minijob employment after birth and remaining mothers



Note: The sample contains an unbalanced panel of 3,090 first-time mothers of children born between January 1999 and December of 2006 in West Germany. 55 of these mothers took up a Minijob in months 0-13 after birth.

Source: SOEP (1984-2018, v35, 10.5684/soep-core.v35i).

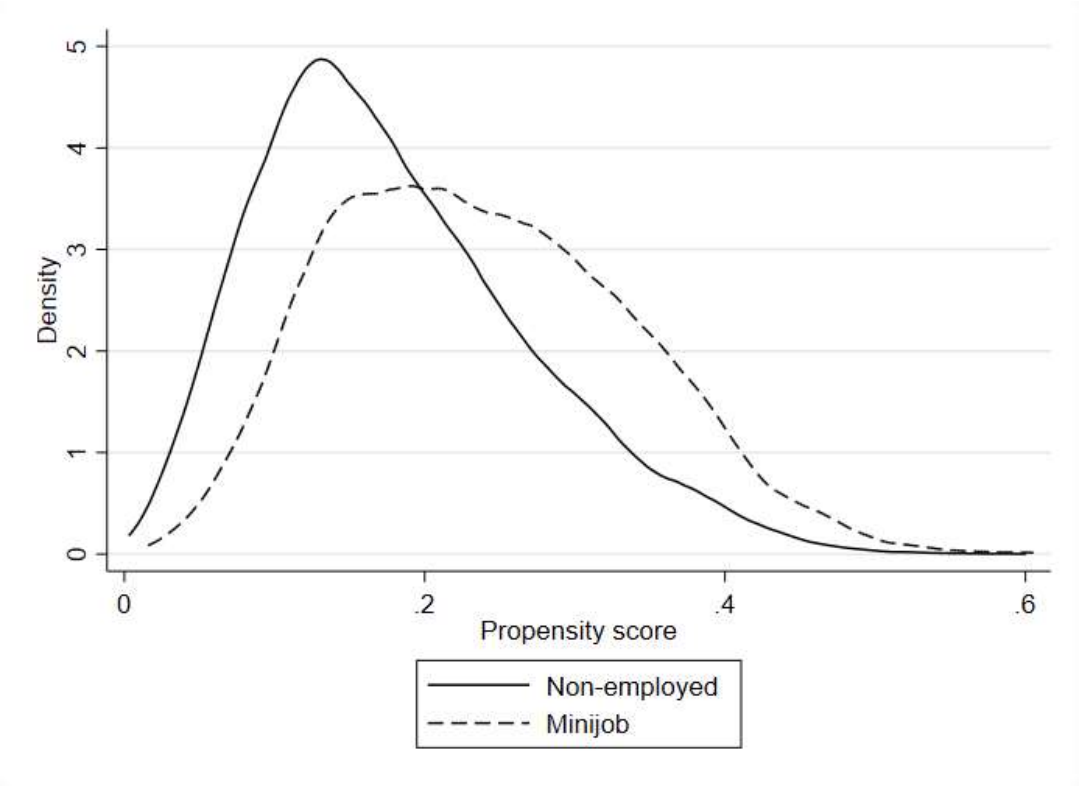
Figure A.6 Motherhood penalties for mothers starting out in Minijob versus those not employed after birth



Note: The x-axis is indexed to 0 in the month of birth. The figures show the employment status and pay at child's age t relative to the respective outcome 6 months prior to birth. The estimation samples are a result of a matching of the treatment group (Minijob) to the control group of non-employed mothers. The figures show 95 percent confidence intervals and cover the period from 60 months prior to 120 months post birth.

Source: SIAB (1999-2017) and own calculations.

Figure A.7 Propensity score distributions when matching mothers starting out in Minijob (treatment) and non-employment after birth



Source: SIAB (1999-2017) and own calculations.