The Supply of Nursing Labor in French Hospitals: Outflows, Part-Time Work and Motherhood*

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Abstract

This paper quantifies the supply of nursing labor in French hospitals over the course of hospital nurses' careers, using detailed longitudinal payroll tax data matched with birth certificates and census data. Over the first ten years of their careers, the nursing hours supplied to hospitals decrease by more than a third on average. This decline is primarily driven by hospital nurses leaving these positions, and to a lesser extent by transitions to part-time schedules within hospital nursing jobs. Nurses who leave hospital positions predominantly transition to other jobs, usually within the healthcare sector, rather than to non-employment. These job transitions are mostly unrelated to motherhood, whereas having children frequently leads mothers to switch to part-time schedules within hospital nursing jobs. In fact, without the effect of motherhood, the prevalence of part-time work among hospital nurses would be significantly lower. Finally, while hospitals offset the loss of nursing hours due to unanticipated staff departures by hiring new nurses, they struggle to compensate for nursing hours lost to part-time transitions.

Keywords: Nursing, hospitals, labor supply, maternal labor supply, event-study.

JEL Classification: I10, I11, J13, J16, J22.

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1 Introduction

The insufficient supply of nurses has been a concern in most advanced economies for over two decades (see Shields, 2004, for instance). Since nursing labor directly and positively impacts patients' health outcomes (Propper and Van Reenen, 2010; Gruber and Kleiner, 2012; Friedrich and Hackmann, 2021), this shortage may lead to adverse health effects. The Covid-19 crisis, which further intensified the pressure on healthcare workers, has made this issue particularly urgent, prompting policy-makers and experts to worry about potential increases in outflows and decreases in inflows of nurses. In France specifically, these concerns triggered substantial pay increases for public-sector healthcare workers in 2020-2021, exceeding 15% of their net wages. These measures were aimed at discouraging current workers from leaving their careers and attracting additional workers.

On the supply side of the nursing labor market, addressing this concern involves three potential margins. The first pertains to whether a sufficient number of individuals begin nursing careers, which primarily depends on nurse training. The second relates to the length of these careers, largely determined by the strength of outflows. The third concerns the amount of nursing labor delivered by nurses over the course of their careers.

This paper focuses on the last two margins: given that some individuals become nurses, it examines how many of them leave the profession over time and how many hours of nursing labor they supply while holding nursing jobs.[1] The analysis spans a 30-year period (1988–2019) in France, relying on detailed longitudinal data from administrative registers. It focuses specifically on hospital nurses, who represent the majority of the nursing profession in France, and the nursing labor they supply to hospitals.[2] Ultimately, it investigates how many hours of nursing labor individuals who start their careers as hospital nurses supply to hospitals over time. This combines the two margins of interest, as these hours drop to zero once nurses leave hospital jobs.

To this end, it first analyzes the evolution of nursing hours supplied to hospitals over the lifecycle of hospital nurses. The decline in nursing labor supplied to hospi-

[1] In France, the first margin – training individuals to become registered nurses – is addressed through a competitive exam system. The number of available training slots is fixed annually by the Ministry of Health, and the number of applicants has consistently far exceeded the available slots.

[2] Due to data limitations, the analysis also includes midwives, that cannot be distinguished from hospital nurses in payroll tax data. In practice, midwives account for about 3% of the population under study.

tals over time is primarily driven by outflows, and, to a lesser extent, by transitions from full-time to part-time schedules within hospital nursing jobs. Compared to studies that have analyzed the retention rates of hospital nurses without observing their employment situation after leaving hospital positions (see e.g. Holmås, 2002; Moscelli et al., 2024b), the data used here provide a detailed characterization of the alternative employment options for nurses who exit hospital jobs.

As it turns out, outflows are mainly driven by transitions to other jobs rather than to non-employment. In most cases, these jobs – whether salaried or self-employed – are within the healthcare sector. This finding implies that policies aimed at improving hospital nurse retention rates can have broader implications for the entire healthcare system, beyond hospitals. Consequently, evaluating the benefits of such policies requires not only estimating the efficiency of nursing labor in hospitals but also comparing its efficiency across different settings. Additionally, it may involve within-nurse comparisons of efficiency between these settings.

Noting that hospital nursing is a heavily feminized profession,[3] I then build on recent literature on gender inequality, which shows that in developed countries, women's labor supply decisions are strongly influenced by family-related events (Kleven, Landais, and Søgaard, 2019; Kleven et al., 2019; Cortés and Pan, 2023; Kleven, Landais, and Leite-Mariante, 2024). Specifically, I quantify the contribution of parenthood to the decline in nursing labor supplied to hospitals over the course of hospital nurses' careers. To this end, I employ an event-study approach similar to that of Kleven, Landais, and Søgaard (2019) to estimate the causal impact of parenthood on hospital nurses' labor supply.

I find that motherhood frequently leads female hospital nurses to transition to part-time schedules within hospital nursing jobs, but does not prompt them to leave these jobs for other positions or non-employment. In fact, this effect, combined with the predominance of women in the profession and the high likelihood of becoming mothers during the early years of their careers, largely explains the prevalence of part-time work among hospital nurses. Without the impact of motherhood, the share of part-time work in this group would be significantly lower. Ultimately, motherhood accounts for up to 15% of the decline in hours worked as a hospital nurse during the first ten years of a career. By contrast, fatherhood has virtually no effect on male hospital nurses' labor supply. Even men who self-select into a female-dominated profession do not adjust their labor supply patterns in response to family-work considerations as mothers do.

[3] In France, over 85% of nurses are women (Bessière, 2005).

The negative impact of motherhood on female hospital nurses' labor supply aligns with previous findings from Phillips (1995); Askildsen, Baltagi, and Holmås (2003); Nooney, Unruh, and Yore (2010); Hanel, Kalb, and Scott (2014). However, it diverges from other results in the literature, such as those of Holmås (2002); Estryn-Béhar et al. (2007); Frijters, Shields, and Price (2007); Toren et al. (2012). These studies do not specifically address the role of motherhood, as they focus on more general or structural models of nurses' labor supply, which complicates direct comparisons with this paper (see Antonazzo et al., 2003, for a survey of this earlier literature).

While heterogeneity analysis is limited by sample size, it suggests that the impact of motherhood does not vary with paid parental leave reforms and does not provide evidence that formal childcare availability moderates the effect. This finding aligns with recent evidence showing that the child penalty is largely independent of family policies in the general population (Kleven et al., 2024). Together with the clear difference in labor supply decisions between mothers and fathers within the same occupation, this points to gender identity as a key factor in understanding child-related labor supply decisions (Andresen and Nix, 2022).

However, the evidence regarding parental leave stands in stark contrast with the Danish case examined by Friedrich and Hackmann (2021), who find that the aggregate provision of nursing services is greatly affected by generous paid parental leave policies. This contrast may stem from the fact that the Danish policy under consideration in their paper is significantly more generous than the paid parental leave allowances available in France.

The last question to consider is whether these individual-level labor supply decisions affect the provision of nursing services at the hospital level, which is arguably what matters most for patients. Indeed, if the market for nursing labor were frictionless, and newly hired hospital nurses were perfect substitutes for those with more experience, hospitals could simply replace nursing hours lost to outflows or transitions to part-time work by hiring additional nurses.

I investigate this possibility using repeated comprehensive short-panel data from the same payroll tax registers that underpin my analysis of hospital nurses' careers. These data allow me to compare hospitals that, at a given point in time, experience higher than usual outflows or transitions to part-time work among their incumbent nurses with a counterfactual built from both their usual behavior at other points in time and the behavior of non-affected hospitals at the same point in time.

Hospitals facing higher-than-expected, unusual and transitory outflows offset the resulting loss in nursing hours by hiring additional nurses, nearly compensating for this loss on a one-to-one basis. In contrast, hospitals experiencing more transitions to part-time work than expected do not appear to compensate for the resulting decrease in nursing hours.

The fact that hospitals can offset nursing hours lost due to outflows almost one-to-one matches recent evidence from Denmark, which shows that small firms are usually not affected by parental leave take-up by their employees, as they are able to hire temporary workers or increase the hours worked by other employees (Brenøe et al., 2024). This stands in contrast to the findings in Germany, where labor demand for incumbent employees increases when a salaried employee dies unexpectedly (Jäger and Heining, 2022). Interpreting this finding in light of the existing literature is challenging, as outflows encompass a wide range of shocks beyond workers' death and parental leave, such as retirement and transitions to other jobs. However, it suggests that when it comes to hospital nurse outflows, French hospitals behave as if nursing hours worked by different nurses were close substitutes, and the market for nursing labor were frictionless. This choice may, however, have adverse consequences if there are strong complementarities across healthcare professionals (Moscelli et al., 2024c) or if a high turnover rate is itself detrimental to patients (Moscelli et al., 2024a).

The results show, however, that nursing hours lost at the individual level to transitions to part-time schedules translate almost one to one into nursing hours lost at the hospital level. The limited compensation for part-time transitions, compared to full departures, may stem from a mix of budgetary constraints, workforce rigidities, and collective work adjustments. Hospitals often face strict employment caps, making it easier to justify replacing a full departure than incrementally adjusting staffing for part-time transitions. Additionally, the organization of work schedules – particularly when managed at the service unit level – may limit flexibility in redistributing hours. Finally, part-time reductions might be absorbed through internal workload adjustments rather than external hiring, as tasks are redistributed among remaining staff. These factors could help explain why hospitals tend to compensate departures but not reductions in working hours.

The data indicate that most transitions to part-time schedules result from child-related decisions made by mothers, whereas outflows are unrelated to this effect. They also suggest that nursing hours lost due to transitions to part-time work are not easily compensated for by hospitals, whereas nursing hours lost due

to outflows are. This indicates that the negative impact of motherhood on hospital nurses' labor supply at the individual level has an effect on the aggregate provision of nursing services at the hospital level.

From a methodological point of view, this paper emphasizes the benefit of data that covers all potential jobs for hospital nurses (Frijters, Shields, and Price, 2007; Nooney, Unruh, and Yore, 2010; Hanel, Kalb, and Scott, 2014), as opposed to retention studies based on hospital registers only (Holmås, 2002; Moscelli et al., 2024b), as most of the outflows from these jobs are directed towards other jobs in the healthcare system. It also makes it clear that, while transitions to part-time schedules are far from explaining the entire lifecycle profile of hospital nurses' labor supply, they deserve specific attention as they can have more implications for the overall supply of nursing services than retention rates do. When considering the impact of motherhood on labor supply, this paper improves on the now usual event-study approach developed within the child penalty literature by resorting to more credible estimators based on the recent difference-in-differences literature (de Chaisemartin and D'Haultfœuille, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021). The lesson is that failing to account properly for treatment effect heterogeneity in this context can substantially understate the negative impact of motherhood on women's labor supply.

The remainder of this paper is organized as follows. The next section outlines the institutional context. Section 3 describes the administrative data upon which the analysis is based. Section 4 presents evidence regarding the lifecycle profiles of hospital nurses' labor supply. Section 5 details the empirical framework aimed at estimating the impact of motherhood on hospital nurses' labor supply, and Section 6 presents the corresponding results. Section 7 performs the empirical analysis regarding the hospital-level implications of hospital nurses' individual labor supply decisions, and Section 8 concludes.

2 Institutional context

2.1 Nurses careers

2.1.1 Training

As is the case in many countries, nursing is a licensed profession in France. In other words, there are strong barriers to entry in the nursing market, as one must meet several requirements to be granted authorization to work as a registered

nurse. The most salient of these is, unsurprisingly, education: authorization is only granted upon the completion of a curriculum at specific institutions (Instituts de Formation en Soins Infirmiers, IFSI). Admission to these institutions usually involves passing a competitive entrance exam, after which students follow a three-year training program. Since 1979, the number of available positions in these competitive exams has been fixed *ex ante* at the national level by the Ministry of Health. These programs were part of vocational education until 2009, but have since moved to higher education and are now provided by or in partnership with universities. As a result, this initial nursing training now corresponds to a bachelor's degree.

This nursing degree grants authorization to work as a general care nurse. Over the course of their careers, and usually conditional on experience, nurses can choose to pursue additional training to specialize in one of several nursing fields. This additional training may take the form of a master's degree or a professional degree, depending on the specialization.

2.1.2 Work options

There are two main settings in which nurses may work in France. Firstly, nurses may work as salaried employees, with their employer being a hospital, a long-term care facility, a health center, a school, etc. Secondly, they may work as freelance nurses, in which case they provide healthcare directly to patients. Freelance nursing usually involves a different range of health-related procedures compared to hospital nursing. Freelance nurses typically work in patients' homes, providing care to individuals who do not require hospitalization – such as those recovering from surgery or managing chronic illnesses that need daily attention. Freelance nursing is funded in the same manner as other medical procedures, with the Social Security system largely reimbursing patients for these healthcare expenses. It grants nurses with more flexibility regarding their schedule, provided that they are able to meet patients' needs. Qualitative data indicate that transitions to freelance work are often tied to working conditions, as well as time flexibility concerns (Douguet and Vilbrod, 2007).

However, freelance nursing is not open to newly graduated nurses. Indeed, to be granted authorization to work as a freelance nurse, one must not only have a nursing diploma, but also at least two years of experience as a salaried nurse at a healthcare facility. In 2006, the majority of registered nurses (63%) were salaried

employees at a hospital, either public (49%) or private (14%); 4% were employed in a long-term care facility, and 21% were salaried employees in other settings. Lastly, 12% worked as freelance nurses (Barlet and Cavillon, 2010). In this paper, I focus on the career lifecycle of nurses who hold a hospital job at least once. This covers the majority of the nursing profession, as nearly 80% of nurses begin their careers in a hospital (see Appendix A.1).

2.1.3 Hospital nurses

Lastly, the composition of the hospital nursing workforce has remained fairly constant over the time period under scrutiny in this paper (see Appendix A.2). Specifically, the share of women among hospital nurses has remained roughly constant at around 85%, regardless of whether they work in the public or private sector. The public sector provides the majority of hospital nursing labor in France: the share of hours worked by hospital nurses in public hospitals accounts for 75% of the total and has varied very little from 1988 to 2019.

2.2 Family policies

2.2.1 Part-time work options

Parental part-time work is strongly encouraged by French institutions, especially in the public sector.[4] Specifically, in France, children grant their parents the right to work part-time.[5] In contrast to part-time work for personal convenience, this right is binding for the employer. In the public sector, service requirements cannot be opposed to employees whose part-time work is motivated by children.

In the public sector, child-related part-time work can only be chosen in discrete steps, that is, by selecting among 50%, 60%, 70%, or 80% schedules.[6] Pay is proportional to working time, except at the 80% level, where it is slightly higher (about 85% of the full-time salary). Part-time work periods grant the same rights

[4] Appendix B provides additional details regarding the private sector.

[5] This discussion focuses on cases where an employee requests to work part-time. In the public sector, it is actually not possible for employers to require an employee to work part-time.

[6] An additional 90% level exists when part-time work is chosen for personal convenience.

to promotion[7] and training as full-time periods, and since 2004, they also open the same rights to retirement pensions (i.e., retirement pension rights are not proportional to working time).

Part-time work is quite common among hospital nurses in France. Over the time period under scrutiny in this paper, between 20% and 30% of hospital nurses were working on a part-time schedule (see Figure A.4). This is driven by a similar share of female hospital nurses resorting to part-time options, which is only logical given that women form the vast majority of the hospital nursing workforce. However, part-time work does exist among male hospital nurses, as about 10% of them work on a part-time schedule. Lastly, the prevalence of part-time work has increased over time. Even though the data display some fluctuations, it increased by about 10 percentage points between the end of the 1980s and the beginning of the 2010s.

2.2.2 Parental leave

Employees with children may also choose a full-time parental leave option instead of these part-time work arrangements. In that case, the employer no longer pays the employee during the time she is out of the workforce. The potential duration of parental leave is the same in both the private and public sectors: it is open for three years from the birth of the first child. Since 2019, in the public sector, parental leave periods grant the same rights to promotion as full-time work periods,[8] up to a maximum of five years over the entire career. Since 2004, they also grant similar rights to retirement pensions, up to a maximum of three years over the course of a career. At the end of parental leave, public sector workers are guaranteed to return to their former job, or a job with similar hierarchical responsibilities.

[7] In France, within the public sector, there is a disconnect between administrative promotions and job positions. Specifically, administrative promotions pertain to advancement along a rigid pay scale, where transitions are largely based on seniority and, to a lesser extent, on success in competitive exams and the specific job held. In this context, promotion eligibility primarily concerns meeting the seniority requirements to apply for advancement to the next grade on the pay scale. Notably, part-time workers are not required to wait longer than full-time workers to become eligible.

[8] The same disconnect between administrative promotions and job positions applies in this context. Promotion rights pertain to transitions from one grade to the next on the rigid public pay scale: parents on full-time parental leave are not required to wait longer than full-time workers to become eligible. To put it differently, spending one year in parental leave and one year in full-time employment is the same as regards the pay scale. This concept differs from promotions linked to the specific job held.

2.2.3 Parental leave subsidies

In addition to these considerations regarding the relationship between employer and employee, child-related part-time work or full-time parental leave can also grant parents public subsidies, in the form of paid parental leave provided by the family branch of social security. This paid parental leave policy was first introduced in 1985, when it only covered mothers of three children or more, and was later expanded to mothers of two in 1994, and finally to all mothers in 2004. In 2015, a reform took place to incentivize parents to split the leave between mothers and fathers. The paid part-time option offers parents an income supplement that depends nonlinearly on their working time: it amounts to approximately €200 per month for parents working at an 80% rate. The full-time option grants about €400 per month. The existing literature suggests that all the policy reforms have affected mothers' labor supply in the general population (Choné, Le Blanc, and Robert-Bobée, 2004; Piketty, 2005; Lequien, 2012; Joseph et al., 2013; Périvier and Verdugo, 2024).

2.2.4 Childcare coverage

Among both OECD and EU countries, France ranks high in terms of fertility rate, female employment rate, and formal childcare coverage (see e.g. OECD, 2011). In contrast to other countries, childcare arrangements in France are extremely diverse: its long-standing institutional history has led to the coexistence of paid parental leave and highly subsidized formal childcare services, the latter including a continuum from individual at-home childcare to collective services provided by daycare centers.

France has achieved this broad childcare coverage by fostering very diverse childcare arrangements, with daycare centers representing only a fraction of the total. Formal individualized childcare solutions, such as childminders and, to a lesser extent, individual at-home childcare, are also quite common. Few parents rely heavily on informal solutions in France: less than 3% of families with young children relied on a relative as their primary childcare provider in 2013 (Villaume and Legendre, 2014).

Hospitals frequently offer daycare services to their staff in order to make family-work reconciliation easier for those jobs with long and atypical hours, as well as frequent and unpredictable schedule changes (Daune-Richard, Odena, and Petrella, 2007). Unfortunately, quantitative data regarding these services do not appear to

be available.

3 Data

My analysis is based on a combination of labor market data from payroll tax forms and fertility data from birth registers, both made available by Insee. I merge these datasets using a common individual identifier based on a Social Security number. This allows me to build a sample of qualified healthcare workers who have at least once held a job at a French hospital, either in the public or private sector, which I can track over time in the salaried sector from 1988 to 2018.

3.1 Labor market data

My labor market data are drawn from the *Déclarations Annuelles de Données Sociales* (DADS). By law,[9] French employers must fill out a DADS form for every employee subject to payroll taxes. The form contains detailed information about days worked, hours worked, occupation, industry, gross and net wages, other job characteristics (such as the beginning, duration, and end of a period of employment, and part-time employment), employer characteristics (size and location), and individual characteristics (age, gender, and municipality of residence).

Throughout the paper, my main variable of interest is hours worked, measured in full-time units. Specifically, this corresponds to the total hours worked between January 1 and December 31 of a given year. A full-time worker employed for the entire year is assigned a value of 1, while this measure is lower if (i) employment started or ended during the year (e.g., a job beginning in April), or (ii) the individual worked part-time. During maternity leave, daily hours are recorded at their usual pre-birth level, making this measure more appropriate for capturing the long-run impact of parenthood – through transitions to part-time work and nonemployment – rather than short-run incapacitation effects directly linked to maternity leave. To address the latter, I also consider an alternative measure in which maternity leave durations are explicitly imputed, setting daily hours to 0 during leave periods.[10] Comparing results from both measures helps distinguish

[9] The absence of DADS or incorrect or missing answers is subject to fines.

[10] Appendix H.3.1 replicates the main findings of the paper using the alternative measure. Because short-run incapacitation effects that result from maternity leaves matter less than long-run effects, which are driven by transitions to part-time work, this change does not affect the main conclusions of the paper.

between short- and long-run effects of parenthood on labor supply, following an approach similar to Adams-Prassl, Jensen, and Petrongolo (2024). Further details on the construction of these measures are provided in Appendix C.

Hours worked are capped at 1 for individuals working full-time for the entire year, so as not to include overtime. However, the data make it possible to investigate hours worked beyond the usual amount for a full-time worker. I investigate this approximate measure of overtime separately, as an additional margin of adjustment besides the full-time/part-time status and the employment status, which are well captured by the main measure of hours worked in FTU.[11]

Longitudinal version Most of the results in this paper rely on a longitudinal version of these data. Specifically, I use the DADS panel, a longitudinal sample that tracks mothers' labor supply from 1988 to 2019, thanks to an anonymized personal identifier based on their social security number, which allows me to link this information to birth records. A comprehensive cross-sectional dataset is also made available to researchers. I rely on this cross-sectional data to investigate the implications of part-time work at the hospital level. In contrast to the longitudinal version of the DADS data, this dataset cannot be linked to birth records.

The sampling rate of this longitudinal dataset varied over time: from 1988 to 2001, the data only covered individuals born in October in even-numbered years; from 2002 onwards, it also included individuals born on January 2-5, April 1-4, July 1-4, and October 1-4, regardless of their year of birth.[12] This creates left-censoring regarding the beginning of the career for the latter group of individuals. For this reason, I restrict the analysis to individuals who belong to the former group.

Comprehensive version The comprehensive version of the DADS data does not allow tracking salaried employees over the course of their entire careers. Instead, it consists of repeated short-panel data that contain information for two consecutive years. For instance, the 2017 file contains information for 2017 and 2016. This information is available at the individual × employer level. In my

[11] See Appendices G.1 and G.2.

[12] The sample definition only relies on salaried employees' dates of birth. Their children's birth dates do not matter here. In other words, these data make it possible to track the lifecycle of hospital nurses born on specific days, regardless of whether their children were born on those days. Additionally, their children's dates of birth are recorded and available in the data, no matter their values.

investigation of the implications of part-time work at the hospital level, I rely on these data, which I aggregate at the hospital × year level between 1995 and 2017.

The DADS data have two main caveats with respect to my analysis. The first is that the most detailed occupation variable is not available before 2009. Indeed, prior to this, employers were only required to answer a 2-digit occupation question, as opposed to the 4-digit occupation classification, which is the most detailed level used by Insee. This prevents resorting to the naive approach to the labor supply of nurses, which would basically select individuals into the sample based on whether or not they have, at some point in their lives, held a job as a nurse, as made salient by the 4-digit occupation variable. Instead, I select individuals based on the combination of the 2-digit occupation variable and the 5-digit industry variable. Subsection 3.3 details this choice and characterizes the selected individuals in terms of their detailed occupation, when observed.

The second issue is that hours worked are not observed before 1995. Prior to this, the data only provide information on days worked and working-time status, either full-time or part-time. I choose to impute hours worked, measured in full-time units, before 1995, based on these two variables. Specifically, for full-time workers, I consider time worked to be proportional to days worked and equal to 1 for those who work a full year — in this, there is absolutely no difference from the way time worked is measured after 1995. For part-time workers, I consider them to be on a 50% schedule, which was the most frequent case after 1995 (see Appendix C); as a result, time worked is proportional to days worked, so that for those who work a full year, time worked is equal to 0.5. My results are nevertheless robust to this particular choice (see Subsection 6.3).

Self-employment While the DADS data offer interesting insights regarding salaried employment, they do not cover self-employed workers. This can prove problematic when investigating hospital nurses' careers, given that transitioning to the freelance sector is a possibility open to them once they have spent 2 years working as salaried nurses. Information regarding self-employment that can be linked to the longitudinal version of the DADS data has been recently made available. These data are derived from a variety of administrative forms, all related to the payment of social security contributions for self-employed workers. They cover the 2006-2019 time period. In the context of this paper, these data allow me to determine (i) whether each individual receives positive labor earnings from the self-employed sector; and (ii) whether these earnings come from freelance nursing

activities (thanks to the 5-digit industry information).

3.2 Fertility data

My analysis also relies on birth records. Births are registered by an individual who was present at the time of birth, usually the father, but in some cases, a doctor or a midwife. I take advantage of a longitudinal version of these records at the individual level, extracted from the *Échantillon Démographique Permanent* (permanent demographic sample, EDP), to obtain information on the timing of births. Because it displays an anonymized personal identifier based on the same social security number as the DADS data, this dataset can be merged with the longitudinal version of the DADS.

Inclusion in this dataset is based on (potential) parents' date of birth and does not depend on their children's date of birth. Specifically, it covers all children born to parents born on October 1-4, regardless of their parents' year of birth; information regarding children born to individuals born on January 2-5, April 1-4, and July 1-4 is available from 2004. To get around this left-censoring issue, and due to the sampling of the labor market data, I restrict my analysis to individuals born on October 1-4 of even-numbered years.

In the birth certificate data, parenthood is recorded when parents appear on their children's birth certificate. For mothers, this is always the case, except for anonymous births. For fathers, this is the case when fathers recognize their children either before or at the time of their birth. Marriage with the children's mother makes this recognition automatic, without any action from their part other than the birth declaration itself. However, children born outside marriage have become increasingly common in France over the time period under scrutiny in this paper: in 1990, 30.1% of French children were born to unmarried parents, and this share has increased steadily to 59.7% in 2019. In such cases, fathers must explicitly recognize their children. This recognition can take place before birth, at the time of birth, or afterward. The data are only informative as to fatherhood in the first two cases. In 2019, this was the case for 86.6% of children born to unmarried parents, compared to 65% in 1990. As a result, the share of childbirth events that are tied to fathers in the data is about 90% over the entire time period.

A caveat of this dataset is that some birth-related data for the 1990s were incomplete in administrative birth records for individuals born on October 2-3 (for details, see Wilner, 2016). For these individuals, I use 1990 and 1999 census

data to fill in the gaps, as do Pora and Wilner (2024). The quality of these data is comparable to that of those covering individuals born on October 1 or 4, for whom administrative birth records have been available since 1967.

3.3 Sample construction

My analysis relies on a sample of qualified healthcare workers working in a hospital setting, which I follow over the course of their lives. As explained in Subsection 3.1, data regarding detailed occupations are not available before 2009, which restricts the possibility of basing my sample selection on this variable. Indeed, nurses, in general, cannot be isolated from the rest of the workforce without knowledge of the detailed occupation, as the 2-digit occupation level groups them with social workers. Unfortunately, this detailed occupation information is not available before 2009 in the DADS data. However, when restricting the sample to the hospital workforce, a large majority of those who belong to this 2-digit occupational group are actually nurses. Additionally, even though the focus is specifically on hospital nurses, this is relevant to the larger nursing occupation, as most nurses begin their careers in the hospital sector.[13]

Specifically, I define hospital nurse jobs as those with (i) a 2-digit occupation variable equal to "Qualified healthcare and social workers"[14] and (ii) a 5-digit industry variable equal to "Hospital activities." This definition only approximates the usual definition of a hospital nurse job. However, it closely matches the usual definition: Table 1 displays the distribution of detailed occupations among jobs that meet this criterion, which is observed in the DADS data as of 2009. Over three-quarters of these jobs are indeed nurse jobs, and the remainder are mostly midwives and health-related technical jobs. Note that my approach includes nurse managers but excludes auxiliary nurses, who belong to another 2-digit occupation group. Social workers, although nominally included in the criterion, represent a very small share of this population.

Individuals of interest are all those who are observed, between 1988 and 2019, to hold this type of job for at least six months. I then track their labor market trajectories from 1988 to 2019, regardless of whether or not they still hold this

[13]The data indicate that nurses who begin their careers outside hospitals tend to be slightly older than those who start in hospitals. Qualitative research suggests that, in most cases, nurses' choices regarding their first job are primarily driven by considerations of work satisfaction (Sylvestre and Randon, 2012).

[14]Medical doctors do not belong to this category, as they belong to another one that is part of the "Managers and professionals" group.

kind of job. In other words, hospital nurses who form part of my sample are not necessarily hospital nurses throughout their lives, but it is assured that they have been at some point.[15] This leaves me with 183,121 observations that account for 5,999 individuals. As detailed above, inclusion in this sample is based on individuals' birthdays. Since the causal effect of birthday on labor supply is close to 0, it can be treated as a representative sample of the population of interest at a rate of 0.6%.

The data only allow following individuals into salaried employment. When individuals are not observed with a salaried job, I consider their hours worked to be equal to 0. In that way, my estimates regarding hours worked are not conditional on salaried employment, as they do take into account time periods spent outside employment, but they do not take into account labor supply in the freelance sector.

Crucial to my analysis are (i) the year during which individuals are first observed to hold a nurse job at a hospital and (ii) the length of the time period during which they are observed afterwards. The fact that my data only cover the 1988-2019 period generates two issues with respect to this. Firstly, a substantial share of individuals who are observed to hold such a job in 1988 likely did so for an unobserved number of years, creating a left-censoring issue. Secondly, recent cohorts, as defined based on the timing of the first hospital nurse job, are only observed for a restricted time period afterwards. My identification strategy is entirely based on within-cohort comparisons of nurses who become mothers sooner or later. Hence, for these recent cohorts, some control groups of mothers whose first child is born later are unobserved, because the birth of this child cannot be recovered from the data. This creates a right-censoring issue. I discuss these two concerns in Subsection 6.3 and provide evidence that my results are robust with respect to these issues.

Table 2 displays a few summary statistics regarding the sample. Individuals of interest usually get their first job as a hospital nurse around age 30, typically after a few years in different jobs, either as a nurse in a different work setting or in a different occupation. By age 45, about 80% of them have children. This rate is comparable to that of the overall French population (81.7% for women, see

[15] Additionally, the vast majority of individuals who ever held a nurse position will fall within the universe that I cover, because most of them work at a hospital at some point in their lives. To show this, in Appendix A.1, I quantify the share of workers who ever held a job at a hospital among those whom I can properly identify as beginning their careers as nurses after 2010, thanks to the detailed occupation variable. This share is about 80%.

Reynaud, 2020). By contrast, about 35% of female hospital nurses and 40% of male hospital nurses have children by the time they get their first hospital nurse job. This suggests that about half of newly recruited hospital nurses will go on to have children in the future. The average age at first child's birth is close to the age at which many hospital nurses get their first hospital nurse job: in 2015 in France, the average age of mothers when they gave birth to their first child was 28.5. This implies that for a sizable share of hospital nurses, the beginning of their career coincides with child-rearing years.

To investigate the impact of parenthood on hospital nurses' labor supply, I restrict the sample to individuals whose first child is born at least two years after they first became hospital nurses. The reason for this restriction is that for those whose first child is born earlier, it is possible that becoming a hospital nurse is actually a consequence of parenthood itself. Table 3 displays summary statistics regarding this subsample of interest. The data allow for investigating 1,765 first birth events for women and 260 for men, which implies that any estimation carried out on the impact of fatherhood on male hospital nurses' labor supply will have much less statistical power. This subpopulation enters the occupation at a younger age than the entire population, around age 25. The first child is usually born a few years later, around age 30. Lastly, these individuals end up with an average of 2 children.

4 Lifecycle profiles for hospital nurses

This section presents evidence regarding the lifecycle of hospital nurses. Longitudinal data on hospital nurses' employment make it possible to examine how much labor they supply to various types of employers over the course of their careers. The results in this section are estimated on the entire sample, which includes: (i) hospital nurses whose first child is born at least two years after they started their first job as a hospital nurse; (ii) hospital nurses who already had children at that point; and (iii) hospital nurses who remain childless. Appendix D.1 presents the estimated lifecycle profiles for hospital nurses whose first child is born at least two years after they started their first hospital nurse job. These profiles, which allow for the identification of the impact of parenthood on labor supply, are very similar to those estimated for the entire sample. The main difference is that transitions to part-time work as hospital nurses are more frequent in this subsample.

4.1 Nursing labor supplied to hospitals

Figure 1(a) illustrates the nursing labor supplied to French hospitals, measured as the average hours worked as a hospital nurse in full-time units.[16] This measure is not conditional on being employed as a hospital nurse (except at the start of one's hospital nurse career): hours worked as a hospital nurse are set to 0 for individuals who no longer hold such positions, whether they are employed in another occupation or not employed at all.

Shortly after the first two years, which correspond to a gradual entry into the job,[17] the nursing labor supplied to hospitals begins to decline. Over the first ten years of a career, this decline amounts to 0.26 full-time units, a substantial drop considering the baseline of 0.72 full-time units at the start of a career. In percentage terms, this represents an average decline of 36% (0.26 / 0.72).

Finally, splitting the data by cohorts—based on the timing of the first hospital nurse job—confirms that this decline is not driven by changes in cohort composition over time.

How much of this decline in hours worked is explained by transitions to part-time hospital nurse positions? Figure 1(b) addresses this question by plotting the share of hospital nurses working full-time or part-time in hospital settings throughout their careers. As before, these shares are not conditional on individuals holding a hospital nurse position.[18] The shares are shown both in aggregate and across cohorts defined by the timing of their first hospital nurse job.

The figure indicates that the decline in hours worked by hospital nurses is not primarily due to transitions from full-time to part-time hospital nurse positions. At the beginning of their careers, 78% of hospital nurses work full-time. Ten years later, only 36% remain in full-time hospital nurse positions. However, the share of those in part-time hospital nurse positions changes much less over time. It starts at 22% early in their careers, decreases slightly, and then increases modestly,

[16] This measure excludes overtime hours. Appendix G.1 examines hospital nurses working overtime and shows that, while overtime is common, it represents only a small share of the total nursing labor supplied to hospitals. Including overtime hours would not significantly alter the overall trends.

[17] Because hours worked are measured over the calendar year (January 1 to December 31), individuals who begin their first job after January 1 typically report fewer than 1 full-time unit of work in their first year, even if they are full-time workers. Consequently, the increase between years 0 and 1 is largely mechanical, driven by workers starting mid-year.

[18] In some cases, hospital nurses may be recorded as holding both a full-time and a part-time position within the same year, for instance due to a transition to part-time work mid-year. Such individuals are classified as part-time hospital nurses for that year.

stabilizing at about 18% after the initial years.[19]

Ultimately, the primary factor driving the decline in nursing labor supplied to hospitals over the course of hospital nurses' careers is their exit from hospital nursing altogether. Ten years after starting their careers, only 54% of hospital nurses remain in the occupation, with 36% in full-time roles and 18% in part-time roles. This implies that nearly half of hospital nurses leave hospital nursing within the first decade of their careers.

4.2 Transitions to other jobs

Why do hospital nurses leave this occupation? Addressing this question requires examining what happens to hospital nurses after they leave their positions. This can be done by tracking their career trajectories beyond hospital nursing. Indeed, nonemployment is only one of several possibilities: former hospital nurses may take on other salaried jobs, either in healthcare or in other sectors, or transition to self-employment, whether as freelance nurses or in other independent roles outside healthcare. Table 4 summarizes these different pathways. As detailed in the remainder of this subsection, the data show that most former hospital nurses remain employed (about 75%), with the majority (60%) continuing to work in the healthcare sector.

Salaried employment Figure 2 presents two measures of salaried labor supply: (a) the average hours worked across all salaried jobs, measured in full-time units and including positions outside hospital nursing, and (b) the salaried employment rate. Both measures are shown over time relative to the first hospital nurse job, in the aggregate and across cohorts defined by the timing of the first hospital nurse job.

Soon after the first two years, which represent a gradual entry into the job, hours worked across the entire salaried sector begin to decline. This pattern is consistent across cohorts and is not driven by changes in cohort composition over time. The decline amounts to 0.17 full-time units over the first ten years of a career. As noted above, the decline in hours worked specifically as a hospital nurse over the same period is 0.26 full-time units, which is 0.09 full-time units greater. A

[19] Because hospital nurses who start their careers on a full-time schedule may later switch to part-time positions, this does not necessarily mean that the retention rate is higher for those who begin on a part-time schedule. In fact, the opposite is true: the 10-year retention rate is 56% for the former group, compared to 47% for the latter.

simple accounting approach would thus attribute roughly one-third (0.09 / 0.26) of the decline in hospital nurse hours to transitions into other salaried jobs.

Considering the salaried employment rate leads to similar conclusions. Figure 2(b) shows that ten years after starting their first hospital nurse job, 79% of hospital nurses still hold a salaried position. However, as discussed earlier, only 54% of them remain in a hospital nurse position (which is always salaried). This means that 25% of them have transitioned to salaried jobs in other occupations. Using a simple accounting framework, approximately half (0.25 / 0.46) of hospital nurse outflows over the first ten years of their careers can be attributed to transitions into other salaried jobs, while the remaining half results from hospital nurses leaving salaried employment altogether.

Salaried healthcare jobs Of salaried jobs outside of hospital nurse positions, those that contribute to the healthcare system more broadly warrant special attention. To shed light on this issue, Figure 3 displays: (a) the average hours worked as a salaried healthcare worker,[20] including but not limited to hospital nurse positions, measured in full-time units; and (b) the share of hospital nurses who still hold a salaried healthcare job, over time relative to the first hospital nurse job, both in the aggregate and across cohorts defined by the timing of the first hospital nurse job.[21]

The decline in hours worked in the healthcare system as a whole over the first ten years of a career represents 0.20 full-time units, placing it between the decline in hours worked as a hospital nurse (0.26) and the decline in hours worked across all salaried jobs (0.17). This implies that hours worked in the healthcare system, other than as a hospital nurse, increase on average by 0.06 full-time units over the same period, compared to 0.03 for jobs unrelated to healthcare. From an accounting perspective, transitions to other health-related jobs would therefore account for 23% (0.06 / 0.26) of the decline in hours worked as a hospital nurse, while transitions to jobs unrelated to healthcare would account for 10% of this decline.

Considering the extensive margin of labor supply decisions yields similar results. Ten years after they took their first hospital nurse job, 74% of hospital

[20] Salaried healthcare jobs include: (i) all jobs in hospitals, nursing homes, and other healthcare facilities, including but not limited to nurse positions; and (ii) all nurse positions, even outside hospitals and nursing homes (e.g., working as a nurse in a school).

[21] The data only go back to 1995, as nursing homes and other healthcare facilities cannot be isolated from the rest of employers prior to this date.

nurses still hold a salaried job in the healthcare system as a whole. Since, at that time, the share who still work as hospital nurses is 54%, and the share in salaried employment is 79%, this implies that 20% of them work within the healthcare system, but no longer as hospital nurses, while 5% have moved to jobs outside the healthcare system. As a result, transitions to other salaried health-related jobs would account for 43% (0.20 / 0.46) of the outflows, compared to 11% (0.05 / 0.46) for transitions to other jobs unrelated to healthcare.

Self-employment This picture is, however, not complete, because salaried employment does not cover all possible jobs. Figure 4 makes the picture more complete by using self-employment data, available from 2006. It displays (a) the share of hospital nurses who still hold a job as a hospital nurse and the share who hold a job as a freelance nurse; and (b) the share of hospital nurses who still hold a salaried job and the share who hold a self-employed position,[22] from 2006, by year relative to the first hospital nurse job.

Consistent with the rule that requires at least two years of experience as a salaried nurse before starting a freelance nursing practice, the share of hospital nurses who go on to work as freelance nurses is 0 during the first two years of their careers and begins to increase thereafter. It reaches a plateau about ten years later: approximately 7% of hospital nurses then work as freelance nurses. The share of those who hold a self-employed position follows a very similar pattern, although it is slightly higher. Ten years after starting their careers as hospital nurses, approximately 10% of hospital nurses are self-employed. This implies that about 3% of them are self-employed but do not work as freelance nurses.

Individuals who are not observed either in salaried employment or as self-employed workers can be considered outside the workforce.[23] When considering only data from 2006 onwards, the share of hospital nurses who still hold a job as a hospital nurse ten years after starting their careers is 52%. The share of those who hold a salaried position is 78%, with 74% working in healthcare as a whole, while the share of those who hold a self-employed position is 10%, with 7% working as

[22] In this figure, all those who hold at least one salaried position are not included in the share of those who hold freelance jobs. In practice, this share is not always negligible, even though it remains smaller than that of those who hold "pure" salaried and self-employed positions: see Appendix E.

[23] Because the data only cover employment in France, this margin encompasses emigration to other countries. In 2017, about 9,700 French-trained nurses were working in other OECD countries (Socha-Dietrich and Dumont, 2021), while the number of nurses and midwives working in France was 633,000. This suggests that emigration remains low among French nurses.

freelance nurses. As a result, from an accounting perspective, 75% ((0.78 – 0.52 + 0.10) / 0.48) of the outflows correspond to transitions to other jobs, of which 60% ((0.74 – 0.52 + 0.07) / 0.48) contribute to the healthcare system, while the remaining 25% correspond to hospital nurses leaving the workforce entirely.

This analysis confirms that a sizable share of the decline in nursing labor supplied to hospitals over the course of hospital nurses' careers is tied to transitions to other jobs in the healthcare system as a whole. As a result, policies aimed at improving the retention of hospital nurses can affect other parts of the healthcare system if the affected nurses are those who would have otherwise transitioned to other health-related jobs, rather than to jobs unrelated to healthcare or non-employment. This is particularly relevant in the French context, where nearly 80% of nurses begin their careers in a hospital setting.

An implication of this is that assessing the benefits of such policies requires (i) determining the counterfactual employment choice of the additional retained hospital nurses, and (ii) comparing the efficiency of nursing labor across settings, in case the additional retained hospital nurses would have taken health-related jobs outside the hospital sector. If such policies also induce nurses who would have been hired by hospitals to replace the additional retained hospital nurses to turn to other parts of the healthcare system, this assessment would additionally require (iii) making efficiency comparisons within nurses, across settings (e.g. is it better to have less experienced nurses work at hospitals and later transition to other parts of the healthcare system, or the reverse).

4.3 Fertility decisions

As highlighted by Table 2, most hospital nurses begin their careers without children. However, by age 45, most of them have children. Additionally, most hospital nurses begin their careers between the ages of 25 and 30, which often correspond to childbearing years. This suggests that a sizable share of hospital nurses are likely to have children during the first years of their careers.

Figure 5 investigates this issue. It plots the share of hospital nurses who have children over time relative to the first hospital nurse job, both in the aggregate and separately across cohorts defined by the timing of their first hospital nurse job. The share of parents increases slightly before hospital nurses start their first hospital nurse job, but remains relatively small: one year before starting their first job as a hospital nurse, 24% of them had children.

By contrast, after starting their first hospital nurse job, this share rises quickly: ten years after this first job as a hospital nurse, the share of parents is 79%. This share is not conditional on gender but actually varies little across genders: among women, the proportion is 80%. Given that the vast majority of hospital nurses are women, this implies that, at this point, 66% of hospital nurses are mothers, compared to women without children and men, regardless of whether they have children.[24] Splitting the data across cohorts confirms that this pattern is not driven by changes in the composition of cohorts observed at each point in time, given the restricted time period of observation.[25]

The question is therefore whether the arrival of children, which often occurs at the onset of hospital nurses' careers, may explain part of the decline in nursing labor supplied to hospitals over their lifecycle. This would be the case if motherhood induced a substantial share of hospital nurses to either shift to part-time employment, transition to other, more family-friendly jobs, or leave the workforce entirely. Sections 5 and 6 investigate this issue.

5 Empirical analysis: impact of parenthood

My analysis builds on the event-study approach proposed by Kleven, Landais, and Søgaard (2019). It improves upon this approach by (i) using more restrictive comparison groups and (ii) incorporating insights from recent advancements in the difference-in-differences literature (see de Chaisemartin and D'Haultfœuille, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021). Specifically, my approach addresses potential identification issues associated with the use of two-way fixed effects in settings where treatment effects are likely heterogeneous. The exposition of my empirical framework primarily draws on Callaway and Sant'Anna (2021) and Sun and Abraham (2021).

[24] The data records indeed only two genders and treats gender as a person-constant characteristic. Only women become mothers, and only men become fathers.

[25] There is one outlier with a much higher share of mothers at the beginning of a career than the rest. This is actually the oldest cohort, namely hospital nurses first observed holding a job in this occupation in 1989. Due to left-censoring (the public sector is not observed before 1988), it is plausible that part of them held a hospital nurse job before this date, which would explain why their average fertility at what my approach retains as the beginning of their careers is higher than that of other cohorts. In fact, the average age at the beginning of a career for this particular cohort is 32, for both men and women, compared to 31.6 and 28.1 for the rest of the sample.

5.1 Model and identification

5.1.1 Setting and definitions

Let $Y_{i,t}$ denote a labor supply outcome—for instance, the total number of hours worked as a hospital nurse—of individual i at time t, measured relative to the year she took her first job as a hospital nurse. Let G_i denote the group to which individual i belongs, defined by (i) her gender, (ii) her year of birth, and (iii) the year in which she first took a hospital nurse job.[26] Lastly, let C_i denote the year in which her first child was born ($C_i = \infty$ if she does not have children).

Defining causal effects requires specifying potential outcomes. In this setting, let $Y_{i,t}(c)$ represent the potential value of individual i's labor supply outcome at time t, under the hypothetical scenario where her first child was born at time c. Accordingly, $Y_{i,t}(\infty)$ represents her labor supply outcome at time t in the hypothetical scenario where she remains childless. By construction:

$$Y_{i,t} = Y_{i,t}(\infty) + \sum_{c} (Y_{i,t}(c) - Y_{i,t}(\infty)) \mathbb{1}\{C_i = c\} \tag{1}$$

My analysis focuses on the causal effect of parenthood on labor supply. Specifically, I am interested in (functionals of) the distribution of the random variables $Y_{i,t}(c) - Y_{i,t}(\infty)$, where $c < \infty$. I define the cohort-specific average treatment effect on the treated:

$$CATT_{g,c,t} = \mathbb{E}[Y_{i,t}(c) - Y_{i,t}(\infty) \,|\, G_i = g,\, C_i = c] \tag{2}$$

This quantity corresponds to the effect of being $t - c$ years away from the birth of one's first child, for those who gave birth to their first child at time c and belong to group g. These average treatment effects are not conditional on possible subsequent childbirths. As a result, they incorporate both the causal effect of parenthood at the extensive margin, i.e., choosing to become a parent or not, and at the intensive margin, i.e., choosing to have an additional child for those who are already parents. In other words, the causal effect of parenthood combines the effects of the first child and all subsequent children, with weights that depend on the difference between the time period t and the timing of the first child's birth c: short-run effects ($t = c$) relate almost exclusively to the extensive margin of fertility,

[26] Due to left-censoring in the data, this year is unobserved for individuals who began their first hospital nurse job before 1989. These individuals are grouped by (i) their gender, (ii) their year of birth, and (iii) having taken their first hospital nurse job in 1988 or earlier.

whereas longer-run effects ($t > c$) integrate a larger share of the consequences at the intensive margin. This is especially relevant in a context where most parents choose to have more than one child, as shown in Table 2 and Table 3. I address these concerns and provide a decomposition of the effect of children between these two margins for women in Appendix G.3.

5.1.2 Identifying assumptions

To identify these quantities from the data, I make two assumptions: (i) a parallel trend assumption, and (ii) a limited anticipation assumption.

Assumption 1 (Parallel trends in baseline outcome)**.** *For all g, for all (t, t'), for all (c, c'), if $c, c' > 1$ and $c, c' < \infty$ then:*

$$\mathbb{E}[Y_{i,t}(\infty) - Y_{i,t'}(\infty) \,|\, G_i = g,\, C_i = c] = \mathbb{E}[Y_{i,t}(\infty) - Y_{i,t'}(\infty) \,|\, G_i = g,\, C_i = c'] \quad (3)$$

Assumption 2 (Limited anticipation)**.** *For all t, for all g, for all c, if $t < c - 1$ then:*

$$\mathbb{E}[Y_{i,t}(c) - Y_{i,t}(\infty) \,|\, G_i = g,\, C_i = c] = 0 \quad (4)$$

Assumption 1 states that, absent children, the average labor supply of parents of the same gender, born at the same time, who took their first job at a hospital during the same year and had their first child only afterward, would evolve in parallel over time. A key concern, however, is that the timing of childbirth is unlikely to be exogenous. In particular, nurses may decide to have children at a stage in their careers when they anticipate reducing their working hours, regardless of parenthood.

While the data do not allow for an identification strategy based on quasi-random fertility shocks, several elements suggest that endogenous timing may not fully account for the observed effects. Firstly, in the public sector – where most hospital nurses are employed – employers cannot require an employee to transition to part-time work, and this possibility is very restricted in the private sector. Moreover, the persistent tightness of the nursing labor market throughout the period studied makes it unlikely that nurses would expect external demand-side pressures to reduce their hours independently of their own choices.

Secondly, wage progression is largely predictable, particularly in the public sector, where salaries follow a centralized grid. Since the public sector dominates hospital employment, wages in the private sector are also closely aligned. Con-

sequently, nurses hired at the same time and at similar ages should anticipate comparable wage trajectories. This reduces the likelihood that some nurses systematically reduce their working hours earlier than others due to expectations of weaker returns on time spent on the job.

That said, the possibility remains that observed reductions in hours reflect shifts in individual preferences rather than external constraints. For instance, nurses experiencing difficult working conditions may reduce their labor supply due to burnout (Estryn-Béhar et al., 2007) and choose to have children at that point. In addition, women who have children earlier in their careers are likely to have stronger preferences for children and may exhibit a different attachment to their job or to the labor force in general. They may also be less risk-averse.

Given these considerations, the estimates in this paper should be interpreted not strictly as the causal effect of having a child, but rather as capturing both (i) the direct impact of parenthood and (ii) other labor supply adjustments that are causally independent of children, as long as they are both unrelated to age and experience and correlated with parenthood. While this does not invalidate the estimated effects, it underscores the importance of accounting for lifecycle and career dynamics when assessing the impact of children on labor supply. Moreover, recent evidence on the effect of having a third child suggests that event-study methods yield causal estimates similar to those obtained from more restrictive quasi-random fertility shocks (Kleven, Landais, and Søgaard, 2019). This suggests that additional labor supply adjustments, independent of children, age, and experience, may be relatively small compared to the overall impact of parenthood.

Assumption 2 states that the average effect of children on their parents' labor supply is 0 up until two years before they are born. The reason for this choice, as opposed to a full no-anticipation assumption, is that (i) becoming a parent during year t generally results from fertility decisions made during year $t-1$, and (ii) maternity leave may begin during the last year before childbirth if childbirth occurs at the start of the civil year, which will mechanically affect the mother's labor supply.

5.1.3 Identification

Under these assumptions, provided that within each group there is sufficient variation in the timing of childbirth, cohort-specific ATTs can be identified from the data.

Proposition 1 (Difference-in-difference estimand)**.** *For all* (g, c, t)*, if* $1 < c < \infty$ *then:*[27]

$$\begin{aligned} CATT_{g,c,t} \;=\; & \mathbb{E}[Y_{i,t} \,|\, G_i = g,\, C_i = c] \\ & -\mathbb{E}[Y_{i,c-2} \,|\, G_i = g,\, C_i = c] \\ & -\mathbb{E}[Y_{i,t} \,|\, G_i = g,\, \max(1,\, c-2\,, t+1) < C_i - 1 < \infty] \\ & +\mathbb{E}[Y_{i,c-2} \,|\, G_i = g,\, \max(1,\, c-2,\, t+1) < C_i - 1 < \infty] \end{aligned} \tag{5}$$

Proposition 1 implies that as long as, within a group, there are future parents who can still be observed at least two years before their first child is born, it is actually possible to impute the counterfactual labor supply lifecycle profile of mothers whose first child is already born, so as to identify cohort-specific ATTs. Specifically, let $\{\underline{T(g)},\, \underline{T(g)}+1,\, \ldots,\, \overline{T(g)}-1,\, \overline{T(g)}\}$ denote the set of time-periods that can be observed for individuals who belong to group g. Then, for all c, $CATT(g, c, t)$ is identified from the data provided that:

(i) $\underline{T(g)} \leq c-2 \leq \overline{T(g)}$;

(ii) $\underline{T(g)} \leq t \leq \overline{T(g)}$;

(iii) $\mathbb{P}(\max(1,\, c-2,\, t+1) < C_i - 1 < \infty \,|\, G_i = g) > 0$.

This last condition implies that very long run effects generally cannot be identified under these assumptions, because no counterfactual is available after the last parent is about to have her first child. Specifically, given the profile of Figure 5, cohort-specific effects are very unlikely to be identified for $t > 10$, and even more so for $t > 15$.

5.2 Aggregation and estimation

Aggregation The quantities I am interested in correspond to the causal effect of having been a parent for a certain amount of time, for individuals who, before having children, held a job as a hospital nurse. I recover these quantities by aggregating my cohort-specific ATTs with weights proportional to population

[27] In principle, when $t \leq c-2$, this expression compares the (g, c) cohort to all g-cohorts whose children are born after $c-2$. This includes in particular the (g, c) cohort. However, with finitely many cohorts, this is not a very good test of the validity of the identifying assumptions, because this quantity is biased towards 0 due to the inclusion of the (g, c) cohort on both sides. Instead, when $t \leq c-2$, I consider the comparison where the (g, c) cohort only appears on one side, and is compared to all cohorts whose children are born after $c-1$.

shares. Specifically, for gender f let $\Omega(f)$ be the subset of group-cohort-time-period triplets of gender f for which all three conditions hold, as well as $C_i > 1$, so that $CATT(g, c, t)$ is identified from the data. I define:

$$\tau(f, s) = \mathbb{E}[Y_{i,C_i+s}(C_i) - Y_{i,C_i+s}(\infty) \,|\, (G_i, C_i, C_i + s) \in \Omega(f)] \tag{6}$$

This quantity represents the average treatment effect of being s years away from the birth of one's first child, for a certain subset of individuals of gender f that varies depending on s. By the law of iterated expectations:

$$\tau(f, s) = \sum_{(g,c,c+s)\in\Omega(f)} \mathbb{P}(G_i = g, C_i = c \,|\, (G_i, C_i, C_i + s) \in \Omega(f))\, CATT(g, c, c + s) \tag{7}$$

By Proposition 1, it is therefore possible to express $\tau(f, s)$ as a function of quantities that are all identified from the data.

Lastly, I consider $\bar{\tau}(f, S)$, a quantity that represents the impact of children over the first S years of parenthood for hospital nurses of gender f:

$$\bar{\tau}(f, S) = \frac{1}{S} \sum_{s=0}^{S} \tau(f, s) \tag{8}$$

Estimation Combined with Proposition 1, Equation 7 suggests a very simple plug-in estimator, where population probabilities and expectations are replaced by their empirical analogues. The same applies to the estimation of $\bar{\tau}(f, S)$.

Under standard integrability assumptions, these estimators are asymptotically normal (Callaway and Sant'Anna, 2021). To perform inference, I rely on a bootstrap approach, clustered at the individual level. This level of clustering is justified both from a sampling perspective – since the sampling scheme is defined at the individual level – and from a design perspective – as the treatment, i.e., children, is assigned at the individual level (Abadie et al., 2022).

5.3 Simulation exercise

To quantify the contribution of children to the lifecycle profile of hospital nurses' labor supply, I construct a counterfactual profile of their labor supply, assuming either (i) that nurses did not have children, or (ii) that motherhood had no impact on their labor supply. To this end, I first consider the realized lifecycle profile of average labor supply, described by $\mathbb{E}[Y_{i,t} \,|\, \underline{T(G_i)} \leq t \leq \overline{T(G_i)}]$, which represents the average hours worked by nurses observed t years after they begin their first

job at a hospital. I consider the counterfactual lifecycle profile of labor supply to be described by the quantity:

$$\Lambda(t) = \mathbb{E}[Y_{it} \,|\, \underline{T(g)} \leq t \leq \overline{T(g)}] - \sum_{s \geq 0} \mathbb{P}(t = C_i + s, C_i > 1 \,|\, \underline{T(G_i)} \leq t \leq \overline{T(G_i)},\, F_i = 1)\, \tau(1, s) \tag{9}$$

where F_i denote individual i's gender, with $F_i = 1$ if she is a woman and 0 otherwise. This approach: (i) focuses solely on first children born *after* their mothers begin their first job as a hospital nurse; and (ii) abstracts from considerations related to treatment effect heterogeneity across cohorts and associated compositional shifts.

5.4 Comparison with other approaches

Two-way fixed effects The approach underlying this paper aims to prevent issues associated with the use of two-way fixed effects regressions in settings where treatment effects are likely to be heterogeneous. Specifically, two-way fixed effects approaches make the same assumptions about parallel trends in potential outcomes and the absence of anticipated effects that I do; they introduce one additional assumption, which posits that average treatment effects are the same across cohorts defined by the timing of the treatment. Under this additional assumption, average treatment effects can be identified not only from comparisons between a treated cohort and cohorts that will experience the arrival of children later, but also from comparisons between this cohort and cohorts that have already entered parenthood. When this assumption holds, this method can improve the efficiency of the estimator.

To investigate this issue, Appendix F.1 compares my baseline estimates to (i) Kleven, Landais, and Søgaard (2019)'s approach, which is even simpler than TWFE estimators, and (ii) a TWFE approach that makes the same assumptions as I do, along with the homogeneity assumption mentioned above. The lesson is that Kleven, Landais, and Søgaard (2019)'s approach and a more restrictive TWFE model lead to very similar results. However, the estimated effects of parenthood on hospital nurses' labor supply are much smaller in magnitude than those suggested by my approach, which indicates that the bias arising from the additional homogeneity assumption can be sizable.

Stable control group The event-study analysis upon which this paper's results are based uses most individuals as both treated and control units: until two years

before they give birth to their first child, all nurses belong to the control group, after which they become part of the treated group. As a result, the control group changes over time relative to the first child's birth: whereas, within a cohort, the short-run effect of motherhood relies on a control group that includes almost all nurses except the ones who become mothers immediately after they get their first job, the long-run effect relies on a control group that is restricted to nurses who become mothers long after they get their first job.[28]

To assess whether the dynamics of the treatment effects are driven by this compositional shift in the control group, Appendix F.2 replicates my analysis, this time restricting the control group to hospital nurses who have their first child long after they got their first hospital nurse job, and restricting the treated group to hospital nurses who have their first child shortly after their first hospital nurse job. This approach is akin to more traditional difference-in-differences approaches, in which units do not switch from one group to the other over time. The resulting estimates are very close to my baseline estimates. This implies, in particular, that *before* childbirth, trends in hours worked are very similar across cohorts.

Childless control group My event-study approach is based on comparisons across parents whose first child is born at different dates. As a result, it does not involve any comparison with individuals who chose to remain childless. The reason for this choice is that selection into parenthood is likely to be even more endogenous with respect to labor supply decisions than selection into the timing of when one chooses to have her first child. Additionally, if the assumptions underlying a difference-in-differences estimand that compares parents to non-parents indeed hold, then my preferred estimator is consistent and is likely to be more efficient, given that non-parents are less frequent than parents, at least as long as short-run effects are concerned.

To compare these two approaches, Appendix F.3 contrasts my preferred estimator with (i) estimates based solely on comparisons between mothers and childless women, and (ii) an estimator that builds on both comparisons between mothers and childless women and comparisons across cohorts of mothers defined by the

[28] This concern is different from the one that drives the move from the TWFE estimator to more credible approaches. Indeed, it deals with how many *pre*-birth cohorts are used to build the counterfactual. By contrast, the difference between my estimand and TWFE methods deals with whether *post*-birth observations also contribute to the identification of the counterfactual. TWFE makes an additional assumption regarding treatment effect heterogeneity, namely, that average treatment effects are the same for all cohorts. When this assumption holds, comparisons across post-birth cohorts are also informative regarding dynamic treatment effects.

timing of the first birth. Estimates based solely on comparisons between mothers and childless women yield much smaller effects of motherhood on hospital nurses' labor supply than my baseline estimates. However, the pre-trends are not well controlled, which suggests that childless women are less convincing as a control group than future mothers. Results based on both comparisons yield estimates very similar to those obtained from comparisons between mothers and childless women. The reason for this is that the mothers vs. childless women comparison contributes more to the identification of the long-run effect of motherhood than do comparisons across cohorts of mothers.

6 Results

6.1 Child-related labor supply decisions

6.1.1 Female hospital nurses

Figure 6(a) presents the results of my event-study framework, showing the average changes in hours worked as a hospital nurse by mothers whose first child is s years old, relative to (i) two years before the child was born, and (ii) the change in nursing labor supplied to hospitals by future mothers over the same period.[29] Under the parallel trend and limited anticipation assumptions, these quantities identify the causal impact of motherhood on mothers' nursing labor supplied to hospitals, representing the average treatment effect for a specific subpopulation (see Section 5).

Before having children, the dynamics of female hospital nurses' hours worked closely resemble those of their counterparts who have children later.[30] The corresponding estimates are small and are not statistically different from 0 at usual confidence levels, which supports the credibility of my identifying assumptions.

After becoming mothers, the dynamics of nursing labor supplied to hospitals vary depending on the timing of the first child's birth. Specifically, following

[29] As noted in Subsection 3.3, when individuals are not observed working as hospital nurses, I assume their hours worked as hospital nurses to be zero. This approach ensures that my estimates of hours worked as hospital nurses are not conditional on participation in this sector, as they account for periods spent outside hospital nurse jobs, whether due to transitions to other jobs or non-employment.

[30] These estimates of hours worked as hospital nurses are not conditional on remaining in these jobs, as they account for periods spent outside hospital nurse positions. However, they exclude labor supply in the freelance sector. Notably, the pre-trends include periods before the first hospital nurse job, during which hours worked as a hospital nurse are zero by construction.

the birth of their first child, female hospital nurses reduce their hours worked as hospital nurses compared to those who will have their first child later. This reduction reflects both the causal effect of the extensive margin of fertility – i.e., the decision to become a mother – and that of the intensive margin of fertility – i.e., the decision to have additional children after the first child. In particular, short-run effects ($s = 0$) primarily capture the extensive margin. Over time ($s > 0$), these estimates increasingly reflect the intensive margin, as most mothers choose to have more children, as shown in Table 2.

Overall, during the first 10 years following the birth of their first child, motherhood reduces hours worked as a hospital nurse by approximately 0.11 full-time units, compared to a counterfactual average of 0.70 full-time units.[31,32,33]

Figure 6(b) presents similar estimates but focuses on a different outcome: holding a nursing position at a hospital, either on a full-time (left panel) or part-time schedule (right panel). These estimates are not conditional on holding a nursing position at a hospital; thus, they do not sum to 1 but rather to a binary variable indicating whether an individual still holds a hospital nursing job.

Consistent with the identifying assumptions, differences before the arrival of the first child are minimal. This suggests in particular that, conditional on having begun a career as a hospital nurse, women do not change jobs in anticipation of fertility. However, the figures indicate that after becoming mothers, female hospital nurses are significantly less likely to hold a full-time nursing position at a hospital. The probability drops by about 10 percentage points immediately after the birth of their first child and decreases further over time. In total, this decline

[31] This measure of time worked assumes that nurses continue to work their usual pre-birth hours during maternity leave. Consequently, it underestimates the short-run incapacitation effect of motherhood directly linked to maternity leave. Appendix H.3.1 replicates this analysis with hours set to 0 during maternity leave. While this adjustment amplifies the short-run negative effect, it has little impact on the long-run effect, which is primarily driven by transitions to part-time work. In the end, as Adams-Prassl, Jensen, and Petrongolo (2024) show, maternity leaves explain part of the child penalty, but a substantial part is not related to these short-run incapacitation effects.

[32] This measure excludes overtime hours worked by hospital nurses. Appendix G.2 examines this additional adjustment margin in detail. The findings indicate that motherhood causes a significant share of hospital nurses to forego overtime hours they would have worked in the absence of children. However, the overall impact of motherhood on overtime hours worked is minimal, as overtime constitutes only a small fraction of the total nursing labor supplied to hospitals. Consequently, including overtime in the main outcome variable would have negligible effects on the overall results concerning hours worked as a hospital nurse.

[33] When expressed relative to the counterfactual, the impact of children on hospital nurses' labor supply is about 16% when maternity leave is not accounted for and 23% when it is. For comparison, in Denmark, Kleven, Landais, and Søgaard (2019) estimate that children reduce mothers' employment rate by 13% and their hours worked (conditional on employment) by 10%.

amounts to a 25 percentage point reduction in the likelihood of holding a full-time position as a hospital nurse, compared to a counterfactual probability of 67%.

Interestingly, the increase in the probability of holding a part-time position as a hospital nurse almost perfectly mirrors the decrease in full-time positions. This increase amounts to 23 percentage points, compared to a counterfactual baseline of 4%. This indicates that part-time hospital nursing would remain rare in the absence of children and is predominantly driven by motherhood. The fact that the decline in full-time work closely matches the rise in part-time work within the same occupation suggests that motherhood often leads to transitions from full-time to part-time roles within hospital nursing, rather than to other jobs or non-employment. Indeed, the difference between these two estimated effects implies that the impact of motherhood on the overall probability of working as a hospital nurse is less than 2 percentage points.

In Appendix G.2, I delve deeper into the data to expand on the findings regarding the impact of motherhood. First, I examine transitions to other jobs. As previously detailed, motherhood does not prompt hospital nurses to leave their positions. Additional evidence supports this null finding, showing that the impact of motherhood on transitions to other salaried or freelance jobs is negligible. I then explore additional dimensions beyond hours worked and employment. The key findings are as follows: (i) motherhood leads many nurses to stop working overtime, but this has minimal effect on the overall supply of nursing labor, as overtime hours constitute only a small portion of their total hours; (ii) motherhood does not appear to alter working conditions in ways that would affect hourly wages; (iii) these labor supply decisions result in a significant drop in earnings; and (iv) the effects of motherhood are primarily tied to the extensive margin of fertility decisions.

6.1.2 Male hospital nurses

The above results investigate the effect of motherhood only for female hospital nurses. While this occupation is clearly female-dominated, male hospital nurses do exist and have children. Investigating the impact of fatherhood on their labor supply is worthwhile, as these men have self-selected into the occupation. It is therefore not obvious that their labor supply decisions should align with those of the average man, for whom the impact of fatherhood on labor outcomes is typically 0 (see e.g. Kleven, Landais, and Søgaard, 2019).

Figure 7 replicates my analysis on fathers. Specifically, it examines the impact of fatherhood on (a) hours worked as a hospital nurse; and (b) the probability of holding a full-time (left panel) or part-time (right panel) hospital nurse position. In all cases, because men are much less common than women among hospital nurses, they are also much less numerous in my sample: the available data allows me to study the consequences of 260 first child birth events. As a result, my estimates are also much less precise than those for women.

Overall, even though there is considerable statistical uncertainty, all my estimates are compatible with null effects of fatherhood on male hospital nurses' labor supply.[34,35] In other words, having children does not seem to induce male hospital nurses to either decrease their hours worked as hospital nurses. The lack of transitions to part-time hospital nurse positions stands in stark contrast to the results for women. In the end, even men who self-select into the female-dominated occupation of the care sector do not appear to adopt the same labor supply behaviors as mothers when it comes to child-related decisions.

6.1.3 Heterogeneity

Over time Figure 8 presents estimates of the aggregate effect of motherhood on average hours worked as a hospital nurse, depending on the year of the first child's birth. The grouping of these years aligns broadly with major parental leave reforms. Specifically, paid parental leave became available starting with the second child in 1994 and was extended to the first child in 2004. As the average effects are calculated over the first ten years following the birth of the first child, they cannot be estimated for the most recent cohorts.

Although the comparison is imprecise due to the small sample size, Figure 8 does not indicate significant variation in the average effect of motherhood on hours worked as a hospital nurse over time. Across all cohorts analyzed, motherhood appears to result in an average decrease of 0.10 full-time units in hours worked. Notably, extensions to paid parental leave do not seem to have substantially am-

[34] As Section 3 details, I am only able to consider the consequences of children for fathers with recognized children. This covers about 90% of childbirths over the period of interest. Since fathers who do not recognize their children are likely to be less involved in their education, it is plausible that my estimated effect actually overstate the impact of children on male hospital nurses' labor supply.

[35] In Appendix G.2, I extend these findings by examining transitions to other salaried jobs. Consistent with the observation that male hospital nurses do not leave their positions upon becoming fathers, I show that fatherhood does not affect their likelihood of holding other salaried jobs.

plified this decline. In Appendix G.4, I present time series showing the proportion of nurses whose behavior during the first three years after a child's birth aligns with paid parental leave rules, both before and after the reforms. These results further support the notion that paid parental leave reforms have had a limited impact on hospital nurses' labor supply. This limited effect could stem from the relatively low compensation provided during the leave, which contrasts sharply with the policy examined in Friedrich and Hackmann (2021), where allowances represented nearly 75% of prior wages.

Over space Figure 9 compares the impact of motherhood on average hours worked as a hospital nurse, distinguishing between nurses who began their careers in the Paris region (*Île-de-France*) and those in other regions. Consistent with the identifying assumptions, the effect is negligible before the arrival of children. Afterward, both groups experience a decline in hours worked. Although the estimation remains imprecise, the data do not suggest that the impact may be larger in the Paris region compared to the rest of the country. If confirmed, this finding would be notable, as formal early childcare coverage is lower in the Paris region than nationally (53% versus 59% in 2019). One possibility is that Paris hospitals might offer childcare services specifically for their employees, but no data are available to verify this. Moreover, the sample size remains too small to draw definitive conclusions.

Public vs. Private sector Figure 10 presents estimates of the average impact of motherhood on hours worked as a hospital nurse, comparing nurses who began their careers in the public sector to those in the private sector. Although the statistical uncertainty is considerable, the results suggest that the impact may be smaller for nurses who started in the private sector. One possible explanation is that private hospitals might be more effective than public ones at implementing family-friendly policies for their employees. However, further data would be needed to substantiate this hypothesis.

6.2 Contribution to lifecycle profiles of labor supply

I evaluate the contribution of mothers' child-related labor supply decisions to the decline in hospital nurses' labor supply over the course of their careers by comparing observed profiles with counterfactual ones, assuming no reduction in labor supply following motherhood. Specifically, I subtract the causal effect of children,

weighted by the proportion of mothers, from the observed profiles (see Subsection 5.3).

Figure 11 presents the results of this simulation exercise for (a) hours worked as a hospital nurse, expressed in full-time units, and (b) the proportion holding full-time (left panel) or part-time (right panel) hospital nurse positions over their careers.[36] Solid lines illustrate observed average lifecycle profiles, as detailed in Section 4, while dashed lines show counterfactual profiles where the causal effect of motherhood has been subtracted for women with children.

Hours worked as a hospital nurse decline in both cases, indicating that motherhood does not fully account for the reduction in nursing labor supplied to hospitals over the course of hospital nurses' careers. However, the dashed line, representing the counterfactual lifecycle profile, progressively diverges from the solid line, which corresponds to the observed profile. In other words, child-related decisions contribute partially to the observed decrease. Specifically, my estimates suggest that while average hours worked as a hospital nurse decrease by 0.26 full-time units over the first ten years of a career, this decline would be limited to 0.22 full-time units if (i) nurses did not have children or (ii) female nurses made the same decisions as male nurses, who do not reduce their hours worked upon becoming fathers. Thus, mothers' child-related labor supply decisions account for approximately 0.04 full-time units, or 15% (0.04 / 0.26), of the observed decline.

Consistent with the above discussion, this contribution is closely linked to transitions from full-time hospital nurse positions to part-time hospital nurse positions. Figure 11(b) shows that the share of nurses holding full-time positions decreases by 34 percentage points over the first ten years of a career, whereas this decrease would be limited to 24 percentage points absent the causal impact of motherhood. By contrast, the share of part-time hospital nurses increases by 10 percentage points due to motherhood. Specifically, without the effect of motherhood, this share would decrease by 8 percentage points instead of increasing by 2 percentage points over the same period. These results imply that ten years after beginning their careers, 18% of hospital nurses work part-time, compared to a counterfactual rate of only 8% without the impact of motherhood. In other words, working part-time as a hospital nurse is strongly tied to motherhood.

The contribution of motherhood to the dynamics of part-time work for hospital

[36] Figures depicting realized or counterfactual labor supply profiles over the course of a career are restricted to this population because the start of the career is unobserved for hospital nurses who began in 1988 or earlier, as explained in Section 4.

nurses closely mirrors its impact on full-time hospital nurse positions. These variables are not conditional on holding a hospital nurse position but instead sum up to an indicator of whether an individual remains in this type of job. Consequently, this implies that motherhood does not drive transitions away from hospital nurse positions. In other words, removing the causal effect of motherhood would not increase the retention rate of hospital nurses but would instead raise the proportion working full-time.

In this simulation exercise, the effect of motherhood – estimated among hospital nurses whose first child is born at least two years after they began their careers and weighted by the size of this population – is subtracted from the observed profile measured over the total population. However, this group represents only about one-third to one-half of the overall population (see Figure 5 and Tables 2 and 3). Consequently, this approach does not account for the potential impact of motherhood on nurses who have children earlier in their careers. Appendix D.2 examines the lifecycle labor supply of this group to refine the interpretation of the simulation exercise. The key takeaway is that, while their labor supply declines over time, this trend is unlikely to be driven primarily by parenthood, because this would require the long-run negative effect of motherhood on labor supply to be much larger than what appears reasonable. Ultimately, it remains plausible that the divergence between observed and counterfactual profiles in Figure 11 fully captures the impact of motherhood on hospital nurses' careers.

Finally, Appendix G.5 replicates this analysis using alternative measures of labor supply, such as total hours worked across all jobs or hours worked as a healthcare worker. Since the primary effect of motherhood for hospital nurses is to increase transitions to part-time positions rather than to other occupations, the differences between realized and counterfactual labor supply profiles remain very similar to those shown in Figure 11.

6.3 Robustness checks

Three main issues arise regarding the data used in this analysis. The first two concern restrictions on the observed time period, while the last relates to the measurement of hours worked in the DADS data.

Left-censoring In the DADS data, the beginning of the hospital nurse career is not observed for those who started their career in 1988 or earlier. This issue

is highlighted by the fact that the parallel trends assumption (Assumption 1) is made conditional on both the year of birth and the timing of the career start. In other words, mothers' counterfactual labor supply, had they not had children, is imputed only based on women born at the same time and starting their careers in the same year. In practice, I group all individuals who began their careers in 1988 or earlier into a single group, ensuring that the parallel trends assumption is conditional only on the year of birth. Appendix H.1 assesses the robustness of my results to this choice by replicating my event-study estimates and the resulting counterfactual profiles, excluding these individuals from the data. The results are very similar, confirming that they are robust to this particular issue. It also reports estimates of the average effect of motherhood on hours worked as a hospital nurse while increasingly restricting the sample to those who started their careers later. The findings indicate that these effects are stable with respect to these restrictions, suggesting that the left-censoring issue is not critical.

Right-censoring The DADS-EDP dataset does not report childbirths that occurred after 2019. As a result, part of my control group of mothers who would have children later is not observed, as they cannot be differentiated from women who remain childless. This impedes the identification of cohort-specific ATTs for the year 2019 and, more generally, alters the composition of the control groups as one looks at younger individuals. Appendix H.2 evaluates whether my results are affected by this issue by replicating my event-study estimates and the resulting counterfactual profiles while restricting the sample to individuals for whom the distinction between mothers who have children later and childless women is less problematic. Specifically, I consider this to be the case for individuals who secured their first hospital nurse job before 2003, as they are likely to have completed their fertility decisions by 2019. The corresponding estimates are very close to my baseline results. Additionally, it reports estimates of the average effect of motherhood on hours worked as a hospital nurse while increasingly restricting the sample to those who began their careers earlier. The findings suggest that these effects are stable with respect to these restrictions, indicating that the right-censoring issue is not critical.

Hours worked measurement Hours worked are not observed before 1995 in the DADS data. Prior to this, I impute hours worked based on days worked and working-time status (full-time or part-time), under the assumption that part-time

workers are on a 50% schedule. This schedule is the most common among part-time workers when hours are observed (see Appendix C). To assess the robustness of my results with respect to this imputation, Appendix H.3 replicates my analysis while restricting the sample to the 1995-2019 time period. This restriction limits the set of cohort-specific ATTs that can be identified under my identifying assumptions. The resulting estimates are very similar to my baseline results, suggesting that my baseline results are not driven by the choice of imputation.

7 Implications at the hospital level

The decline in nursing labor supplied to hospitals over the course of hospital nurses' careers is not necessarily an issue at the hospital level, provided that hospitals manage to maintain an adequate level of aggregate nursing labor, which is arguably what matters for patient-level outcomes. This can be achieved by either (i) compensating for hours lost due to some hospital nurses decreasing their hours worked by increasing hours worked by other nurses, including recruiting new hospital nurses, or (ii) increasing the efficiency of the remaining hours of nursing labor. Assessing whether the second mechanism is at play requires a careful analysis of productivity differences within and across nurses and over time, which goes beyond the scope of this paper. However, repeated short-panel data regarding hours worked by individual hospital nurses at various hospitals during consecutive years allow for closer scrutiny of the first mechanism. In other words, this makes it possible to estimate the transmission of individual-level labor supply decisions to the hospital-level provision of nursing services.

7.1 Accounting approach

Let $H_{j,t}$ denote the total nursing hours at hospital j during year t, and let $h_{i,j,t}$ denote hours worked by nurse i in this hospital during this particular year. Additionally, let $f_{i,j,t}$ ($p_{i,j,t}$) be a dummy variable that equals 1 if nurse i works on a full-time (part-time) schedule at hospital j, and 0 otherwise. Then the change in

nursing hours at hospital j between two consecutive years writes:

$$
\begin{aligned}
H_{j,t+1} - H_{i,t} \quad = \quad & \underbrace{-\sum_i (1 - f_{i,j,t+1} - p_{i,j,t+1})(f_{i,j,t} + p_{i,j,t}) h_{i,j,t}}_{\text{Outflows}} \\
& \underbrace{+\sum_i (f_{i,j,t+1} - p_{i,j,t+1})(1 - f_{i,j,t} - p_{i,j,t}) h_{i,j,t+1}}_{\text{Inflows}} \\
& \underbrace{+\sum_i p_{i,j,t+1} f_{i,j,t} (h_{i,t+1} - h_{i,t})}_{\text{FT to PT transitions}} \\
& \underbrace{+\sum_i f_{i,j,t+1} p_{i,j,t} (h_{i,t+1} - h_{i,t})}_{\text{PT to FT transitions}} \\
& \underbrace{+\sum_i p_{i,j,t+1} p_{i,j,t} (h_{i,t+1} - h_{i,t})}_{\text{PT workers}} \\
& \underbrace{+\sum_i f_{i,j,t+1} f_{i,j,t} (h_{i,t+1} - h_{i,t})}_{\text{FT workers}}
\end{aligned}
\tag{10}
$$

In other words, the change in nursing hours at the hospital level is the difference between the hours worked by newly recruited hospital nurses and the hours previously worked by those who left the hospital, plus the change in hours for those who transitioned from a full-time to a part-time schedule (likely negative), plus the change for those who transitioned from a part-time to a full-time schedule (likely positive), plus changes for those who remained on the same schedule.

Among these components, the ones most closely related to the individual labor supply decisions examined earlier in the paper are the hours lost due to outflows and the hours lost due to transitions from full-time to part-time jobs. The accounting identity simply states that to compensate for nursing hours lost through either hospital nurses leaving the workforce or transitioning to a part-time schedule, hospitals can (i) neutralize the loss by recruiting new hospital nurses, (ii) have hospital nurses previously on a part-time schedule return to full-time positions (for example, when their child-related rights to part-time schedules expire), (iii) encourage part-time hospital nurses to adopt more intensive schedules, or (iv) increase full-time hospital nurses' hours through overtime policies.

7.2 Method

To investigate whether hospitals are able to resort to these solutions, one could therefore estimate the regression:

$$
\begin{aligned}
& H_{j,t+1} - H_{i,t} \qquad (11)\\
= \; & \alpha + \beta \underbrace{\sum_i (1 - f_{i,t+1} - p_{i,t+1}))(f_{i,t} + p_{i,t}) h_{i,j,t}}_{\text{Outflows}} \\
& + \gamma \underbrace{\sum_i (f_{i,t+1} - p_{i,t+1}))(1 - f_{i,t} - p_{i,t}) h_{i,j,t+1}}_{\text{FT to PT transitions}} \\
& + \epsilon_{j,t}
\end{aligned}
$$

The coefficients β and γ represent the extent to which nursing hours lost at the individual level due to outflows or transitions from full-time to part-time schedules translate into nursing labor losses at the hospital level.

However, as shown above, most individual labor supply decisions leading to these hour losses exhibit regular patterns. It is likely that these decisions are, to some extent, incorporated into hospitals' human resources strategies. If the hospital's need for nursing labor remains roughly constant over time, and hospitals can accurately anticipate nurses' future labor supply decisions while recruiting new nurses or increasing hours worked by existing staff is not too costly, it is expected that these coefficients would be close to 0. However, they would not measure how hospitals handle exogenous and unexpected nursing hour losses.

To move closer to this idea, I estimate a modified regression that seeks to measure the impact of nursing hour losses due to outflows and transitions to part-time work, beyond what is typical and expected at the hospital level. Specifically,

I estimate:

$$
\begin{aligned}
& H_{j,t+1} - H_{i,t} \\
= \; & \underbrace{\beta \sum_i (1 - f_{i,t+1} - p_{i,t+1}))(f_{i,t} + p_{i,t}) h_{i,j,t}}_{\text{Outflows}} \\
& \underbrace{+\gamma \sum_i (f_{i,t+1} - p_{i,t+1}))(1 - f_{i,t} - p_{i,t}) h_{i,j,t+1}}_{\text{FT to PT transitions}} \\
& + \lambda_j + \mu_t + \epsilon_{j,t}
\end{aligned}
\tag{12}
$$

where λ_j and μ_t represent hospital-level and year fixed effects. Identification here relies on hospitals experiencing larger (or smaller) year-to-year changes in nursing hour losses due to either full-time to part-time transitions or outflows compared to their counterparts. Consequently, the coefficients can be more directly interpreted as the effect of one additional nursing hour lost due to either outflows or transitions to part-time work.[37] A coefficient of 1 implies that hospitals do not compensate at all for nursing hour losses resulting from outflows or transitions to part-time schedules. Conversely, a coefficient of 0 indicates full compensation, implying that these losses have no impact on the overall provision of nursing labor at the hospital level.

The exogenous shocks considered here capture atypical and unexpected fluctuations in the number of hospital nurses leaving their jobs or switching to part-time work, relative to each hospital's usual patterns. These changes are generally transitory: once hospital and year fixed effects are accounted for, current outflows exhibit low serial correlation (see Appendix I). This suggests, in particular, that nurse outflow shocks are unlikely to signal persistent changes in hospital workplace quality. The same applies to part-time transitions.

7.3 Results

Table 5 presents the estimated coefficients from regression 13, along with results from similar regressions where the outcome is not the overall hospital-level change

[37] Transitions to part-time work may more readily be interpreted as exogenous individual-level labor supply decisions since employers cannot require hospital nurses to transition to part-time schedules. In contrast, departures from hospitals may also reflect changes in the demand for nursing labor.

in nursing hours but each of the margins described in accounting identity 11.[38] The data cover the period from 1995 to 2017.[39] The results suggest that nursing hours lost due to transitions to part-time work are rarely compensated at the hospital level. Specifically, they indicate that when a hospital nurse transitions from full-time to part-time work on a 50% schedule, reducing her weekly hours by 17.5, the corresponding nursing hours lost at the hospital level amount to 15 weekly hours (0.85 × 17.5). This reflects only a slight increase in nursing labor inflows.

By contrast, nursing hours lost due to hospital nurses leaving a hospital appear to be almost entirely offset at the hospital level. Specifically, the data indicate that when a nurse leaves, 92% of the resulting loss in nursing labor (1 - 0.08) is compensated. The primary mechanism through which hospitals mitigate these losses is through new hires.

The difference between the hospital-level transmission of transitions to part-time work and that of hospital nurses leaving the workforce is striking. That part-time transitions are poorly offset by hospitals has already been pointed out in administrative reports, that highlight a general reluctance toward part-time work in hospital services due to concerns over work organization and staffing constraints (Roche, 1999). The asymmetric response of hospitals to full departures versus transitions to part-time work may be explained by a combination of budgetary constraints, rigidities in workforce management, and collective work adjustments.

First, strict employment caps and budgetary constraints often require hospitals to justify new hires, making it easier to replace a departing nurse than to fractionally adjust staffing levels to compensate for part-time transitions. Indeed, full departures create clear vacancies that can be formally filled, whereas compensating for a partial reduction in hours would require fragmented adjustments that may not align with financial and administrative constraints.

Second, hospital staffing decisions are primarily managed at the service unit level rather than across the hospital as a whole, which amplifies the constraints associated with labor supply indivisibility. While hospitals are large organizations,

[38] When individual margins are considered, a coefficient of 0 implies that the margin does not adjust in response to hours lost due to either transitions to part-time work or hospital nurses leaving the hospital. A coefficient of -1 indicates that this margin offsets the hours lost on a one-to-one basis. The coefficient for the overall hospital-level change is equal to 1 plus the sum of the coefficients associated with all possible margins of adjustment.

[39] The data are further restricted to hospital × year observations where relative changes in overall nursing labor provision are not excessively high or low, ensuring that abrupt changes, such as those caused by the closure or opening of a service, do not drive the estimates.

the relevant unit for scheduling and workload distribution is much smaller, as each service unit operates with its own dedicated team and shift arrangements. In practice, 87% of hospital nurses reported working exclusively within a single service unit in 2003 (Bouffartigue and Bouteiller, 2005). This fragmentation makes it difficult to smooth out variations in working hours across the hospital, as adjustments must be made within relatively small teams rather than through a larger staffing pool. Additionally, within-service planning constraints—such as the need to maintain continuous coverage and balance individual schedules—limit the feasibility of fractional adjustments to compensate for part-time transitions.

While, in theory, nurses could be reassigned across services or called in on short notice, practical limitations temper this flexibility (Micheau and Éric Molière, 2014). Replacement strategies unfold at three levels: (i) the service, which first seeks internal solutions; (ii) the hospital division (*pôle*), where resource sharing is unevenly developed across institutions; and (iii) the hospital-wide level, where centralized replacement pools or external staffing solutions may be deployed. Despite efforts to enhance resource pooling across services, especially at the *pôle* level, this approach is often met with resistance from nurses, who perceive it as undermining their specialized competencies and disrupting the reciprocity inherent in within-service adjustments. As a result, the restructuring of hospital management has introduced additional social costs to staff reallocation beyond the service level. While hospital divisions (*pôles*) were meant to enhance flexibility, they have also disrupted established work structures, with staff reassignments affecting job content, team cohesion, and scheduling (Zeggar, Vallet, and Tercerie, 2010). These tensions help explain why hospitals have largely preserved service-level workforce management rather than expanding cross-service staff sharing.

Third, reductions in working hours are often absorbed through internal adjustments within the nursing workforce rather than through external hiring. The collective nature of hospital work allows for a redistribution of tasks among remaining staff, effectively increasing work intensity rather than prompting an equivalent increase in headcount. The limited acceptance of part-time work within hospital services further reinforces this mechanism. Reports indicate that part-time arrangements are often perceived as disruptive by both hospital management and nurse supervisors, leading to a preference for full-time employment whenever possible (Roche, 1999). This reluctance, combined with financial constraints, makes formal compensations for part-time transitions rare, with adjustments primarily occurring within existing teams. As a result, while hospitals are incentivized to

replace full departures to maintain service capacity, they might often manage part-time transitions through internal workload adjustments rather than formal compensation in staffing.

8 Conclusion

This paper examines the labor supply of hospital nurses in France over the period 1988–2019 using detailed longitudinal payroll tax data linked to birth certificates and census data. The analysis begins with a descriptive overview of hospital nurses' career trajectories. The primary finding is that the decline in nursing labor supplied to hospitals throughout nurses' careers is mainly driven by outflows and, to a lesser extent, by transitions to part-time schedules. Notably, most outflows lead to other jobs within the healthcare sector rather than to non-healthcare jobs or non-employment. This suggests that policies aimed at improving hospital nurse retention could have broader implications for the healthcare system, potentially influencing both the level and composition of nursing services in other settings.

Drawing on recent literature on gender inequality and recognizing that the vast majority of hospital nurses are women, this paper estimates the impact of mothers' child-related labor supply decisions on the provision of nursing labor to hospitals at the individual level. The results indicate that motherhood prompts many female hospital nurses to transition to part-time schedules instead of continuing in full-time roles. Combined with the high proportion of women in the profession and the fact that many become mothers early in their careers, this effect explains a significant share of the prevalence of part-time work among hospital nurses. In contrast, motherhood does not lead hospital nurses to switch to other jobs or leave the workforce entirely.

Male hospital nurses do not make comparable adjustments following the arrival of their children, and the impact of motherhood appears largely unaffected by family policies. This suggests that the effect is primarily driven by gender norms, consistent with findings from the recent literature on the child penalty (Andresen and Nix, 2022; Kleven et al., 2024; Kleven, Landais, and Leite-Mariante, 2024).

As a final empirical analysis, this paper examines whether the individual labor supply decisions of hospital nurses affect the hospital-level provision of nursing services. Using comprehensive repeated short-panel data on hours worked by hospital nurses, it estimates the extent to which nursing hours lost due to an increase in the number of nurses leaving the workforce or transitioning from full-time to

part-time schedules translate into hospital-level nursing hours losses. The identification strategy considers hospitals facing higher than usual, unexpected, and transitory increases in outflows or transitions to part-time work. The findings differ significantly across these two margins: nursing hours lost due to outflows are almost entirely offset at the hospital level, while hours lost from transitions to part-time schedules are poorly compensated. In other words, hospitals respond as if the nursing labor market were frictionless and nursing hours perfectly substitutable across nurses in the case of outflows but not for part-time schedules. The limited compensation for part-time transitions, compared to full departures, may stem from a mix of budgetary constraints, workforce rigidities, and collective work adjustments. In particular, French hospitals have largely preserved service-level workforce management rather than expanding cross-service staff sharing, due to the substantial social cost of the latter.

The data reveal that most transitions to part-time schedules stem from child-related decisions made by mothers, whereas outflows are unrelated to this effect. They also show that nursing hours lost due to transitions to part-time work are poorly compensated at the hospital level, while those lost to outflows are effectively offset. This highlights that the negative impact of motherhood on hospital nurses' labor supply at the individual level extends to the aggregate provision of nursing services at the hospital level.

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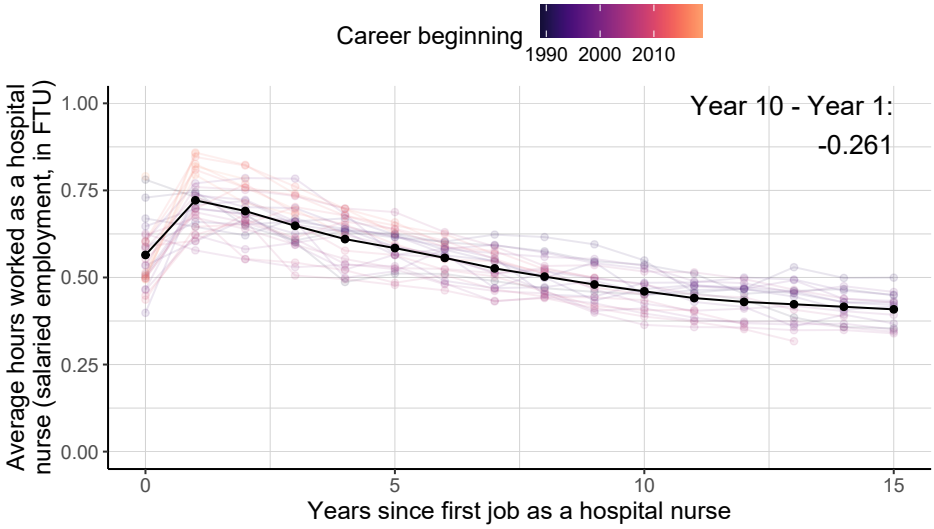
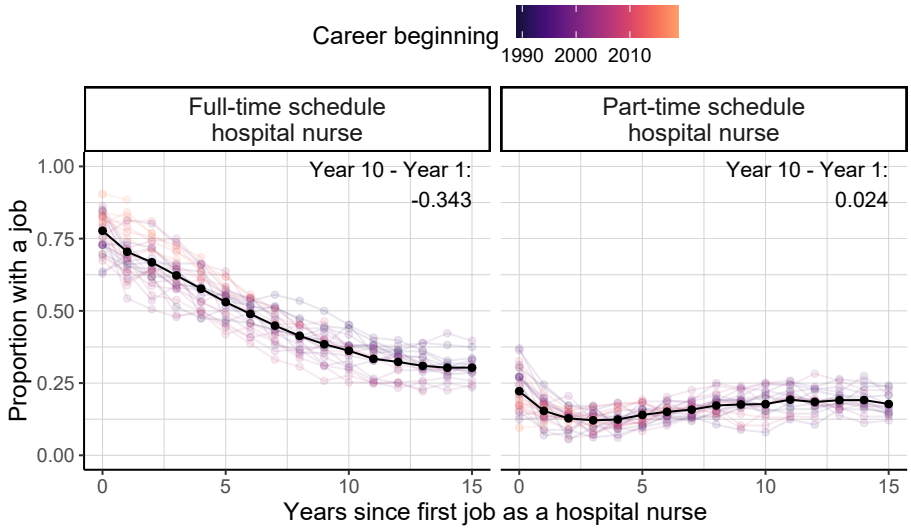
Figures

Figure 1 – Lifecycle profile of hospital nurses' labor supply: nursing labor supplied to hospitals

(a) Hours worked as a hospital nurse



(b) Full-time and part-time work



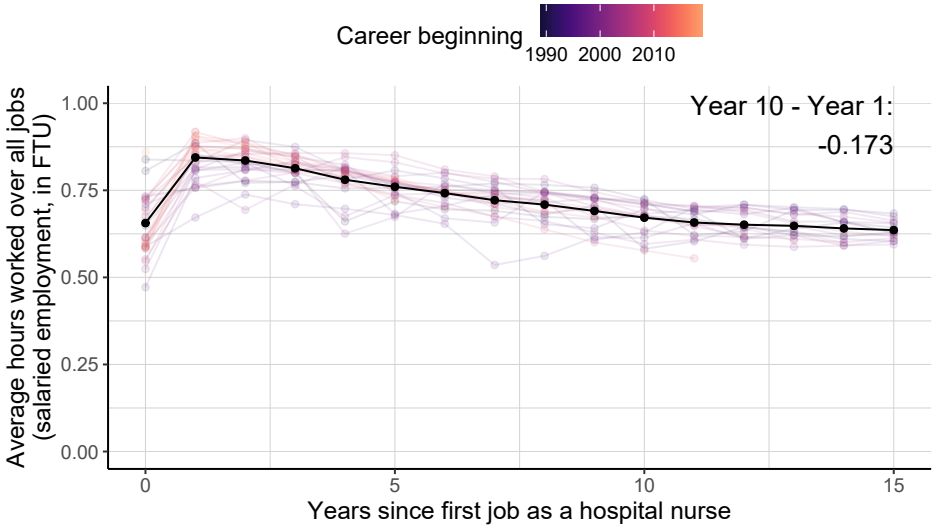
Average hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on holding a hospital nurse position, but incorporate the participation margin (0 hours worked).

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

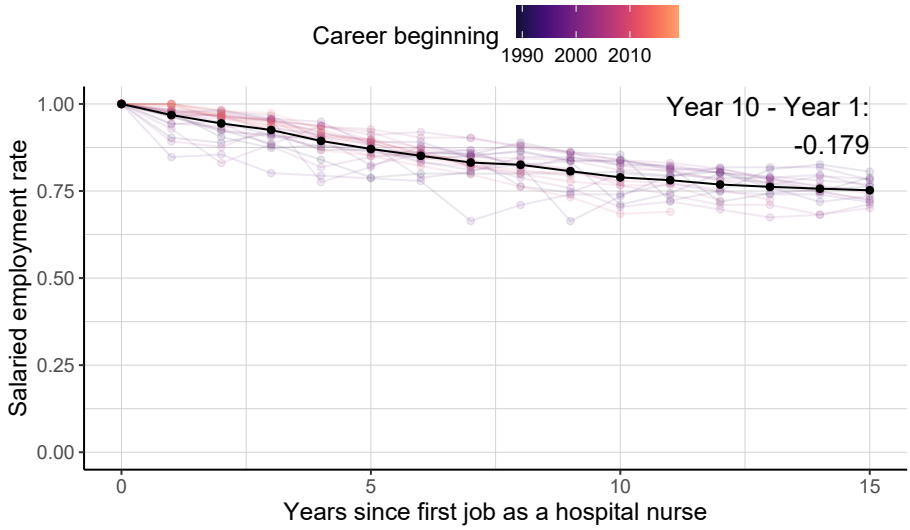
Source. Insee, DADS panel.

Figure 2 – Lifecycle profile of hospital nurses' labor supply: total labor supply in the salaried sector

(a) Hours worked over all jobs



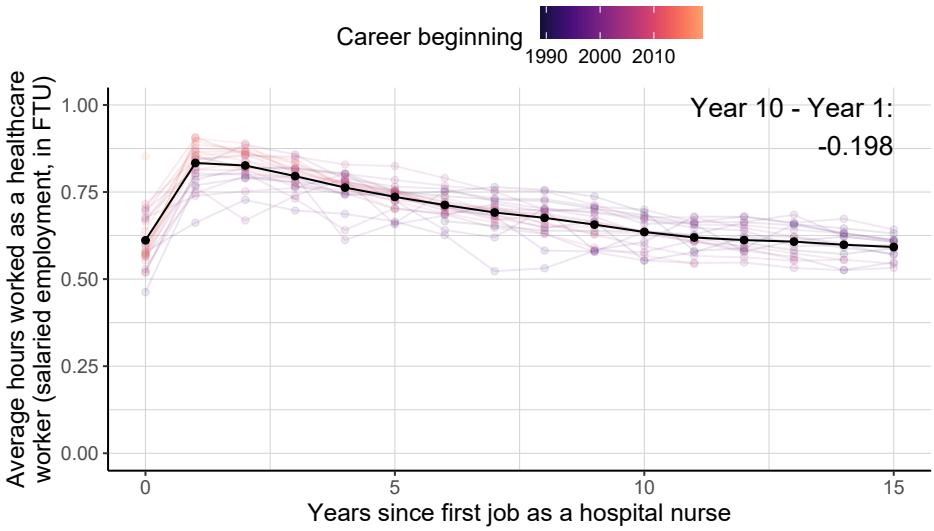
(b) Salaried employment rate



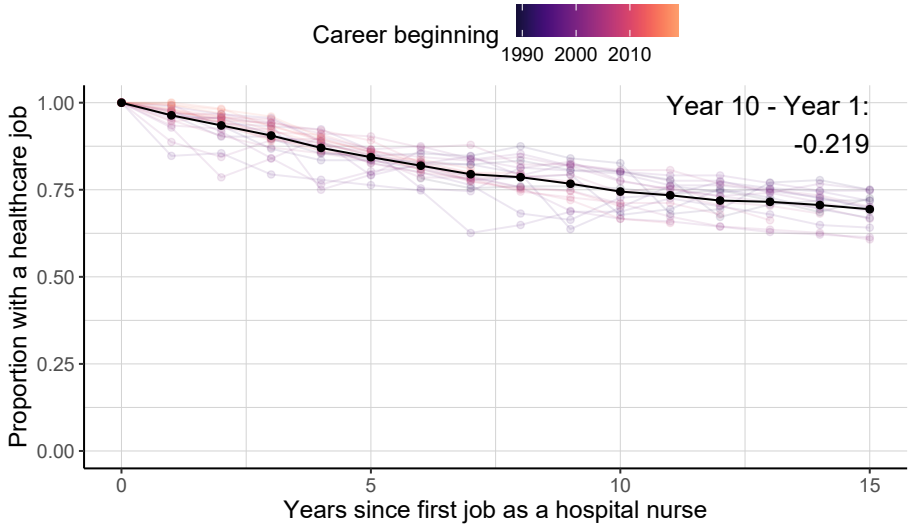
Average hours worked in the salaried sector, in full-time units, and salaried employment rate, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on salaried employment, but incorporate the participation margin (0 hours worked).
Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.
Source. Insee, DADS panel.

Figure 3 – Lifecycle profile of hospital nurses' labor supply: labor supply as a salaried healthcare worker

(a) Hours worked as a healthcare worker



(b) Proportion working as a healthcare worker



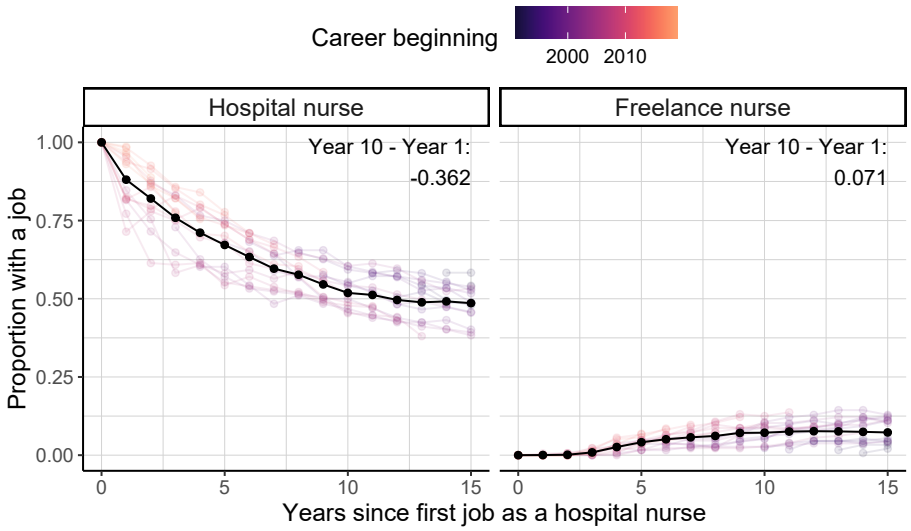
Average hours worked in the salaried sector as a healthcare worker, in full-time units, and proportion with a healthcare-related job, by time relative to the first qualified healthcare worker job at a hospital. Hours worked as a healthcare worker are not conditional on working as a healthcare worker, but incorporate the participation margin (0 hours worked).

Note. Data are not available before year 1995. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

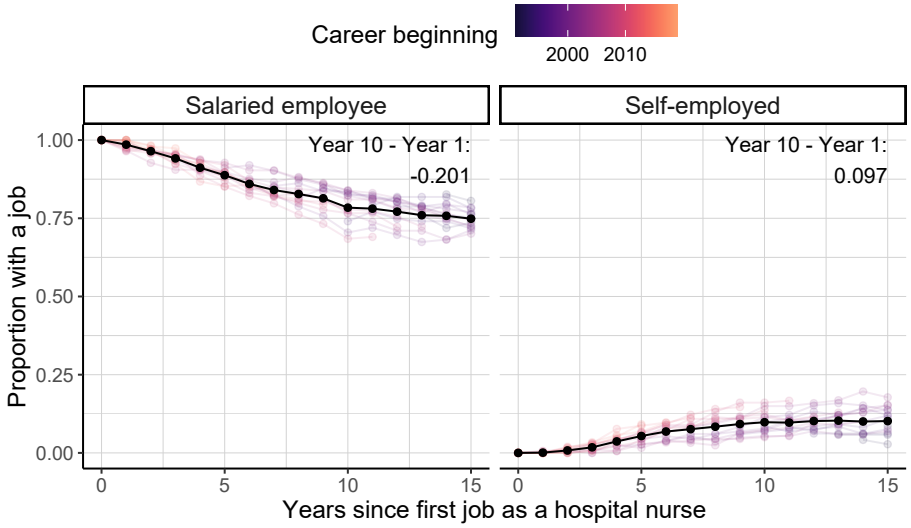
Source. Insee, DADS panel.

Figure 4 – Lifecycle profile of hospital nurses' labor supply: labor supply in the freelance vs. salaried sector

(a) Working as a hospital vs. freelance nurse



(b) Working as a salaried employee vs. self-employed worker

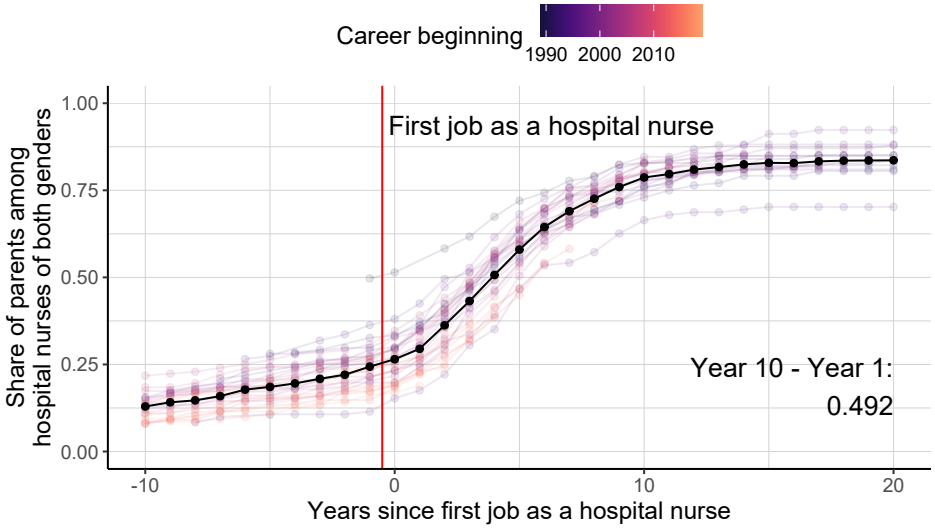


Share of hospital nurses who still hold a job as a hospital nurse, or work as a freelance nurse, and share of hospital nurses who hold a salaried job, or are self-employed, by time relative to the first qualified healthcare worker job at a hospital. Freelance workers are only considered so if they do not hold a salaried job.

Note. Data are not available before year 2006. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

Source. Insee, DADS panel and non-salaried workers panel.

Figure 5 – Lifecycle profile of fertility: share of parents among nurses of both genders



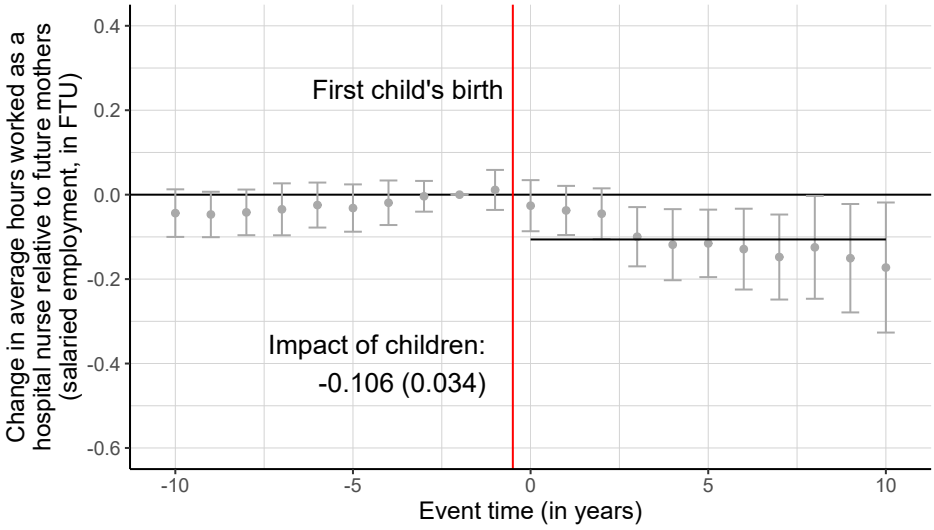
Share of parents, by time relative to the first qualified healthcare worker job at a hospital.

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

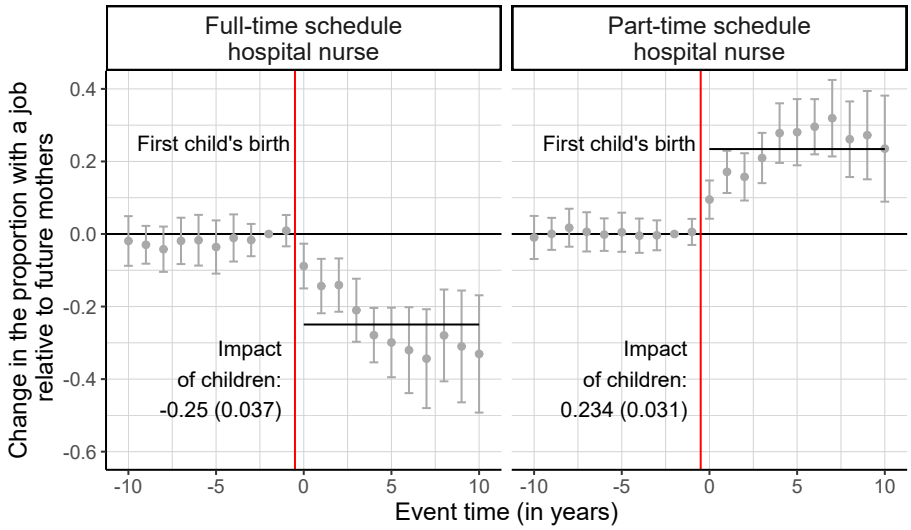
Source. Insee, DADS-EDP panel.

Figure 6 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals

(a) Hours worked as a hospital nurse



(b) Full-time and part-time work

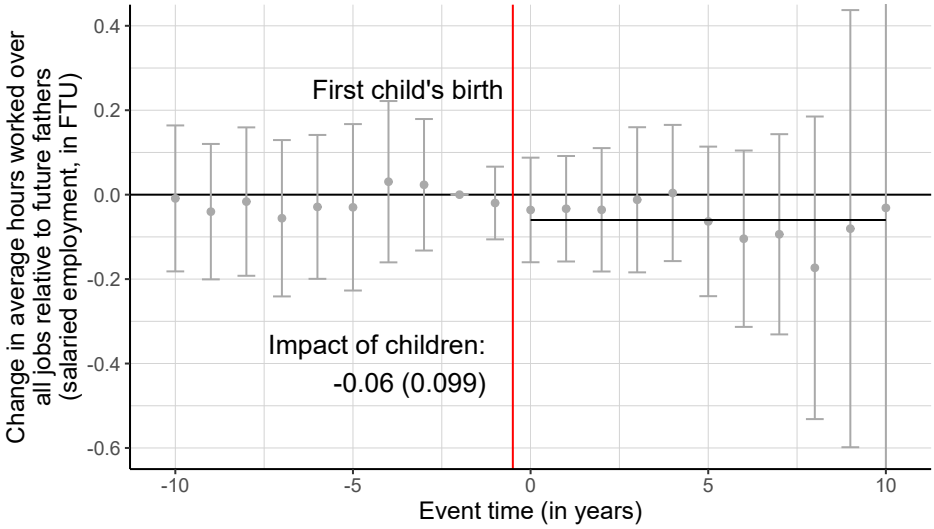


Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time since first child's birth. Hours worked are not conditional on working as a hospital nurse, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

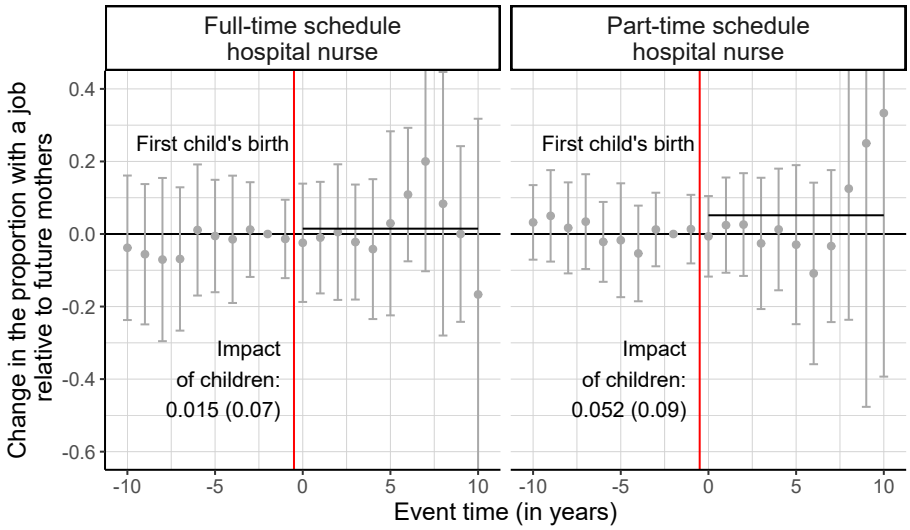
Source. Insee, DADS-EDP panel.

Figure 7 – Event-study estimates of the impact of children on fathers' labor supply: nursing labor supplied to hospitals

(a) Hours worked as a hospital nurse



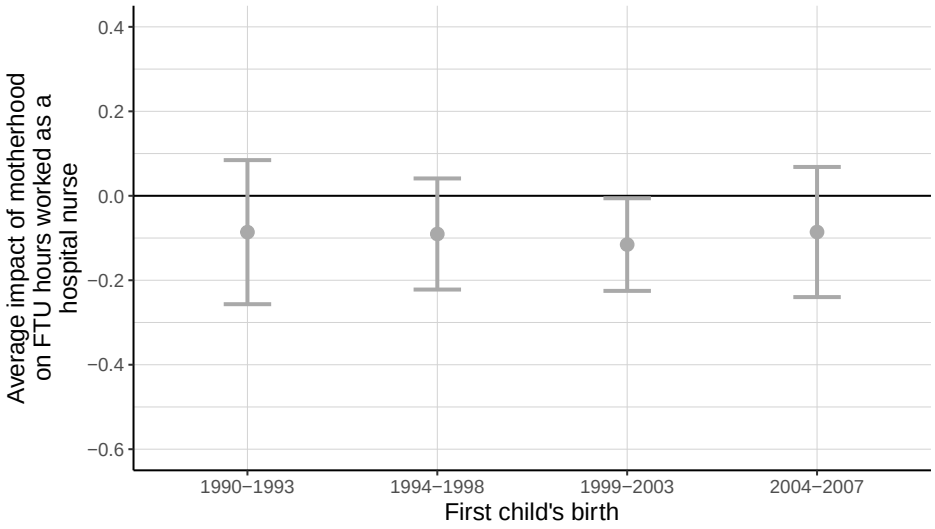
(b) Full-time and part-time work



Event-study estimates of the impact of children on fathers' hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time since first child's birth. Hours worked are not conditional on working as a hospital nurse, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

Source. Insee, DADS-EDP panel.

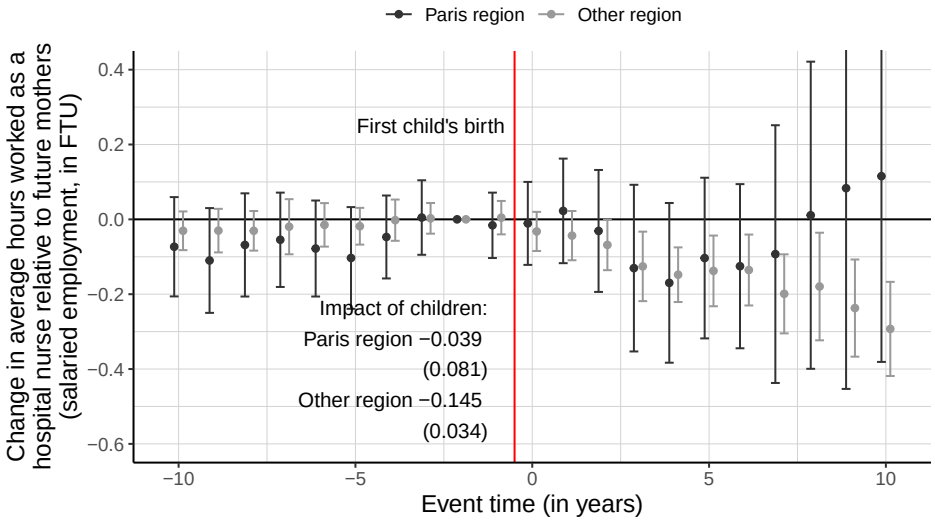
Figure 8 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals – by year of birth of the first child



Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, averaged over the first ten years after the arrival of children, by year of birth of the first child. Hours worked are not conditional on working as a hospital nurse, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

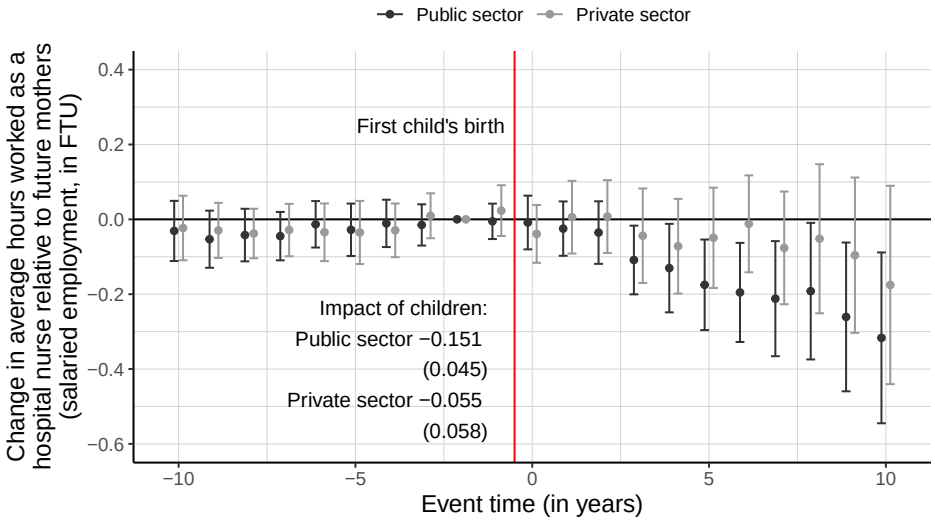
Source. Insee, DADS-EDP panel.

Figure 9 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals – by region of work



Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time since first child's birth and region of work. Hours worked are not conditional on working as a hospital nurse, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

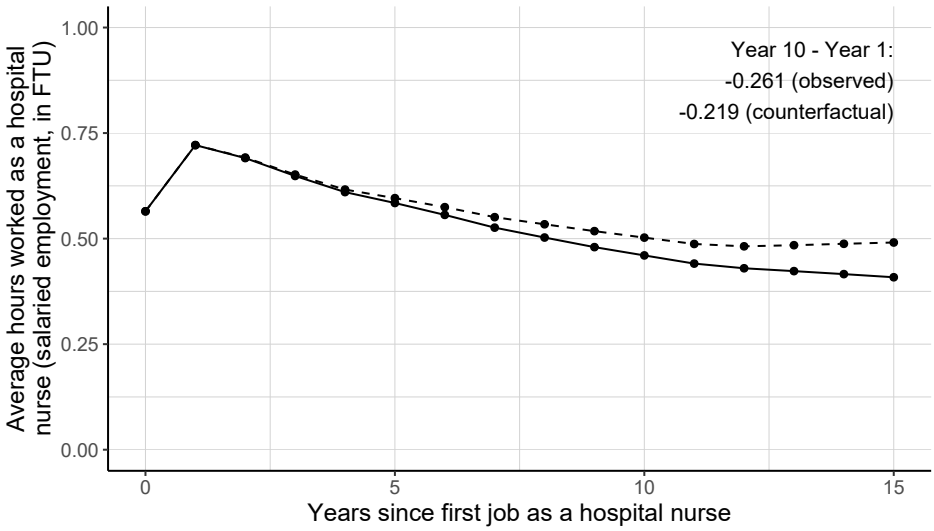
Figure 10 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals – by type of employer



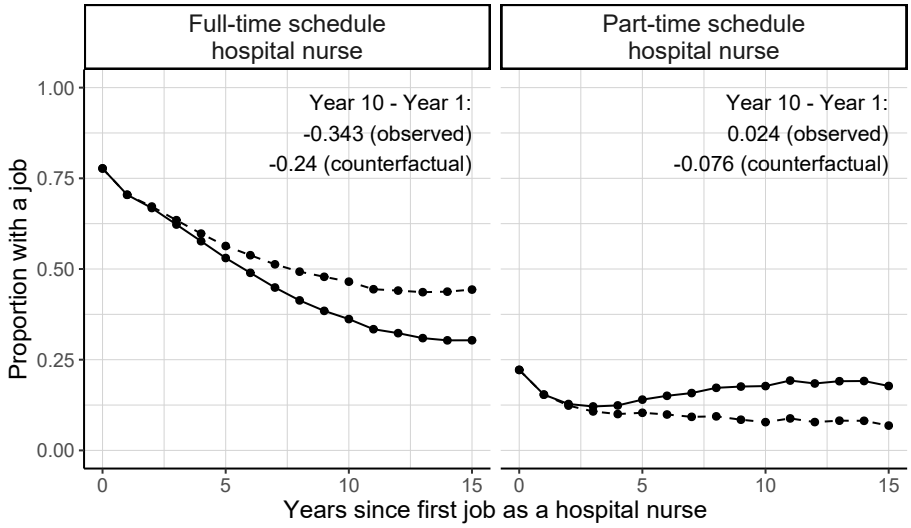
Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time since first child's birth and type of employer. Hours worked are not conditional on working as a hospital nurse, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

Figure 11 – Contribution of children to the lifecycle profile of nurses' labor supply: nursing labor supplied to hospitals

(a) Hours worked as a hospital nurse



(b) Full-time and part-time work



Realized and counterfactual average hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on holding a hospital nurse position, but incorporate the participation margin (0 hours worked).

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

Source. Insee, DADS-EDP panel.

Tables

Table 1 – Detailed occupations distribution among selected jobs (2009-2019)

Detailed occupation	Share among women (in %)	Share among men (in %)
431A – Nurses managers	5.4	9.1
431B – Mental health nurses	1.7	2.6
431C – Nursery nurses	1.9	0.1
431D – Other specialized nurses	3.9	6.7
431F – General care nurses	64.1	56.3
All nurses occupations	77.0	74.8
431E – Midwives	3.4	0.9
432B – Physical therapists	1.8	4.1
432D – Other rehabilitation specialists	4.1	1.6
433A – Medical technicians	6.9	10.0
433B – Opticians and hearing aid professionals	0.0	0.0
433C – Other specialists in medical equipment	0.0	0.6
433D – Pharmacy technicians	2.7	2.5
434A – Social work managers	0.2	0.2
434B – Social work assistants	1.8	0.6
434C – Family economic counselors	0.1	0.0
434D – Specialized educators	0.9	2.0
434E – Instructors	0.4	1.3
434F – Specialized technical educators, workshop monitors	0.1	0.3
434G – Early childhood educators	0.3	0.1
435B – Socio-cultural and leisure animators	0.5	1.1

Source. DADS panel, Insee.

Table 2 – Summary statistics

	Women	Men
# Observations	151,822	31,299
# Individuals	4,978	1,021
a. Age at first hospital nurse job[*]		
Mean	28.3	31.7
St.D.	8.3	9.5
b. Potential experience at first hospital nurse job[**]		
Mean	5.5	6.7
St.D.	4.7	5.2
c. Share of parents at first hospital nurse job (in %)[**]	34.8	40.2
d. Share of parents at age 45 (in %)[***]	81.5	78.1
e. Number of children[****]		
Mean	2.2	2.3
St.D.	0.9	1.2

[*] Among those who got their first hospital nurse job after 1988. [**] Among those who got their first job after 1988. Potential experience is defined as the difference between the year during which an individual get her first job as a hospital nurse, and the year during which she holds her first job whatever the industry or occupation. [***] Among those born before 1973. [****] Among those born before 1973 with at least one child. *Source.* DADS-EDP panel, Insee.

Table 3 – Summary statistics – sample restricted to hospital nurses whose first child is born at least two years after they began their careers

	Women	Men
# Observations	54,452	8,035
# Individuals	1,765	260
a. Age at first hospital nurse job[*]		
Mean	24.0	25.8
St.D.	2.7	4.2
b. Potential experience at first hospital nurse job[**]		
Mean	4.0	4.9
St.D.	2.8	3.3
c. Age at first child's birth		
Mean	29.8	32.1
St.D.	3.9	4.7
d. Number of children[***]		
Mean	2.0	2.2
St.D.	0.9	0.9

[*] Among those who got their first hospital nurse job after 1988. [**] Among those who got their first job after 1988. Potential experience is defined as the difference between the year during which an individual get her first job as a hospital nurse, and the year during which she holds her first job whatever the industry or occupation. [***] Among those born before 1973. *Source.* DADS-EDP panel, Insee.

Table 4 – Decomposition of employment trajectories for hospital nurses

	Healthcare-related jobs		Healthcare-unrelated jobs
Salaried employment	Hospital nurse positions	Other health-related salaried positions (e.g. long-term care facilities)	Salaried jobs outside healthcare
Self-employment	Freelance nurses		Self-employed, outside healthcare
Not employed	Without a job (in France)		

Table 5 – Impact of hospital nurses decreasing their labor supply on the future hospital-level supply of nursing labor

	Hours change, overall	Hours change, full-time to full-time	Hours change, part-time to full-time	Hours change, part-time to part-time	New hours, inflows
Hours change, full-time to part-time	0.85	−0.09	−0.01	0.17	−0.22
	(0.11)	(0.08)	(0.03)	(0.02)	(0.05)
Past hours, outflows	0.08	0.01	0.004	−0.003	−0.94
	(0.02)	(0.01)	(0.002)	(0.001)	(0.01)
N	63,987	63,987	63,987	63,987	63,987

The table displays the estimates of regressions of the overall hospital-level supply of nursing labor, and related adjustment margins, on the yearly change in hospital-level nursing hours due to hospital nurses moving from full-time to part-time schedules, and hospital nurses leaving the hospital workforce. All regressions include hospital fixed effects, as well as year fixed effects. Observations with overall relative changes in nursing labor supply below (over) the first (last) decile of the annual distribution are excluded from the estimation. Standard errors are clustered at the hospital level. *Source.* Insee, DADS.

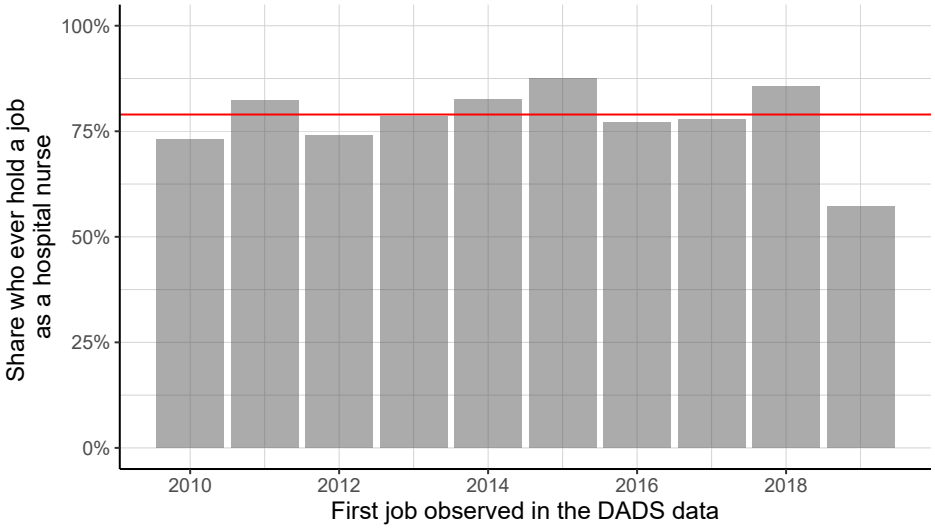
A Hospital nurses in France: additional data regarding the context

A.1 How well does the sample cover the nurse occupation?

Table 1 shows that, even though the detailed occupation variable cannot be used to delineate the sample, it predominantly covers individuals who can reasonably be considered hospital nurses. Reciprocally, a relevant question is how many nurses, at some point in their careers, hold a job as a hospital nurse and therefore fall within the population studied in this paper. To address this, I analyze all individuals who (i) are observed holding a salaried nurse position, based on the detailed occupation variable, at any point since 2010, and (ii) began their first job—irrespective of industry or occupation—in 2010 or later. The second condition ensures the inclusion of individuals whose entire careers are observable in terms of the detailed occupation variable, thereby avoiding selection biases due to nurses gradually leaving the occupation over time (see Figure 1). Since nurses must start their careers as salaried employees and cannot immediately transition to freelance roles, these criteria should encompass all individuals who started their careers in 2010 or later and held a nursing job at some point. I then compute the share of these individuals included in my sample, providing a lower bound estimate of the proportion of nurses who work as hospital nurses at some point in their careers, given that only the early stages of their careers are observable for the selected individuals.

Figure A.1 presents my estimates. Despite some variation across cohorts—likely due to small sample sizes—it suggests that at least 79% of nurses work as hospital nurses at some point in their careers.

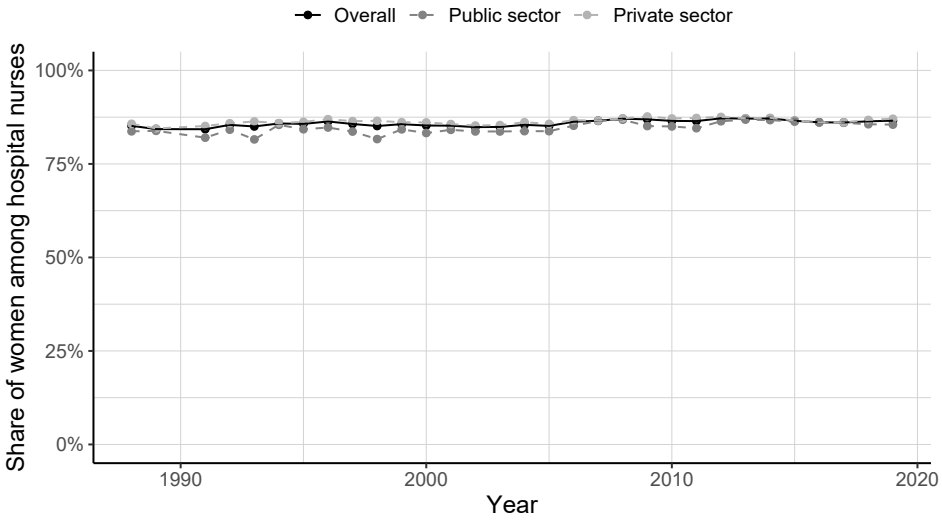
Figure A.1 – Share of nurses who ever hold a job at a hospital



Share of nurses who began their careers in 2010 or later who are observed to hold a job as a hospital nurse at some point of their lives.
Source. Insee, DADS panel.

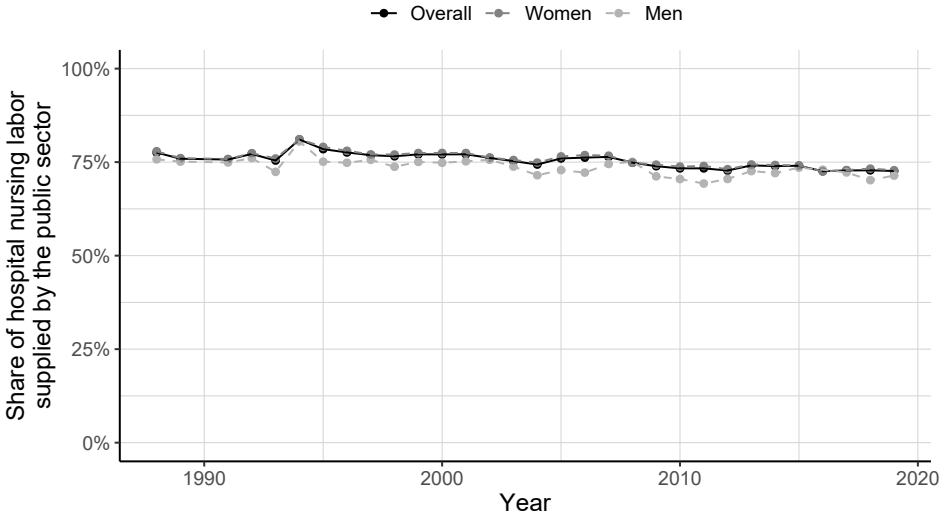
A.2 Composition of the hospital nurse workforce

Figure A.2 – Share of women among hospital nurses



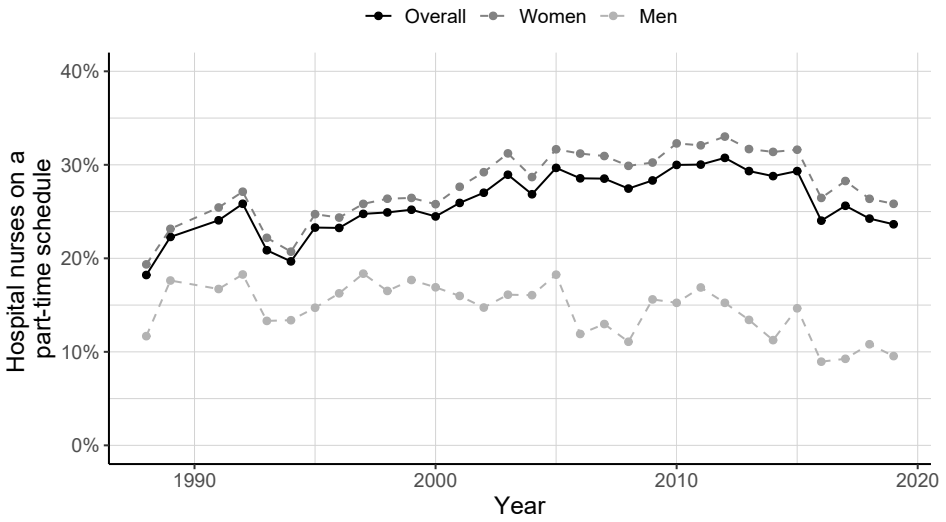
Share of women among hospital nurses, by sector and year of observation.
Source. Insee, DADS panel.

Figure A.3 – Share of hospital nursing labor supplied by the public sector



Share of hours worked by hospital nurses in the public sector, by year of observation.
Source. Insee, DADS panel.

Figure A.4 – Share of hospital nurses working on a part-time schedule



Share of hospital nurses working on a part-time schedule, by year of observation.
Source. Insee, DADS panel.

B Institutional context: additional details

B.1 Part-time work options

In the private sector, an employee whose employer refuses a part-time request due to children can take the case to the labor court.

The exact duration of the right to work part-time due to children differs between the public and private sectors. In the public sector, which employs the majority of hospital nurses, this right to part-time work is available for three years from the birth (or adoption) of each child. In the private sector, it is available for three years from the birth of the first child; it also covers three years from the birth of the second child,[40] but lasts up to six years after the birth of the third child. After these time periods, part-time work is still allowed, but depends on an agreement between the employer and employee.[41]

The private sector is less protective of part-time employees than the public sector. In principle, working time is agreed upon individually by employers and employees; in practice, the chosen level usually aligns with those offered in the public sector. Pay is proportional to working time, and the law only guarantees that, as a child-related part-time work period ends, employees must be granted a position at least comparable to the one they held before transitioning to part-time work.

Lastly, whereas, in the public sector, an employer cannot request an employee to transition to part-time work, in the private sector, this option is available in cases of temporary economic hardship. In such cases, an employee who refuses to transition to part-time work may be laid off for economic reasons, which entails severance payments and grants eligibility for unemployment benefits.

B.2 Maternity leave

Table B.1 presents the legally mandated duration of maternity leave based on parity and the number of expected children. While maternity leave cannot be fully waived, it can be shortened, provided that a minimum of 8 weeks is taken, including at least 6 weeks post-birth. However, opting for a reduced leave remains uncommon. Additionally, these durations may be extended in cases of maternal or infant health risks.

[40] In this case, it ends when the second child enters preschool.

[41] An exception applies to parents of children with disabilities, whose right to part-time work lasts longer.

To estimate time worked while setting hours to 0 during maternity leave – which is not directly observed in the DADS data – I rely on the durations specified in this table, assuming full compliance with legal entitlements.

Table B.1 – Maternity leave duration by number of expected children

Number of Expected Children	Prenatal Leave	Postnatal Leave	Total Maternity Leave
First child	6 weeks	10 weeks	16 weeks
Second child	6 weeks	10 weeks	16 weeks
Third child or more	8 weeks	18 weeks	26 weeks
Twins (2 children)	12 weeks	22 weeks	34 weeks
Triplets or more (3+ children)	24 weeks	22 weeks	46 weeks

B.3 Parental leave

The potential duration of parental leave is the same in both the private and public sectors: it is open for three years from the birth of the first child; it also covers three years from the birth of the second child,[42] but lasts up to six years after the birth of the third child.

In the private sector, parental leave periods grant half the rights to seniority premiums that full-time working periods do. For private sector workers, the law states that the employee shall return either to her past job or to a job with similar pay and responsibilities.

The duration of the paid leave depends on the number of children: it lasts at most 6 months for the first child, but up to 24 months from the second child onward.

[42] In this case, it ends when the second child enters preschool.

C DADS panel: labor supply measures

C.1 Hours worked: concept

In the DADS dataset, hours worked represent the hours for which a worker is paid under their labor contract. Employers report this data when completing payroll tax forms. Before making the data available, Insee performs three checks:

- The total number of hours for a given individual × employer × year observation must not exceed an industry-specific threshold of 2,500 hours per year in a small subset of industries (primarily manufacturing, transportation, hotels, and restaurants) and 2,200 hours per year in other industries.
- The implied hourly wage must exceed 80% of the minimum wage.
- The total number of hours must be positive, except for a limited subset of occupations (mainly journalists and salespeople) who work on a fixed-price or commission basis.

If any of these conditions are not met, Insee imputes hours to the observation to ensure consistency of hourly wages within narrowly defined cells based on 4-digit occupation, full-time or part-time status, age, and gender.

Maternity leave During maternity leave, employees do not receive wages from their employer but are compensated by Social Security, with potential top-up payments from their employer. However, the treatment of time worked during maternity leave varies across sectors in the DADS data:

Public sector: Maternity leave days are counted as days worked, with daily hours set to their usual pre-birth level.

Private sector: Maternity leave days are also counted as days worked, but daily hours are set to 0.

To ensure consistency in hours worked measurement across sectors, I rely on the legal maternity leave durations detailed in Appendix B, assuming full compliance with these regulations. This allows me to construct two alternative measures of hours worked:

- One where hours during maternity leave are set to their usual pre-birth level – consistent with the public sector data, but requiring an upward adjustment for the private sector.

- One where hours during maternity leave are set to 0 – consistent with the private sector data, but requiring a downward adjustment for the public sector.

C.2 Full-time units conversion

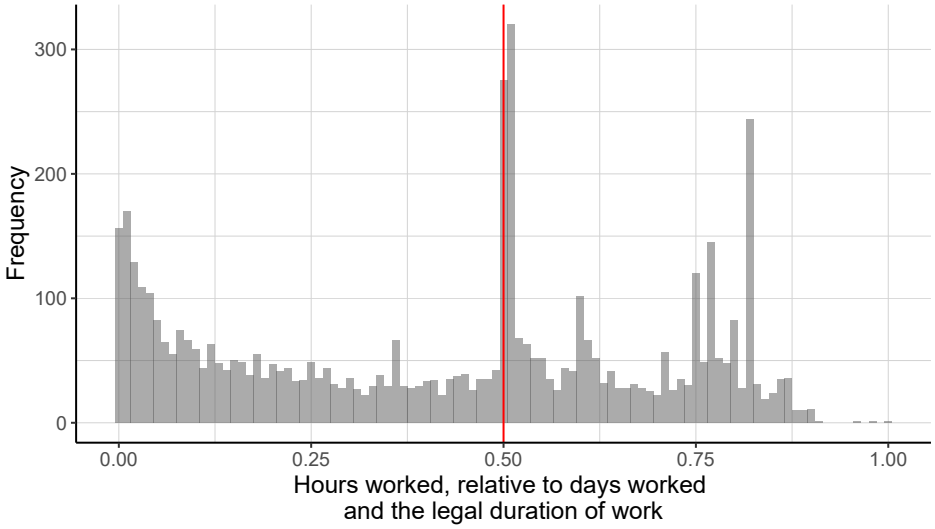
Hours worked are converted into full-time equivalent units using a straightforward approach based on three variables: working-time status, days worked, and hours worked. This method caps time worked at 1 for individuals employed full-time throughout the year, excluding overtime. The primary advantage of this approach is that it ensures comparability of time worked, even when the legal workweek duration changes – as it did during the early 2000s, when it shifted from 39 to 35 hours per week.

Full-time workers employed throughout the entire year are assigned 1 full-time equivalent unit. For full-time workers not employed for the entire year, their assigned value is proportional to the number of days worked, with 1 corresponding to 360 days worked in a year.[43] Part-time workers are assigned a value proportional to their hours worked, with 1 representing hours equivalent to the legal annual full-time work duration.

One limitation of this approach is that hours worked are not recorded in the DADS data prior to 1995. Before this date, only working-time status and days worked are available. To address this, I impute full-time equivalent units for part-time workers under the assumption that they are on a 50% schedule, meaning their time worked is proportional to their days worked and equals 0.5 if they are employed for an entire year. This assumption is based on the likelihood that a 50% schedule was the most common among part-time workers. Figure C.1 illustrates this by showing the distribution of hours worked, relative to (i) the legal duration of work and (ii) days worked, for part-time job spells recorded between 1995 and 1998 for individuals observed in hospital nurse positions at some point in their careers.

[43] In the DADS data, a full year is defined as 360 days worked.

Figure C.1 – Distribution of hours worked for part-time workers, 1995-1998



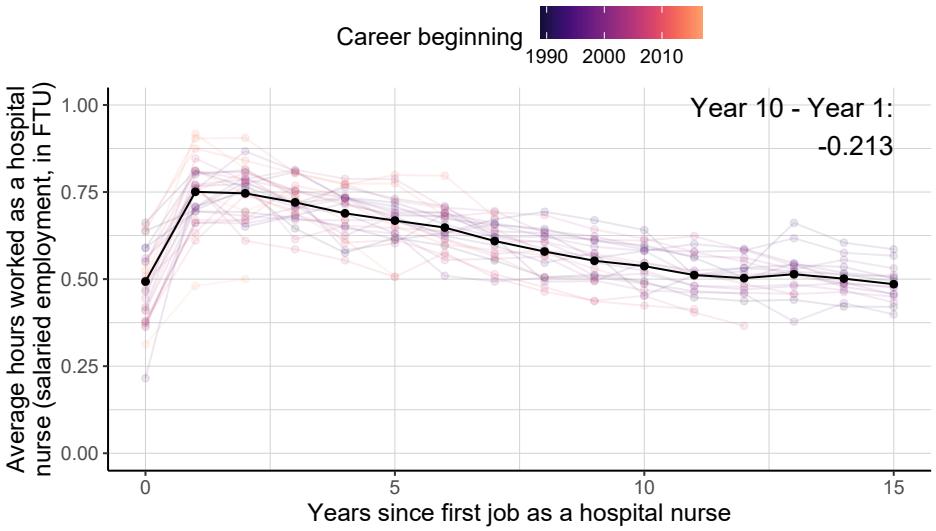
Distribution of hours worked divided by the legal annual duration of work for full-time workers, among individuals who hold a hospital nurse job at least once.
Source. Insee, DADS panel.

D Lifecycle profiles in subsamples

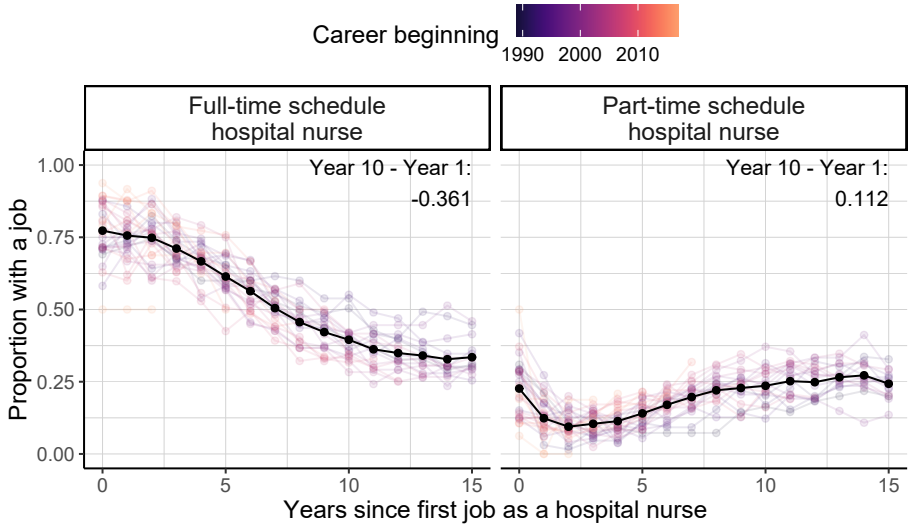
D.1 Lifecycle profiles in the event-study subsample

Figure D.1 – Lifecycle profile of hospital nurses' labor supply: nursing labor supplied to hospitals

(a) Hours worked as a hospital nurse



(b) Full-time and part-time work



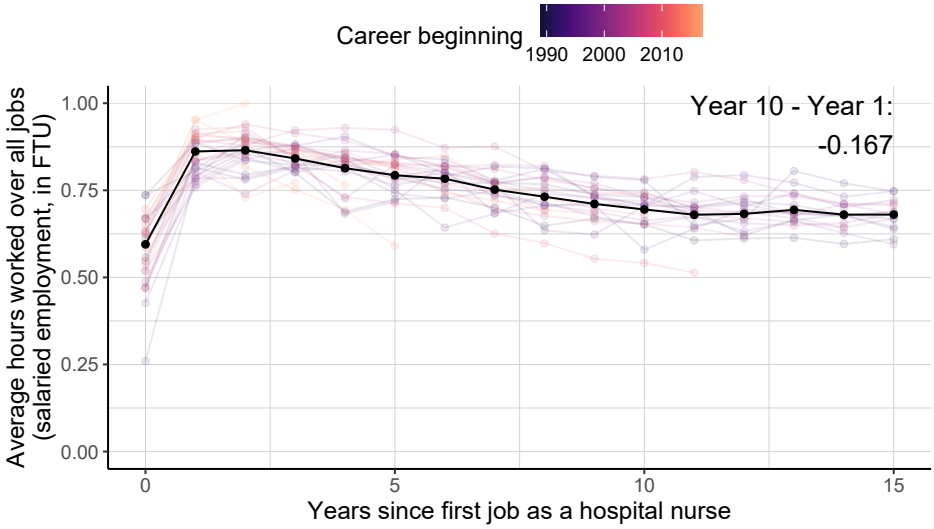
Average hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on holding a hospital nurse position, but incorporate the participation margin (0 hours worked).

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

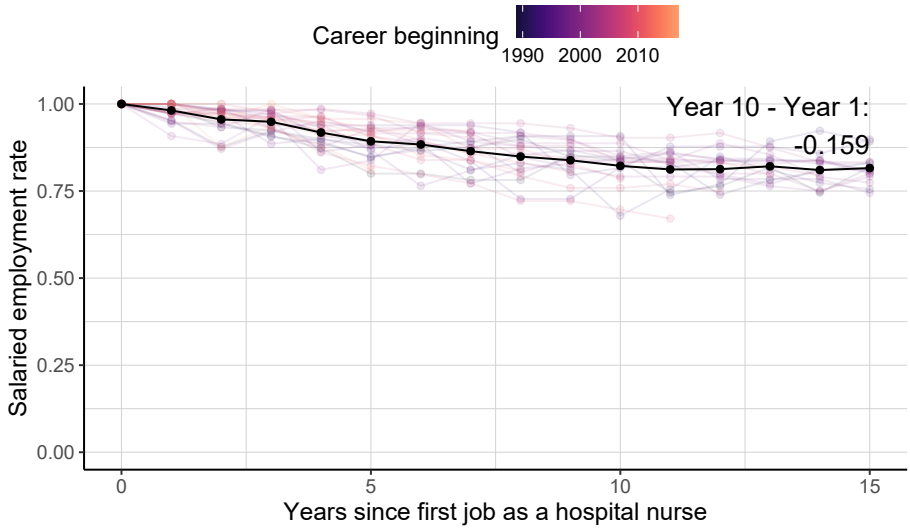
Source. Insee, DADS panel.

Figure D.2 – Lifecycle profile of hospital nurses' labor supply: total labor supply in the salaried sector

(a) Hours worked over all jobs



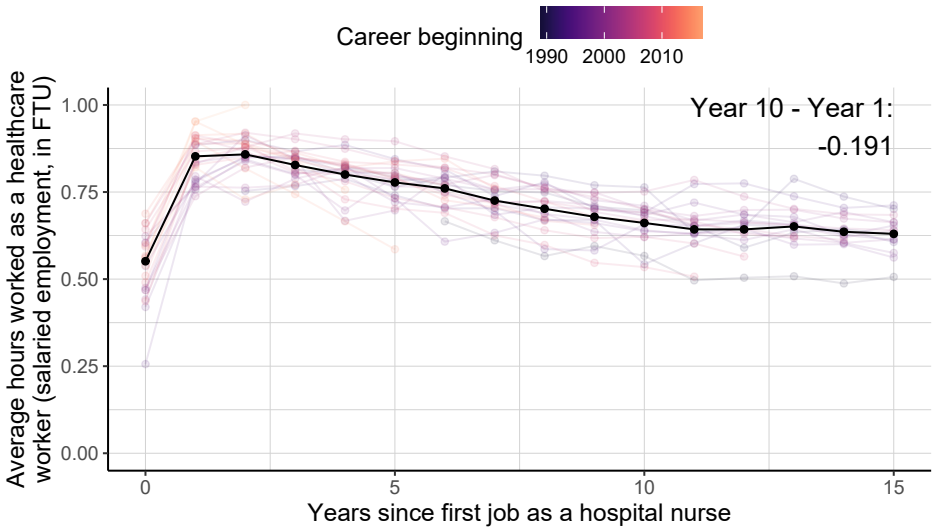
(b) Salaried employment rate



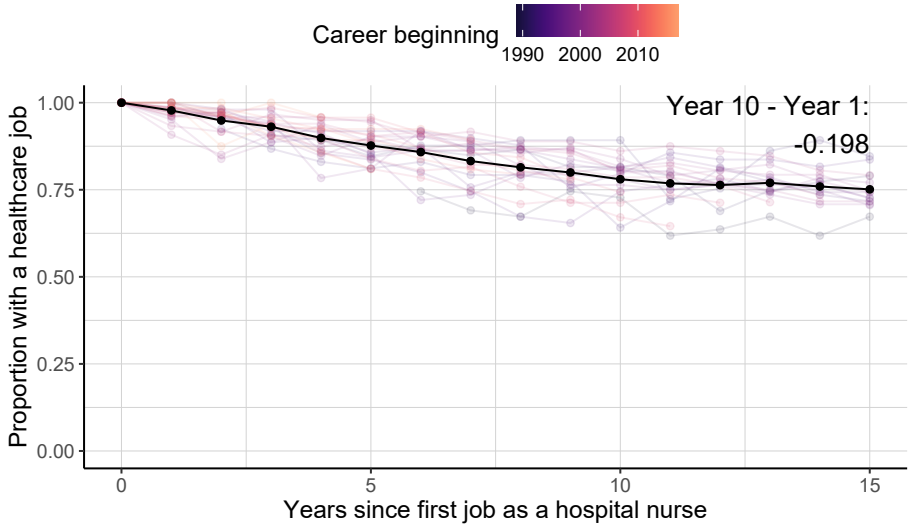
Average hours worked in the salaried sector, in full-time units, and salaried employment rate, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on salaried employment, but incorporate the participation margin (0 hours worked).
Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.
Source. Insee, DADS panel.

Figure D.3 – Lifecycle profile of hospital nurses' labor supply: labor supply as a salaried healthcare worker

(a) Hours worked as a healthcare worker



(b) Proportion working as a healthcare worker



Average hours worked in the salaried sector as a healthcare worker, in full-time units, and proportion with a healthcare-related job, by time relative to the first qualified healthcare worker job at a hospital. Hours worked as a healthcare worker are not conditional on working as a healthcare worker, but incorporate the participation margin (0 hours worked).

Note. Data are not available before year 1995. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

Source. Insee, DADS panel.

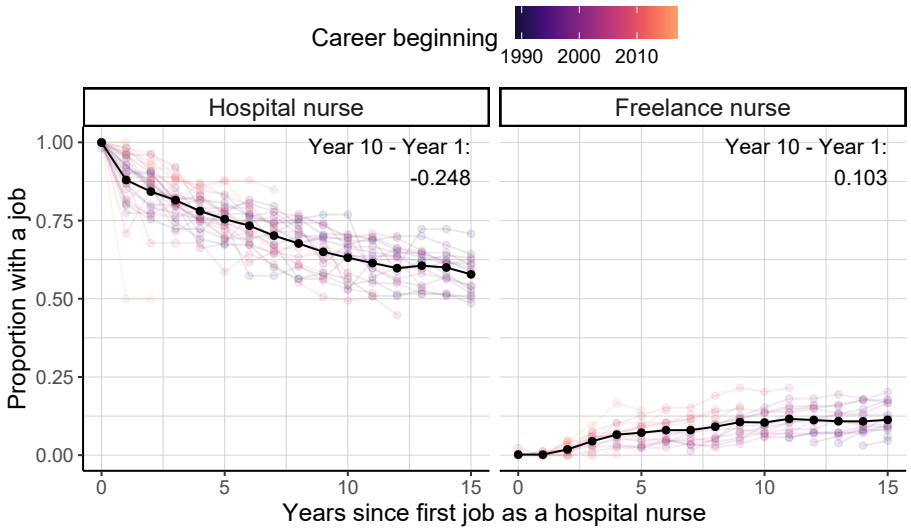
D.2 Lifecycle profiles for earlier parents

Figure D.5 presents the average lifecycle profile of nursing labor supplied to hospitals for nurses whose first child is born less than two years after they began their careers. It replicates Figure 1 for this specific group. The decline in hours worked is similar, though slightly steeper, than that observed in the overall population or among hospital nurses who have their first child later – the latter constituting the event-study subsample (see Figure D.1). A key difference, however, is that while the proportion of nurses holding part-time hospital positions increases over time in the other two groups, it decreases in this one. In contrast, the decline in the share of full-time hospital nurses is comparable across all three populations.

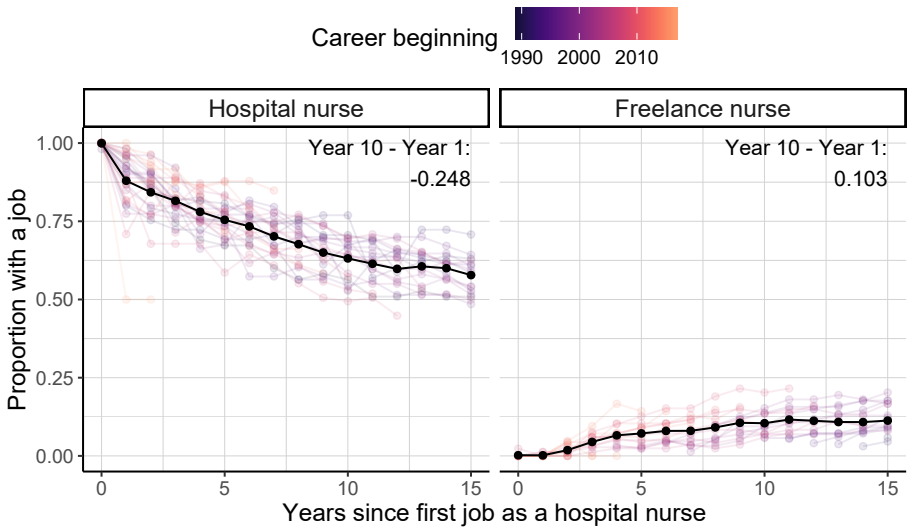
An event-study approach similar to the one used in the core of the paper is not feasible here, as holding a hospital nurse position—and therefore beginning one's career—may itself be an endogenous consequence of fertility. This makes it difficult to directly assess the impact of motherhood on these employment trajectories. However, it seems unlikely that the observed decline in the proportion of both full-time and part-time hospital nurses over the course of a career is driven by motherhood. Indeed, in this population, all individuals are parents from year 1, meaning that the proportion of parents remains constant over time. For motherhood to explain this decline, its effect would need to exhibit strong dynamics – specifically, it would require the impact of motherhood on the likelihood of holding a full-time or part-time job to be much larger in the very long run than when children are still young. This would contradict (i) the findings from the event-study subsample, where motherhood increases the probability of working part-time, and (ii) existing literature on the impact of motherhood on labor supply, which generally finds that its long-term effect is similar to or smaller than its impact when children are young (see Lundborg, Plug, and Rasmussen, 2017; Kleven, Landais, and Søgaard, 2019).

Figure D.4 – Lifecycle profile of hospital nurses' labor supply: labor supply in the freelance vs. salaried sector

(a) Working as a hospital vs. freelance nurse



(b) Working as a salaried employee vs. self-employed worker



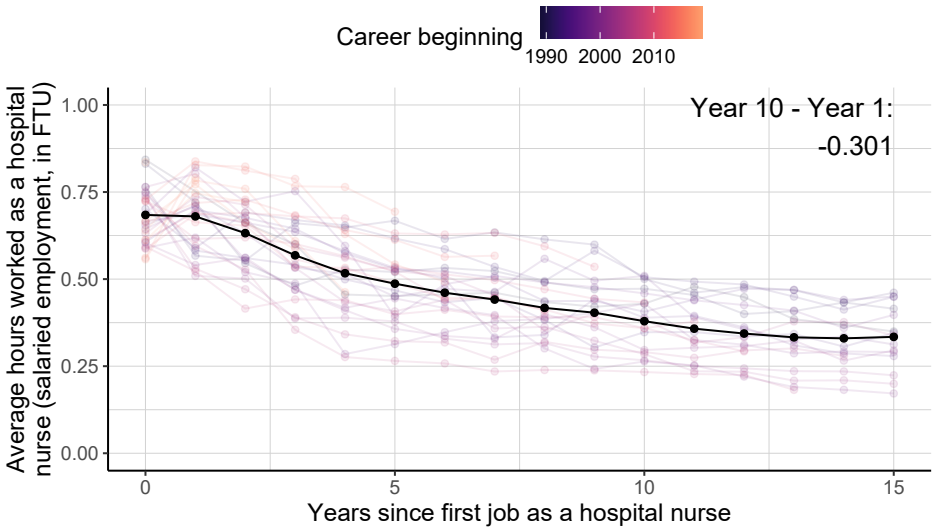
Share of hospital nurses who still hold a job as a hospital nurse, or work as a freelance nurse, and share of hospital nurses who hold a salaried job, or are self-employed, by time relative to the first qualified healthcare worker job at a hospital. Freelance workers are only considered so if they do not hold a salaried job.

Note. Data are not available before year 2006. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

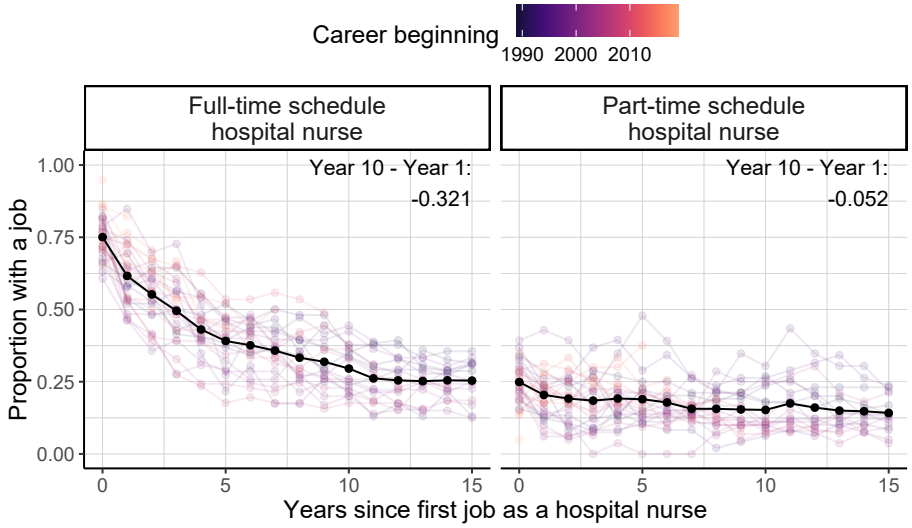
Source. Insee, DADS panel and non-salaried workers panel.

Figure D.5 – Lifecycle profile of hospital nurses' labor supply: nursing labor supplied to hospitals, hospital nurses with children at the beginning of their careers

(a) Hours worked as a hospital nurse



(b) Full-time and part-time work



Average hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on holding a hospital nurse position, but incorporate the participation margin (0 hours worked).

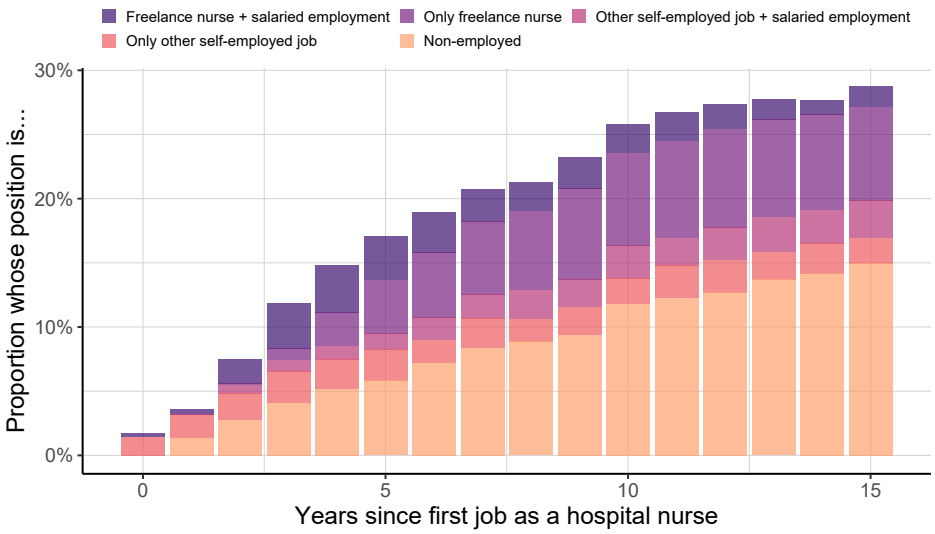
Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

Source. Insee, DADS panel.

E Combining self-employment and employment

Figure E.1 illustrates the employment trajectories of hospital nurses who are not exclusively observed in salaried positions. This group includes: (i) individuals holding jobs in both the salaried and freelance sectors within the same year; (ii) those working exclusively as self-employed; and (iii) those without any employment. The distinction between "pure" freelance nurses (or other self-employed workers) and those combining jobs across sectors is thus possible. However, interpretation is complicated by the fact that most employment transitions do not occur precisely on January 1. Specifically, being categorized as a freelance (or salaried) worker depends on earning self-employed (or salaried) income during the year. Consequently, individuals appearing to hold jobs in both sectors may either truly work simultaneously in both or have transitioned between sectors within the year. The observed decline in the share of individuals combining employment in both sectors over the course of their careers suggests that transitions explain a significant portion of this group. Ultimately, simultaneously combining salaried and freelance positions is likely uncommon.

Figure E.1 – Lifecycle profile of hospital nurses' labor supply: labor supply in the freelance vs. salaried sector



Share of hospital nurses who do not are not observed only as salaried employees, by time relative to the first qualified healthcare workers.

Note. Data are not available before year 2006. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

Source. Insee, DADS panel and non-salaried workers panel.

F Estimators comparisons

F.1 Event-study regressions and TWFE models

My analysis builds on the event-study framework introduced by Kleven, Landais, and Søgaard (2019), with two key refinements: (i) the use of more restrictive comparison groups, and (ii) the integration of recent advancements in the difference-in-differences literature (see de Chaisemartin and D'Haultfœuille, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021). To evaluate the added value of these refinements, I compare my findings with those obtained using (i) Kleven, Landais, and Søgaard (2019)'s original approach and (ii) a specification incorporating more restrictive control groups but without adjusting for bias stemming from treatment effect heterogeneity, as highlighted in the recent difference-in-differences literature.

Event-study regression To replicate Kleven, Landais, and Søgaard (2019)'s event-study approach, I focus on a balanced panel of hospital nurses observed continuously from ten years before to ten years after the birth of their first child. In this subsample, I estimate:

$$Y_{it} = \sum_{s \neq -2} \alpha_s \mathbb{1}\{t = C_i + s\} + \sum_a \beta_a \mathbb{1}\{t = a - A_i\} + \sum_b \gamma_b \mathbb{1}\{t = b - B_i\} + \mu_t + \nu_{it} \quad (13)$$

where Y_{it} represents hours worked by hospital nurse i during year t, measured relative to the point when she took her first hospital nurse job, C_i denotes the year of her first child's birth, A_i indicates the age at which she started her first hospital nurse job, and B_i represents the calendar year in which which she began her first hospital nurse job. The coefficients α_s capture the effect of motherhood s years after the first child's birth, while β_a represents lifecycle trends related to age, γ_b captures time trends such as the business cycle or policy changes, and μ_t accounts for lifecycle trends related to hospital nurse experience. The inclusion of this last trend is a slight difference from Kleven, Landais, and Søgaard (2019), motivated by the fact that while their study considers all women, inclusion in the population of interest is conditional on being a hospital nurse at some point.

Two-way fixed effects models Kleven, Landais, and Søgaard (2019) control for lifecycle and calendar trends common to all hospital nurses, regardless of when they took their first hospital nurse job or their birth cohort. In order to restrict

the identifying comparisons to hospital nurses who took their first job at the same time and at the same age, I consider the following regression:

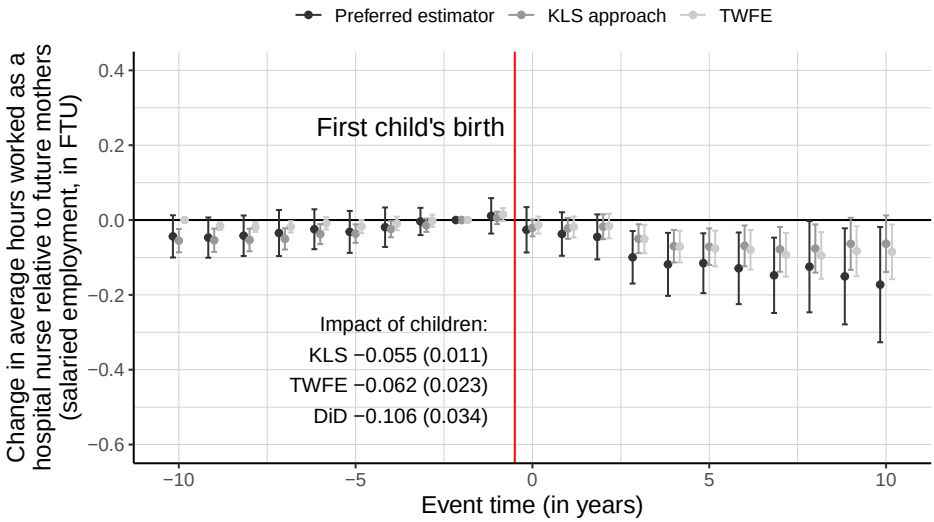
$$Y_{it} = \sum_{s \notin \{-10,-2\}} \alpha_s \mathbb{1}\{t = C_i + s\} + \lambda_i + \mu_{A_i,B_i,t} + \nu_{it} \tag{14}$$

with the same notations as above. Here, λ_i represents individual fixed effects, and $\mu_{a,b,t}$ represents lifecycle trends that are specific to a cohort defined by taking the first job as a hospital nurse at the same age, and during the same calendar year. With respect to regression 13, one more α_s coefficient must be omitted due to colinearity issues (see Borusyak, Jaravel, and Spiess, 2024, Proposition 1). The $\mu_{a,b,t}$ coefficients account for all lifecycle and calendar year trends in a more flexible way than regression 13. As a result, this corresponds exactly to restricting the identifying comparisons to those across hospital nurses of the same birth cohort, who took their first hospital nurse job at the same point, but had their first child at different points in time. I estimate this regression in the exact same sample as my baseline results. In the end, the only difference from my preferred approach is that it makes the additional implicit assumption that average treatment effects are homogeneous across cohorts defined by the arrival of children. When this assumption does not hold, this regression can yield severely biased estimates of average treatment effects, as de Chaisemartin and D'Haultfœuille (2020); Callaway and Sant'Anna (2021); Goodman-Bacon (2021); Sun and Abraham (2021) demonstrate.

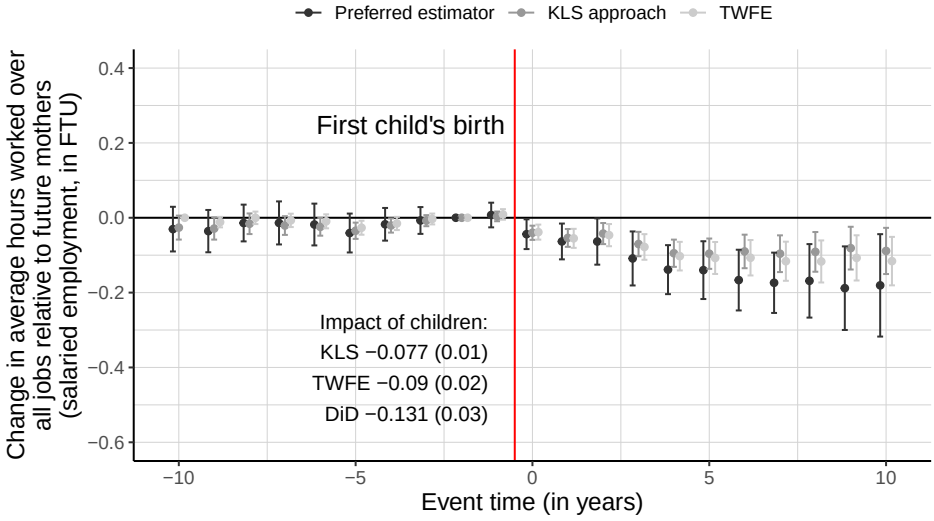
Figure F.1 displays the estimated average treatment effects based on these approaches, along with my preferred estimator, for two outcomes: (a) hours worked as a hospital nurse and (b) hours worked across all salaried jobs. The main takeaway from this exercise is that Kleven, Landais, and Søgaard (2019)'s approach and the more restrictive TWFE model yield very similar results: the benefit of more restrictive comparison sets and more flexible lifecycle trends seems minimal. However, both approaches yield results that appear much more optimistic than my baseline results regarding the negative effect of motherhood on hospital nurses' labor supply. This suggests that the bias arising from the implicit assumption of homogeneous treatment effects, which these approaches rely on, can be substantial.

Figure F.1 – Event-study estimates of the impact of children on mothers' labor supply: comparisons across estimators

(a) Hours worked as a hospital nurse



(b) Hours worked over all salaried jobs



Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse, and hours worked over all salaried jobs, in full-time units, by time since first child's birth. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (as a salaried employee), but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level.
Source. Insee, DADS-EDP panel.

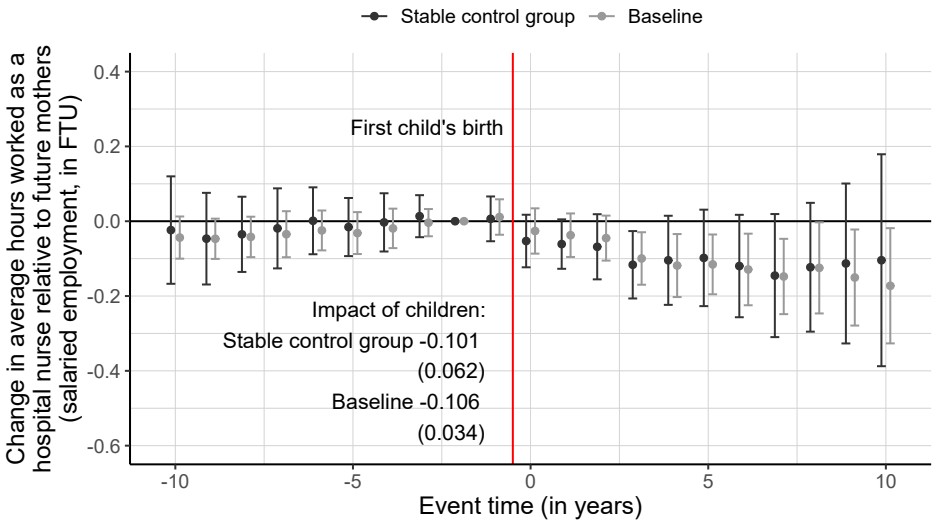
F.2 Stable control group

To assess whether the dynamics of the treatment effects are driven by the fact that the control group changes over time relative to the first child's birth, I replicate my analysis, this time restricting the control group to nurses who have their first child at least 14 years after they took their first nurse job at a hospital, and the treated group to nurses who have their first child at most 13 years after their first job. Additionally, the data are restricted to the 13 years following the first hospital nurse job. This approach is similar to more traditional difference-in-difference methods in which units do not switch from one group to another over time.

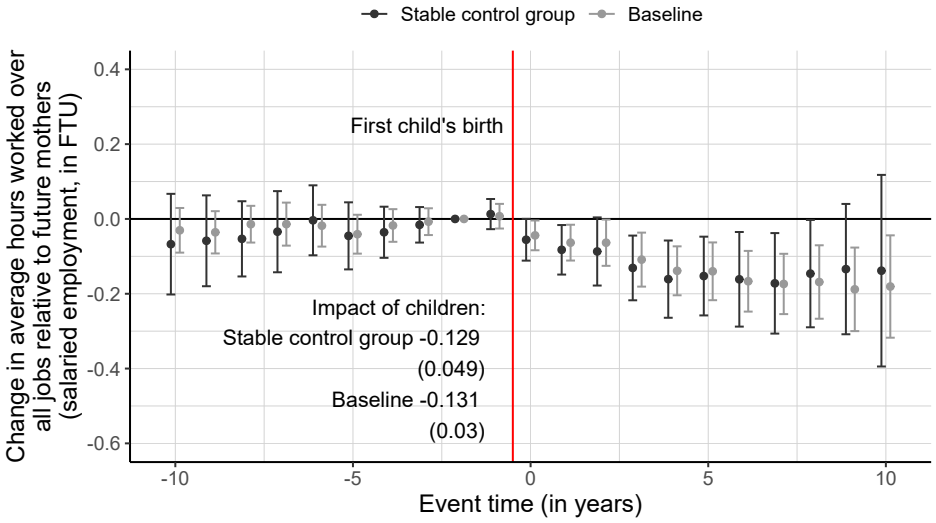
Figure F.2 displays the resulting event-study estimates for (a) hours worked as a hospital nurse and (b) hours worked across all salaried jobs. They are very close to my baseline estimates, implying that trends in hours worked before childbirth are very similar across cohorts. Figure F.3 displays the corresponding counterfactual lifecycle profiles. Given the similarity between the event-study estimates, these counterfactual profiles are almost identical to those resulting from my baseline estimates.

Figure F.2 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals and hours worked over all salaried jobs – stable control group

(a) Hours worked as a hospital nurse



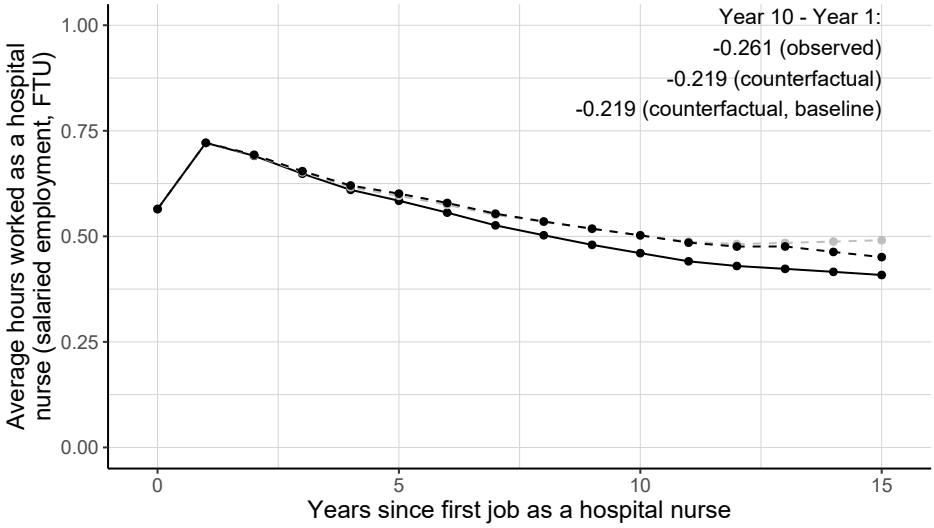
(b) Hours worked over all jobs



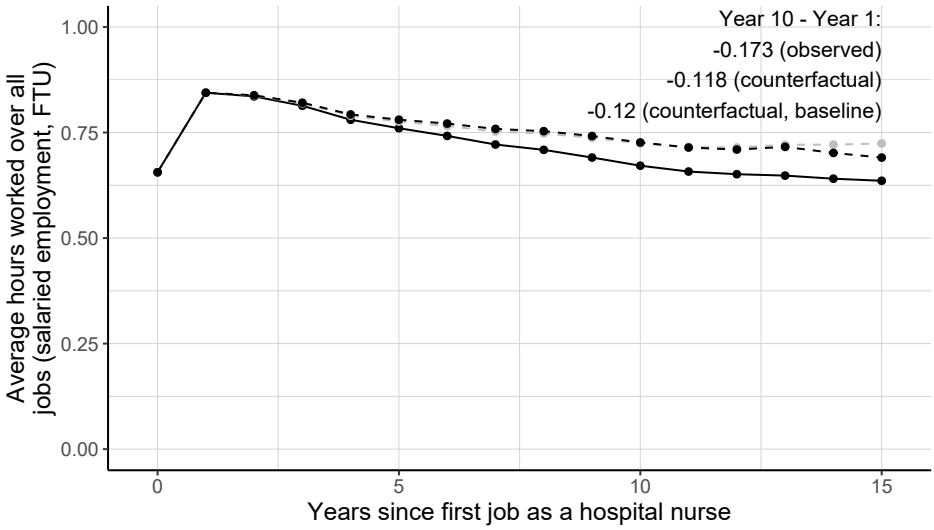
Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

Figure F.3 – Contribution of children to the lifecycle profile of nurses' labor supply: nursing labor supplied to hospitals and hours worked over all salaried jobs – stable control group

(a) Hours worked as a hospital nurse



(b) Hours worked over all jobs



Realized and counterfactual average hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units by time relative to the first qualified healthcare worker job at a hospital. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). The counterfactual profile implied by the baseline event-study estimates appears in grey dashed lines.

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

Source. Insee, DADS-EDP panel.

F.3 Childless control group

Female hospital nurses who choose to remain childless are another potential control group for mothers, in addition to female hospital nurses who will have children later on, which forms the core of this paper. However, relying on this control group may be less credible than relying on future mothers, as endogenous selection into motherhood is likely to be even more severe than selection into the timing of the first child's birth. Additionally, the identifying assumptions when using childless women as a control group imply that future mothers are a good control group. Specifically, these assumptions state that: (i) all cohorts of mothers would move in parallel with childless women if they did not have children; and (ii) the impact of children is 0 before they are born. This implies that all cohorts of mothers would move in parallel with each other in the absence of children, which is precisely the parallel trends assumption upon which my approach is based, and the limited anticipation assumption is the same. In other words, the identifying assumptions required for identification based on comparisons between mothers and childless women imply the identifying assumptions made in the core of the paper, but the reverse is not true.

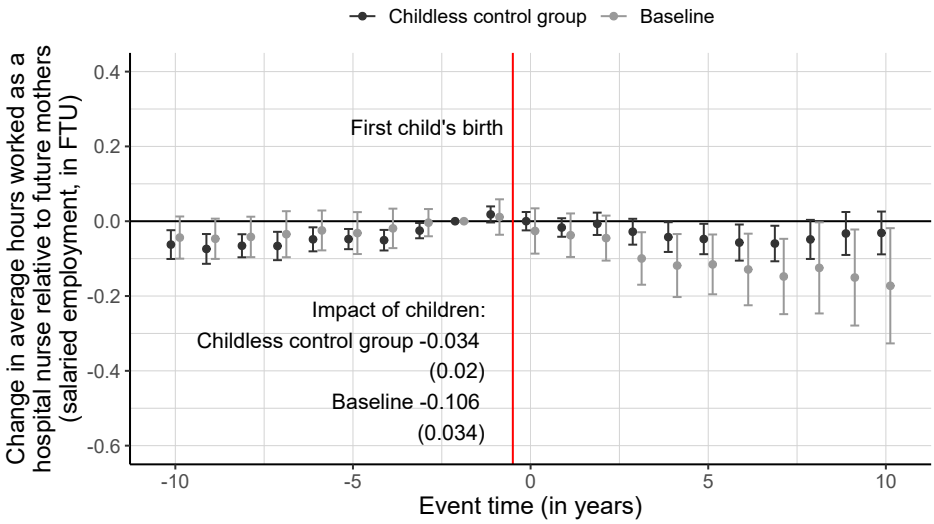
To clarify the differences between these two approaches, Figures F.4 and F.6 display event-study estimates for (a) hours worked as a hospital nurse and (b) hours worked across all salaried jobs. Figure F.4 compares my baseline estimates with those obtained using only comparisons between mothers and childless women to identify the impact of motherhood, while Figure F.6 considers an estimator based on both comparisons between mothers and childless women, and between mothers and future mothers. Figures F.5 and F.7 display the corresponding counterfactual lifecycle profiles.

The main lesson is that in both cases, the implied impact of motherhood on hospital nurses' labor supply is negative, but much less pronounced than what my baseline estimates suggest. When only childless women are used as a control group, the impact on hours worked as a hospital nurse is reduced by a factor of three, and the impact on hours worked across all salaried jobs is reduced by a factor of two compared to my preferred estimator. The difference is mainly observed in the long run, although it is already present in the short run. However, at least when it comes to hours worked as a hospital nurse, the pre-trends are less successfully controlled, suggesting that non-mothers are a less convincing control group than future mothers.

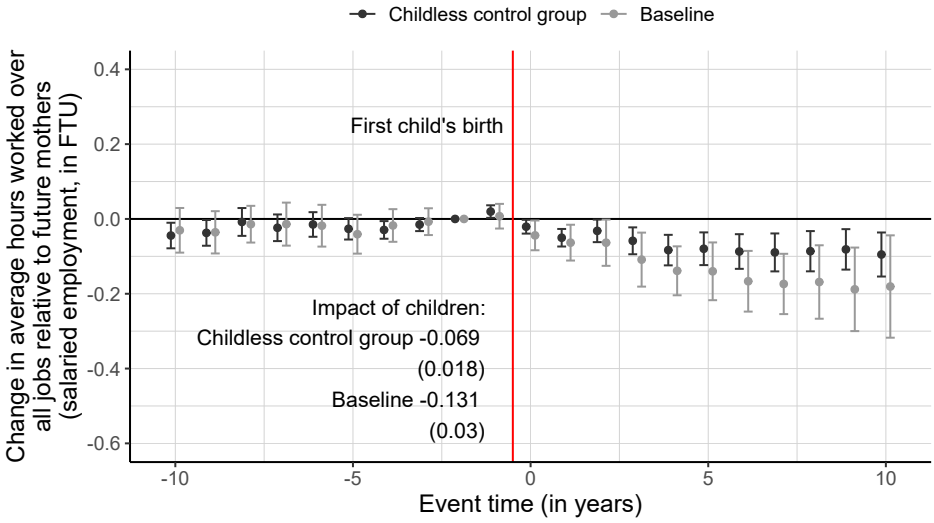
When both childless women and future mothers are used as a control group, the results lie between my baseline estimates and those obtained when only relying on childless women for identification, but are much closer to those obtained in the second case. The reason for this is that long-run effects are mostly driven by mothers vs. childless women comparisons. Indeed, identifying long-run effects using mothers vs. future mothers comparisons requires otherwise comparable mothers to have children at very different points in time: effects ten years after the arrival of children compare women who became mothers at least 12 years apart. Such a difference is not common in the data, whereas within a cohort defined by the beginning of a hospital nurse career, the number of childless women available to contribute to the identification of the impact of motherhood does not decrease when long-run effects are considered.

Figure F.4 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals and hours worked over all salaried jobs – childless women control group

(a) Hours worked as a hospital nurse



(b) Hours worked over all jobs

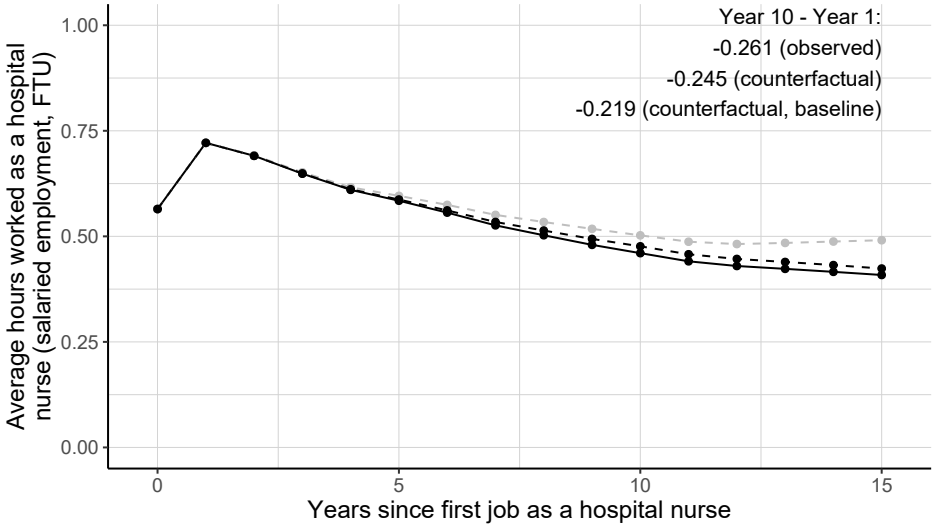


Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

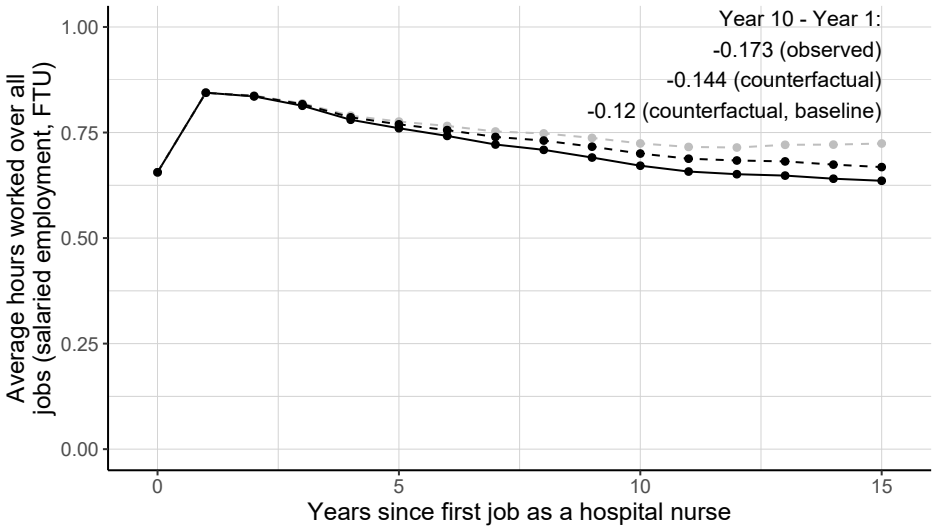
Source. Insee, DADS-EDP panel.

Figure F.5 – Contribution of children to the lifecycle profile of nurses' labor supply: nursing labor supplied to hospitals and hours worked over all salaried jobs – childless women control group

(a) Hours worked as a hospital nurse



(b) Hours worked over all jobs



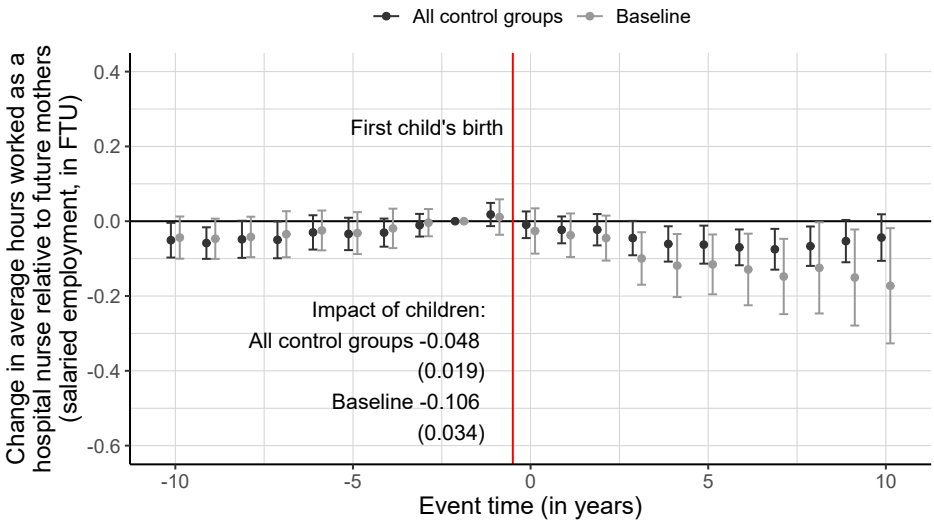
Realized and counterfactual average hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units by time relative to the first qualified healthcare worker job at a hospital. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). The counterfactual profile implied by the baseline event-study estimates appears in grey dashed lines.

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

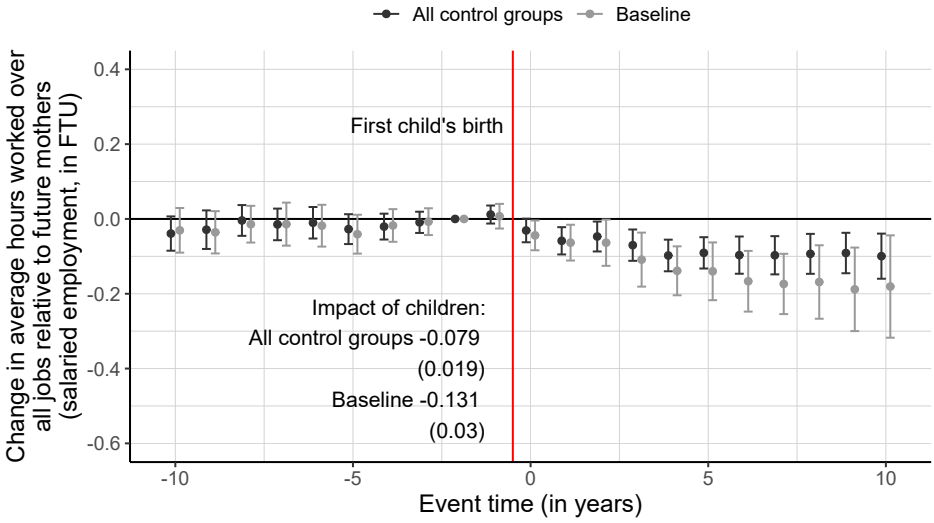
Source. Insee, DADS-EDP panel.

Figure F.6 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals and hours worked over all salaried jobs – future mothers and childless women control group

(a) Hours worked as a hospital nurse



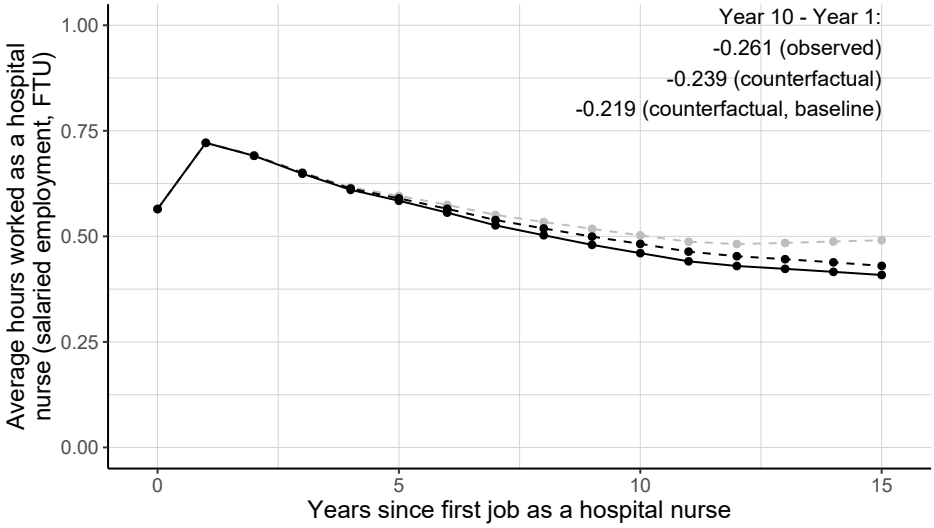
(b) Hours worked over all jobs



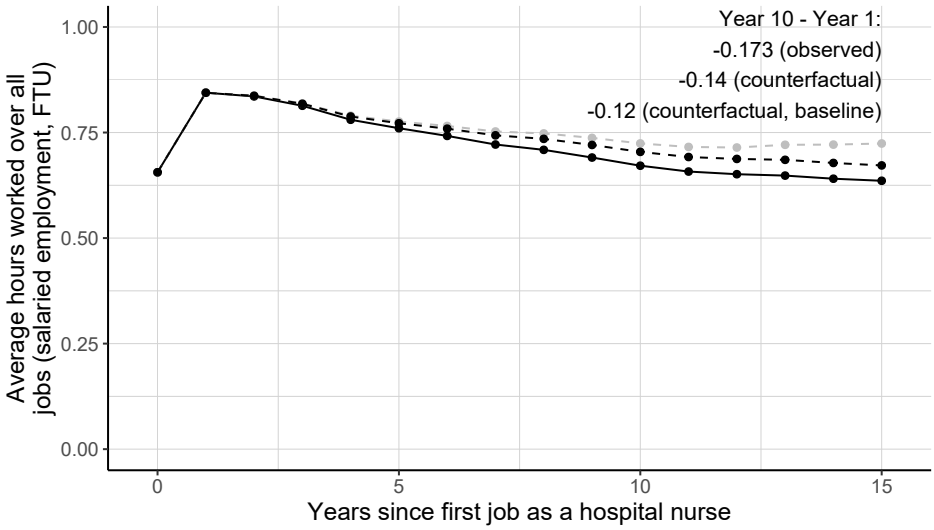
Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

Figure F.7 – Contribution of children to the lifecycle profile of nurses' labor supply: nursing labor supplied to hospitals and hours worked over all salaried jobs – future mothers and childless women control group

(a) Hours worked as a hospital nurse



(b) Hours worked over all jobs



Realized and counterfactual average hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units by time relative to the first qualified healthcare worker job at a hospital. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). The counterfactual profile implied by the baseline event-study estimates appears in grey dashed lines.

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

Source. Insee, DADS-EDP panel.

G Additional results

G.1 Lifecycle profiles: overtime work

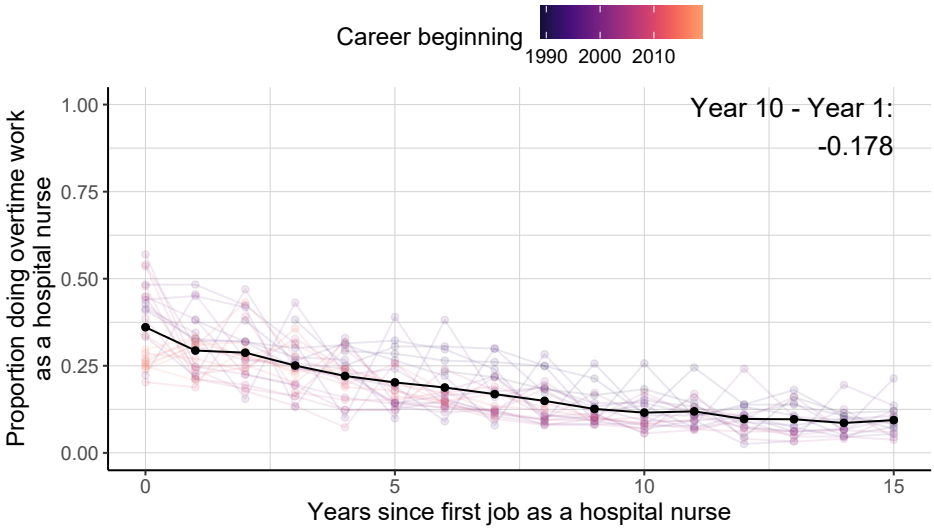
The main outcome chosen in this paper, namely hours measured in full-time units, caps hours at 1 full-time unit for all full-time workers working over an entire year. As such, it omits overtime as a potentially relevant labor supply margin. Figure G.1 displays lifecycle profiles aimed at investigating whether hospital nurses work overtime hours: (a) the share working overtime hours as a hospital nurse; and (b) average overtime hours worked as a hospital nurse. These measures are not conditional, either on working as a hospital nurse or on working overtime hours. Data regarding overtime hours is only available from 1995 onward.

Figure G.1 illustrates that working overtime hours is relatively common among hospital nurses in France. Indeed, the share of nurses doing so amounts to 36% at the start of their careers. Ten years later, this share drops to 12%. Given that, at this point, only 54% of them still hold a hospital nurse position, this implies that among those still working as hospital nurses, the share working overtime hours is 22%.

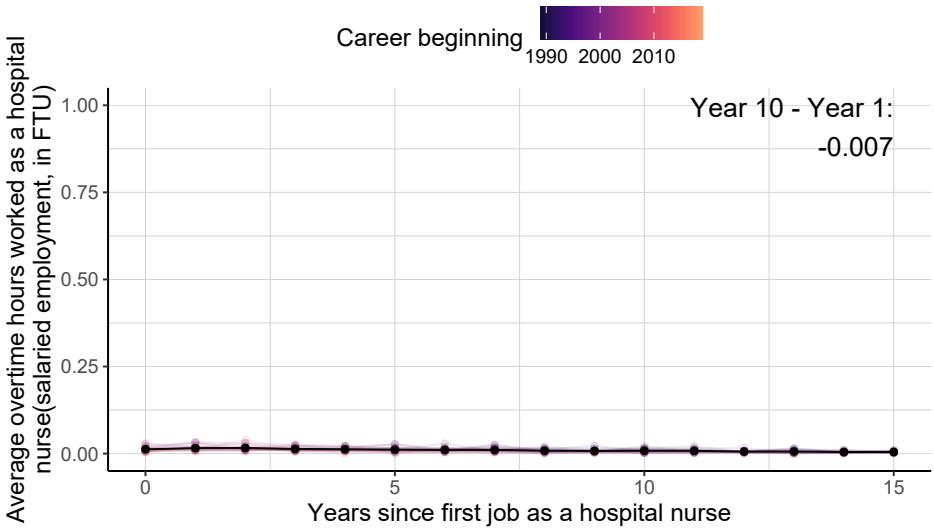
However, overtime hours only represent a small fraction of the nursing labor supplied to hospitals. Indeed, the unconditional average is roughly constant, at about 0.01 full-time units over the first ten years of a career. This implies that the average, conditional on being a hospital nurse who works overtime, is 0.03 full-time units at the beginning of a career, and increases to 0.08 full-time units ten years later. When the full-time basis is 1,820 hours per year, this corresponds to 146 overtime hours per year, or slightly less than three hours per week on average.

Figure G.1 – Lifecycle profile of hospital nurses' labor supply: overtime hours worked

(a) Share working overtime hours as a hospital nurse



(b) Overtime hours worked as a hospital nurse



Share working overtime hours as a hospital nurse, and average overtime hours worked as a hospital nurse, in full-time units, by time relative to the first qualified healthcare worker job at a hospital. Working overtime hours is not conditional on holding a hospital nurse position, but incorporate the participation margin. Overtime hours worked are not conditional neither on holding a hospital nurse position nor on working overtime hours, but incorporate both participation margins (0 overtime hours worked).

Note. Data are not available before year 1995. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

Source. Insee, DADS panel.

G.2 Child-related labor supply decisions: additional labor supply margins

G.2.1 Transitions to other jobs

To further clarify the limited impact of motherhood on transitions to other jobs, Figure G.2 replicates the event-study analysis, this time using overall salaried labor supply as the outcome, rather than nursing labor supplied to hospitals. Specifically, it examines (a) average hours worked, measured in full-time units, across all salaried jobs, including positions outside hospital nursing,[44] and (b) the salaried employment rate.

Consistent with the identifying assumptions, the estimated effects remain close to 0 before the arrival of children. After the birth of the first child, however, average hours worked across all salaried jobs decrease significantly, with the magnitude of this decline growing over time. Over the first ten years following the birth of the first child, the decrease amounts to 0.13 full-time units. Notably, this drop is slightly larger than the reduction in hours worked as a hospital nurse. This suggests that motherhood does not typically lead female hospital nurses to reallocate their labor supply to other salaried jobs. If that were the case, the decrease in hours worked as a hospital nurse would exceed the drop in hours worked across all salaried jobs, whereas the opposite is observed.

The same conclusion applies to the extensive margin of salaried labor supply. The estimated effect of motherhood on hospital nurses' salaried employment rate, considering all jobs, is not statistically different from zero, though the point estimate suggests a 2 percentage point decrease. This decline matches the estimated effect of motherhood on the probability of holding a hospital nurse position. Consequently, the data do not support the notion that motherhood leads nurses to transition to other salaried jobs or exit the salaried workforce entirely.

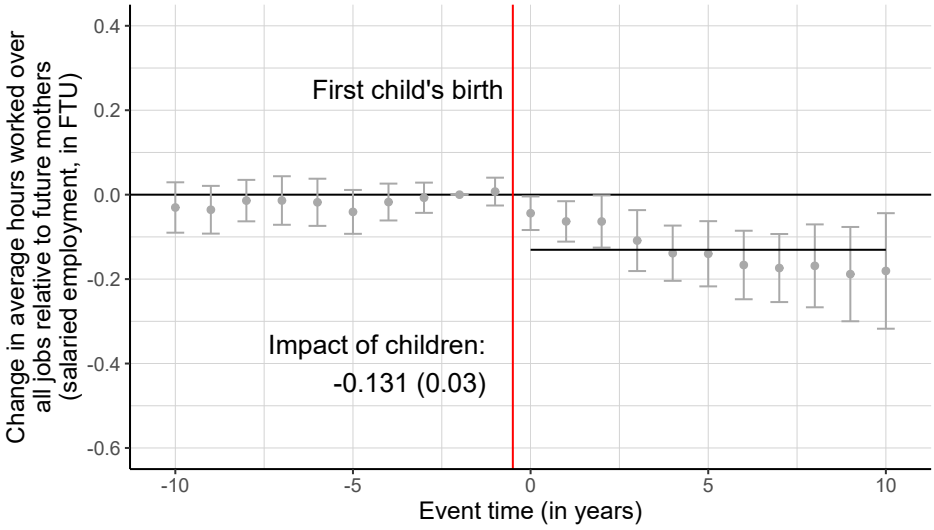
Salaried healthcare jobs Figure G.3 examines salaried health-related jobs as a whole, including but not limited to hospital nurse positions, by assessing the impact of motherhood on (a) average hours worked as a salaried employee in the healthcare system, and (b) the probability of holding a health-related salaried job.[45] In both

[44] As explained in Subsection 3.3, when individuals are not observed with a salaried job, their hours worked are considered to be 0. This approach ensures that the estimates for hours worked are not conditional on salaried employment, as they account for periods of non-employment, though they exclude labor supply in the freelance sector.

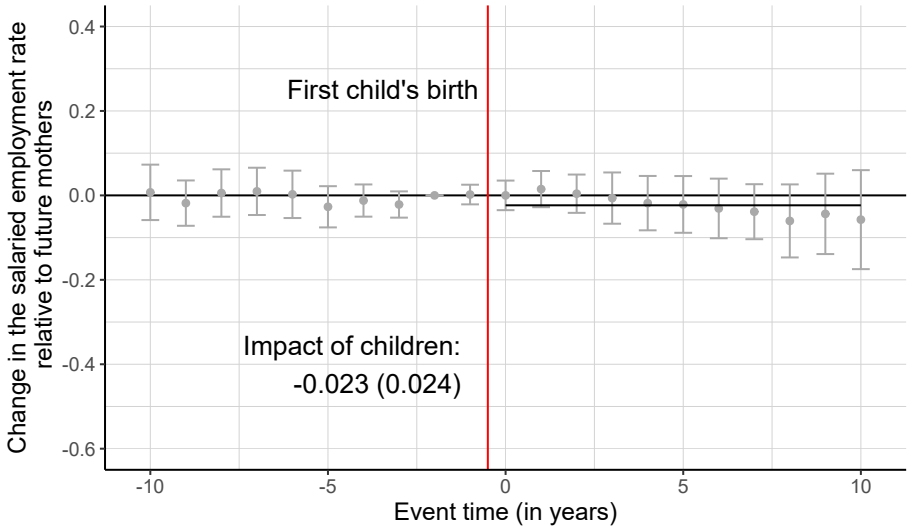
[45] A slight difference from the previous figures is that here the data covers only the 1995-2019 period.

Figure G.2 – Event-study estimates of the impact of children on mothers' labor supply: total labor supply in the salaried sector

(a) Hours worked over all jobs



(b) Salaried employment rate



Event-study estimates of the impact of children on mothers' hours worked in the salaried sector, in full-time units, and salaried employment rate, by time since first child's birth. Hours worked are not conditional on salaried employment, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

Source. Insee, DADS-EDP panel.

cases, and consistent with my identifying assumptions, the estimated effects are very close to zero before the arrival of children. However, average hours worked as a healthcare worker decrease substantially after childbirth. My estimates suggest that children lead female hospital nurses to reduce their hours worked in health-related salaried jobs by 0.13 full-time units over the first ten years following the birth of their first child, compared to a counterfactual average of 0.84 full-time units. This effect is slightly larger than the reduction in hours worked as a hospital nurse. The opposite would be true if motherhood led female hospital nurses to shift part of their hours worked to other health-related jobs.

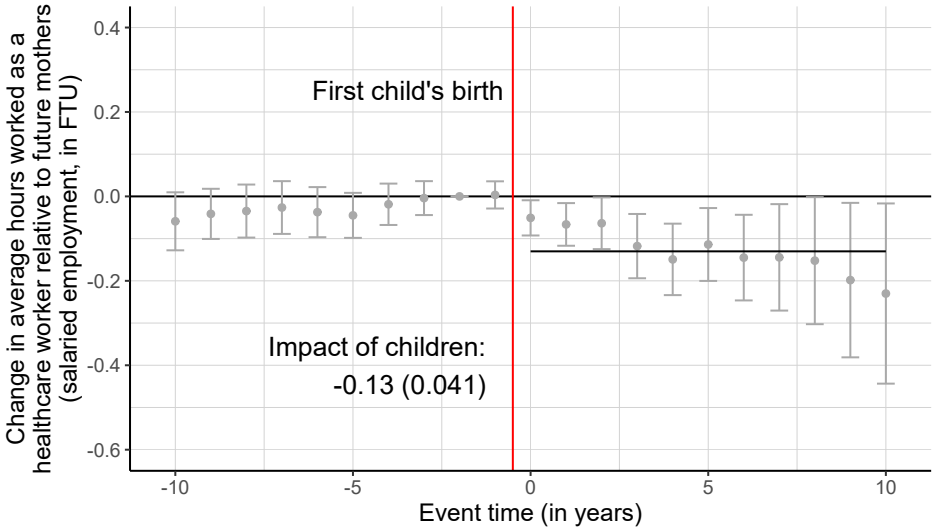
The examination of the estimated effects at the extensive margin is consistent with this view. Indeed, the estimated effect of motherhood on the probability of holding a salaried health-related job is zero. Given the statistical uncertainty, the data are compatible with the hypothesis that motherhood does not trigger transitions from hospital nurse jobs to other salaried positions, whether health-related or not.

Self-employment The picture, however, is not entirely complete because self-employment is not observed in the DADS data, which only cover salaried jobs. This may prove particularly problematic in a context where freelance nursing is an option for hospital nurses with sufficient experience. To address this issue, I replicate my analysis, this time considering the probability of holding a freelance nurse position as the outcome. Since self-employment data are not available before 2006, and because pre-birth levels must be observed, the sample is restricted to hospital nurses who started their careers in 2006 or later. Additionally, because it is necessary to observe sufficiently numerous mothers with later-born first children to identify the counterfactual, this also limits the time span over which the effects of motherhood can be estimated.

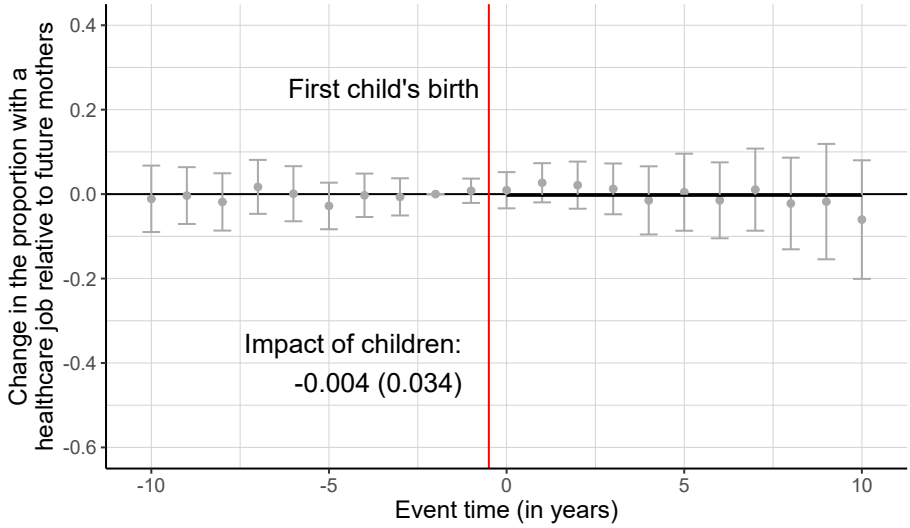
Figure G.4 presents my results, contrasting the estimated effect of motherhood on (a) the probability of holding a hospital nurse position versus that of holding a freelance nurse position, and (b) the probability of holding a salaried job, regardless of occupation or industry, versus the probability of holding a self-employed job. Although the results are less precise than those estimated using more years of data, all the estimated effects are compatible with no effect of motherhood along these margins. This confirms that motherhood does not induce hospital nurses to either shift to other positions, salaried or self-employed, or to leave the workforce altogether. Ultimately, the main effect of motherhood for hospital nurses appears

Figure G.3 – Event-study estimates of the impact of children on mothers' labor supply: labor supply as a salaried healthcare worker

(a) Hours worked as a healthcare worker



(b) Proportion working as a healthcare worker



Event-study estimates of the impact of children on mothers' hours worked as a healthcare worker, in full-time units, and proportion with a healthcare-related job, by time since first child's birth. Hours worked as a healthcare worker are not conditional on working as a healthcare worker, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

Note. Data are not available before year 1995.

Source. Insee, DADS-EDP panel.

to be transitions to part-time schedules while remaining in similar jobs.

Male hospital nurses Lastly, Figure G.5 examines the impact of fatherhood on male hospital nurses, focusing on (a) average hours worked across all salaried jobs and (b) the employment rate. The key takeaway is that, consistent with evidence showing that fatherhood does not lead male hospital nurses to reduce their hours worked in hospitals, it also does not prompt them to transition to other salaried jobs or exit the salaried workforce.

G.2.2 Overtime work

Hours worked, as measured in full-time units, do not include overtime because this measure is capped at 1 for full-time workers. As such, if some nurses choose to keep their full-time jobs but reduce their overtime hours upon becoming mothers, then my estimates of the magnitude of child-related labor supply decisions will underestimate how important these adjustments are. To investigate this issue, Figure G.6 displays event-study estimates of the impact of motherhood on (a) the probability of being a hospital nurse who works overtime hours; and (b) average overtime hours.

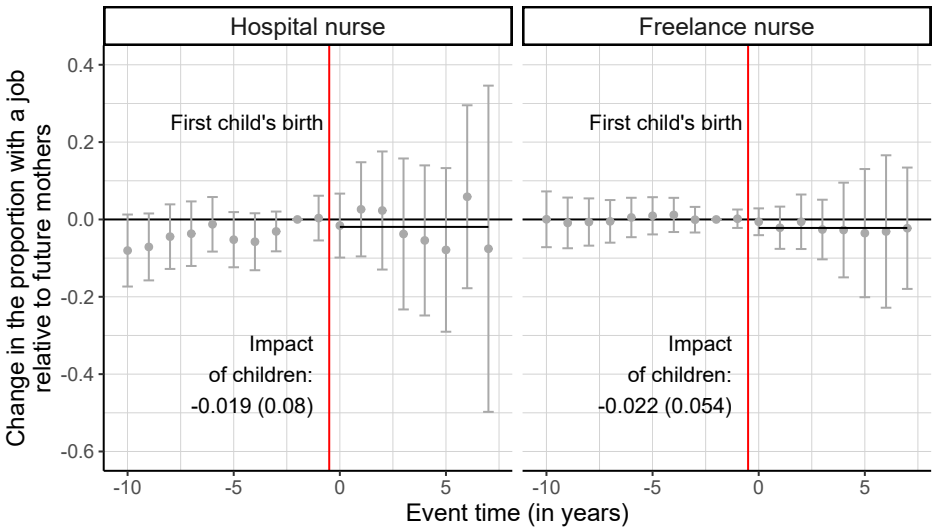
These estimates imply that having children decreases the probability of working overtime hours as a hospital nurse by 15 percentage points over the first ten years after the first child is born. This estimate is not conditional on working as a hospital nurse. However, motherhood has virtually no impact on the share of hospital nurses who continue working as hospital nurses (see Section 6). As a result, the conditional effect would be the same. Compared to a counterfactual baseline of 25%, this represents a substantial drop.

Figure G.6 shows that the impact of motherhood on unconditional average overtime hours amounts to a 0.01 full-time unit drop, compared to a counterfactual baseline of 0.02 full-time unit. Because this effect is unconditional, it combines the extensive margin, where hospital nurses stop working overtime hours, and the intensive margin, where hospital nurses reduce their overtime hours while still working overtime.

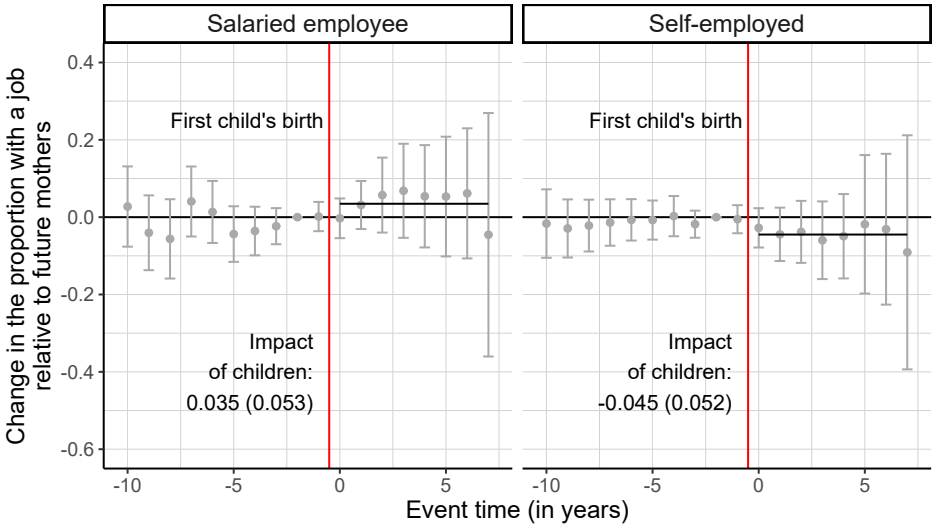
On the one hand, if only the extensive margin were at play, then the average counterfactual overtime hours worked by hospital nurses who no longer work overtime hours would amount to 0.06 (0.01 / 0.11) full-time units, slightly more than 2 overtime hours worked per week, which is not very different from the average conditional overtime hours worked by all hospital nurses. On the other hand, another

Figure G.4 – Event-study estimates of the impact of children on mothers' labor supply: labor supply in the freelance vs. salaried sector

(a) Working as a hospital vs. freelance nurse



(b) Working as a salaried employee vs. self-employed worker



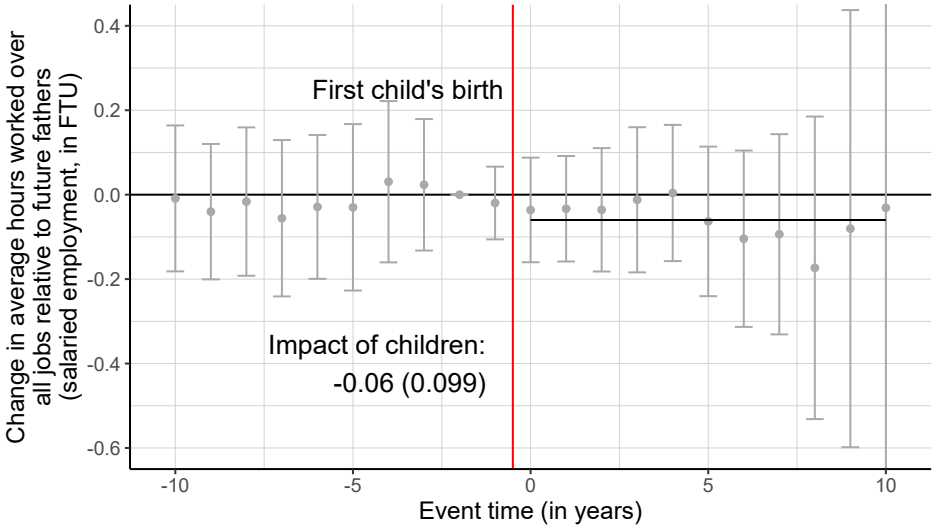
Event-study estimates of the impact of children on the share of hospital nurses still working as hospital nurses, or working as a freelance nurse, and share of hospital nurses who hold a salaried job, or working as self-employed workers, by time since first child's birth. Freelance workers are only considered so if they do not hold a salaried job. Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

Note. Data are not available before year 2006.

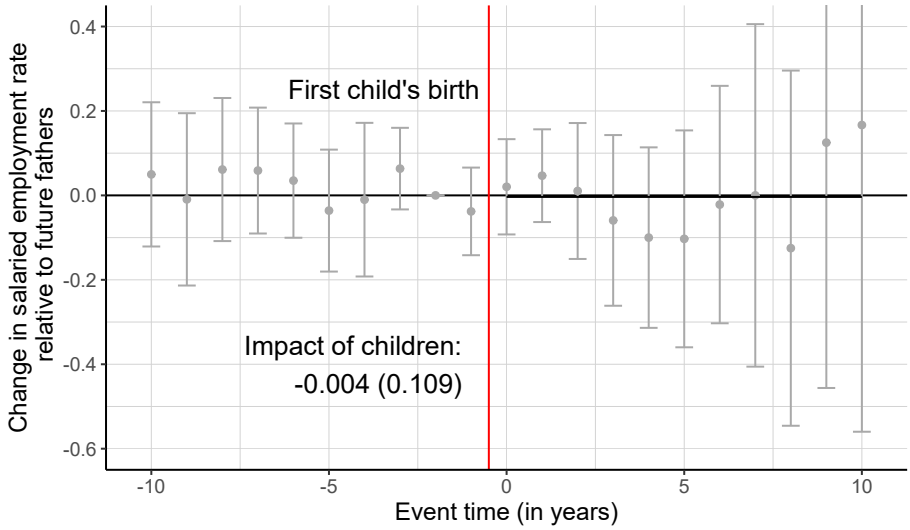
Source. Insee, DADS-EDP panel and non-salaried workers panel.

Figure G.5 – Event-study estimates of the impact of children on fathers' labor supply: total labor supply in the salaried sector

(a) Hours worked



(b) Salaried employment rate



Event-study estimates of the impact of children on fathers' hours worked in the salaried sector, in full-time units, and salaried employment rate, by time since first child's birth. Hours worked are not conditional on salaried employment, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

Source. Insee, DADS-EDP panel.

reasonable assumption would be that the counterfactual conditional average is the same across those who make decisions at the extensive margin and other hospital nurses who continue working overtime. The conditional counterfactual average is 0.08 (0.02 / 0.25), which is about 3 overtime hours worked per week. Because 15% of hospital nurses make overtime decisions at the extensive margin, this implies that the extensive margin generates a 0.01 (0.08×0.15) full-time unit decrease, which almost matches the estimated unconditional effect. The rest of the effect would correspond to a 0.02 full-time unit decrease at the intensive margin (0.002 / (0.25 - 0.15)), which corresponds to less than 1 overtime hour worked per week.

In the end, these results show that hospital nurses do make child-related decisions regarding overtime hours. However, the implied changes in hours worked remain small compared to those generated by decisions along the full-time vs. part-time margin. For this reason, incorporating overtime hours worked into the measure of nursing labor supplied to hospitals would not make much difference.

G.2.3 Hourly wages

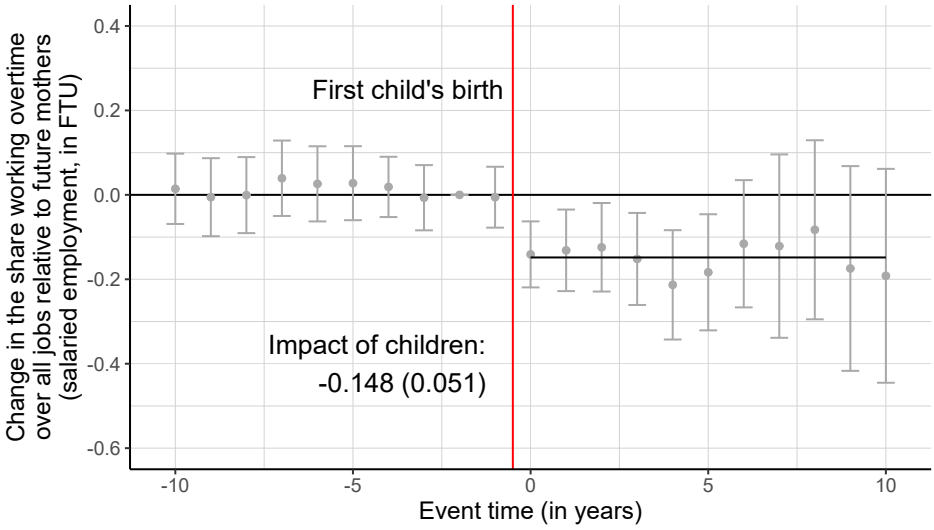
Additionally, nursing in the hospital sector is characterized by particularly salient constraints regarding working time: because healthcare must be provided continuously, shift work is a common arrangement, which is not always sufficient to prevent unforeseeable planning changes. As a result, hospital nurses may be prone to turn to jobs that are less exposed to these time constraints and offer better work-family balance upon becoming mothers. This margin would not appear in hours worked changes measured in full-time units, as it involves other dimensions of working time, such as effort or flexibility.

To investigate this possibility, in Figure G.7, I replicate my event-study analysis, focusing on hourly wages. The rationale for this choice is that pay is extremely rigid, especially in the public sector, where the baseline wage rate is almost uniformly set based on tenure. As a result, conditional on tenure, individual differences in hourly wages are almost entirely driven by differences in (i) hours worked, as overtime hours are paid at a higher rate than regular hours, and (ii) various premiums and bonuses that are tightly linked to the work setting, e.g., shift work or night work. As such, child-related changes in motherhood would be indicative of changes in working conditions through a compensating differential mechanism. I find that the effect of children on the wage rate is a precisely estimated 0 (with the baseline wage rate being around €15), except for the very short run. As a

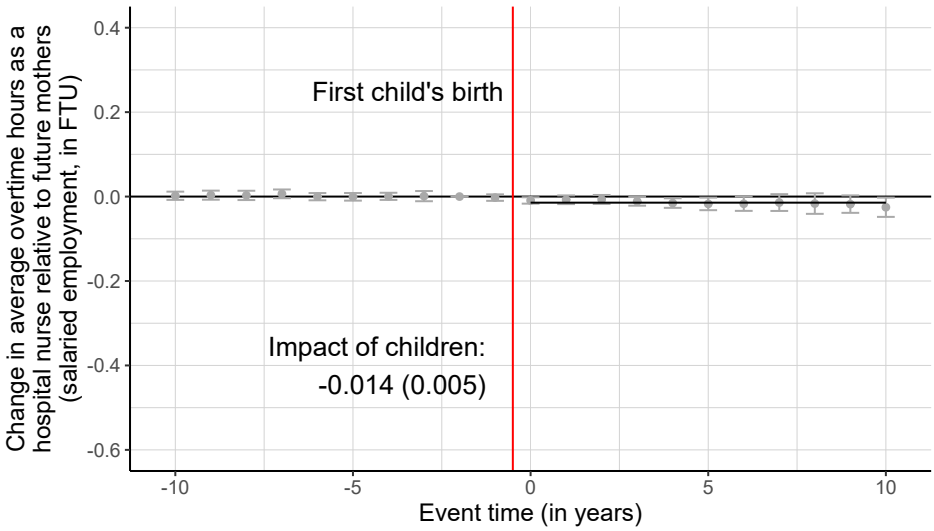
result, the compensating differentials that such adjustments would involve do not seem to be at play.

Figure G.6 – Event-study estimates of the impact of children on mothers' labor outcomes: overtime hours worked as a hospital nurse

(a) Share working overtime hours as a hospital nurse



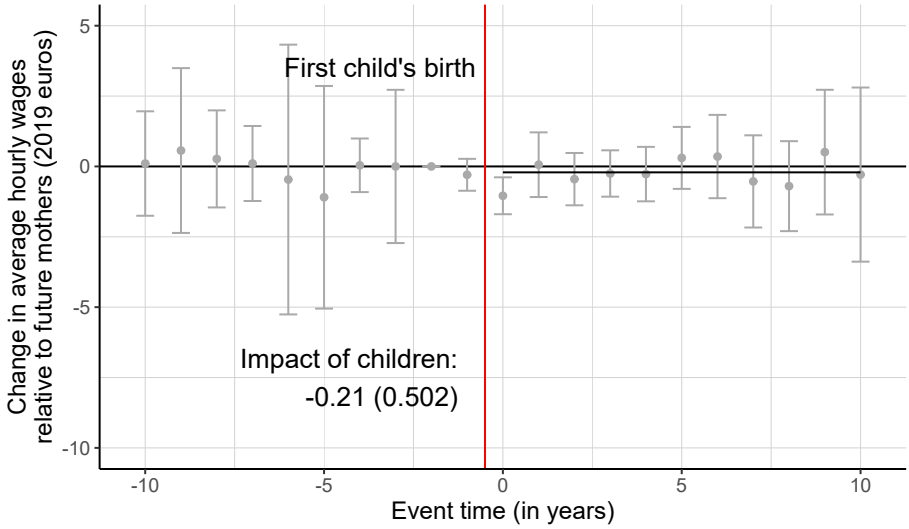
(b) Overtime hours worked as a hospital nurse



Event-study estimates of the impact of children on the share working overtime hours as a hospital nurse, and average overtime hours worked as a hospital nurse, by time relative to the first child's birth. Working overtime hours is not conditional on holding a hospital nurse position, but incorporate the participation margin. Overtime hours worked are not conditional neither on holding a hospital nurse position nor on working overtime hours, but incorporate both participation margins (0 overtime hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

Source. Insee, DADS-EDP panel.

Figure G.7 – Event-study estimates of the impact of children on mothers' labor outcomes: hourly wages



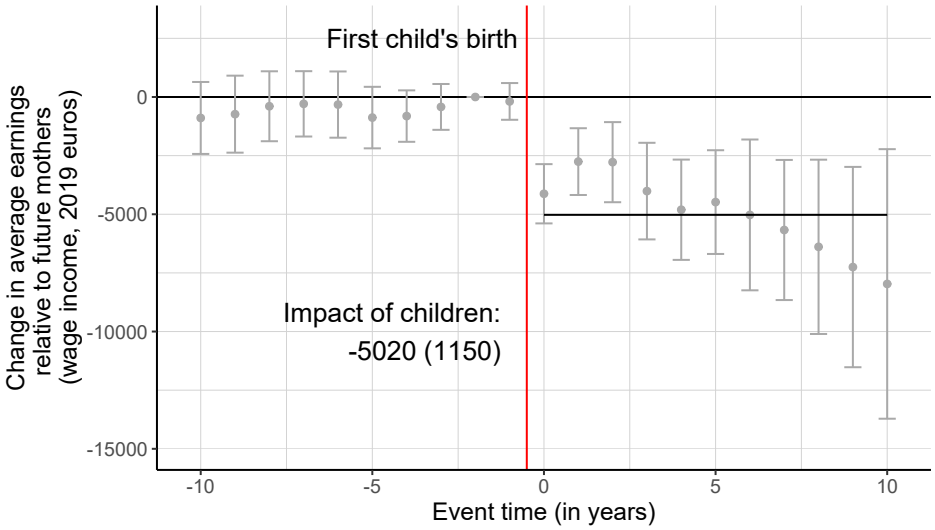
Event-study estimates of the impact of children on mothers' hourly wages, by time since the first child's birth. Average hourly wages are conditional on salaried employment. Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

G.2.4 Labor earnings

How do these multiple child-related decisions translate into labor earnings? Figure G.8 answers this question by displaying event-study estimates of the impact of motherhood on hospital nurses' salaried earnings. While earnings from the freelance sector are omitted from this measure, the fact that motherhood does not lead to more participation in the freelance sector, at least at the extensive margin, suggests that this is a fair measure of the overall impact of motherhood on labor earnings.

The estimated effects suggest that having children results in an average €5,000 loss in labor earnings, with respect to a baseline counterfactual average of €25,000. As the rest of the paper shows, this drop is entirely driven by a decrease in hours worked, as opposed to transitions to nonemployment or a drop in the wage rate.

Figure G.8 – Event-study estimates of the impact of children on mothers' labor outcomes: labor earnings



Event-study estimates of the impact of children on mothers' salaried labor earnings, by time since first child's birth. Salaried earnings are not conditional on salaried employment but incorporate the participation margin (€0). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

G.3 Child-related labor supply: comparison between the extensive and intensive margins of fertility decisions

My approach, based on the child penalty framework of Kleven, Landais, and Søgaard (2019), identifies the causal effect of motherhood on mothers' labor outcomes. However, this causal effect mixes up the consequences of two interventions: (i) becoming a mother, as opposed to remaining childless, which corresponds to the extensive margin of fertility decisions; and (ii) having additional children for women who are already mothers, which corresponds to the intensive margin of fertility decisions. Because my estimates are not conditional on subsequent fertility decisions, they incorporate the causal effect of both margins. Specifically, the short-run effect of motherhood is likely to reflect the short-run consequences of the extensive margin, as it is uncommon to have additional children in the very year one's first child is born. In contrast, my long-run estimates will mix (i) the long-run consequences of the extensive margin and (ii) the short-run effects of the intensive margin, with weights depending on the timing and frequency of subsequent childbirths. This is especially true in this context, where most mothers choose to have more than one child.

To gain further insights into this issue, I replicate my event-study analysis by (a) relying only on observations related to mothers of one child or mothers of additional children *at least two years before their second child is born*; and (b) considering the second child's birth instead of the first child's birth as my event of interest, *and* only relying on observations related to mothers of two children or mothers of additional children *at least two years before their third child is born*. Under parallel trends and limited anticipation assumptions similar to Assumptions1 and 2,[46] this approach allows me to distinguish between (a) the dynamic effect of the first child and (b) the dynamic effect of having one additional child (i.e., the second child), i.e., the dynamic effect of (a) the extensive margin and (b) the intensive margin of fertility, without contamination from subsequent fertility decisions. However, the interpretation of these estimates is complicated by the fact that fertility may also be influenced by the labor market effects following the first birth.

Figures G.9 and G.10 display the resulting estimates for hours worked as a hospital nurse and hours worked across all jobs, respectively. While these estimates

[46] Specifically, I assume that (i) mothers who are to have a second child are a good comparison group for those who just had their second child, and (ii) the second and third children have no effect on their mother's labor supply up until one year before they are born.

may be slightly less precise than the baseline estimates due to relying on fewer observations, they still provide valuable information.

As for hours worked as a hospital nurse, Figure G.9 suggests that the impact of having one additional child is the same as the impact of becoming a mother. By contrast, Figure G.10 shows that while both margins seem to have somewhat similar short-run effects on hours worked across all salaried jobs, the impact of having one additional child is quite short-lived. In other words, the impact of the second child appears to dissipate after a few years, whereas the impact of the first child is long-lasting. Moreover, the magnitude of the impact of the first child is not very different from that of my baseline estimates, which mix all margins. This also implies that while the impact of becoming a mother has little to do with hospital nurses transitioning from hospital jobs to other salaried jobs, it might be more relevant when it comes to having a second child.

This suggests that, when it comes to hours worked across all jobs, my baseline results are mostly driven by the long-run consequences of fertility decisions at the extensive margin, i.e. the decision to become a mother, rather than the short-run consequences of fertility decisions at the intensive margin, i.e. the decision to have one additional child among women who are already mothers. These results are also, to some extent, informative about the origins of such labor supply decisions. Indeed, if these decisions were purely the result of child-related time constraints, as opposed to norms and preferences, one would expect the dynamic path of the effect of the first child to be very similar to that of the second child, because, conditional on their age, the needs of children should not be strongly dependent on their rank among siblings. The fact that they do differ seems to indicate either (i) large returns to scale in the children production function or (ii) that motherhood-related time allocation decisions involve gender norms and preferences.

G.4 Paid parental leave policy reforms

To investigate the contribution of parental leave policy reforms to the child-related labor supply decisions of hospital nurses, I consider, for each female hospital nurse with children, whether she works continuously full-time during the first three years after the birth of her first (or second) child. I regress this individual-level outcome on a full set of dummies that account for possible years of birth for her children, given that the paid parental leave reforms of 1994, 2004, and 2015 affected parents differently depending on the calendar year of birth of their children. For instance, parents whose first child was born on January 1, 2004, were eligible for paid parental leave, whereas those whose first child was born on December 31, 2003, were not. My measure of potentially parental-leave-related labor supply decisions incorporates both the decision to leave salaried employment and the decision to work part-time, given that part-time options have always been available under French paid parental leave policies.

Figure G.11 displays my estimates. While they are quite noisy and the statistical uncertainty is substantial, they do not show breaks around the extensions of paid parental leave policies. Even though additional data are needed to be fully conclusive, this suggests that the impact of these parental leave policies on hospital nurses' labor supply remains limited at best.

This contrasts with recent evidence from Denmark, displayed in Friedrich and Hackmann (2021), which shows that Danish nurses' labor supply decreased substantially due to parental leave policy reforms. The explanation might be that the generosity of the Danish policy was much higher than that of the French setting. Indeed, the Danish parental leave reform they examined offered about 75% of previous wages. By contrast, the French policy offers about €200 a month for part-time options and €400 a month for the full-time option. My estimates suggest that, throughout the period under scrutiny, average hourly wages for hospital nurses were about €15, meaning that moving from full-time to part-time (50%) corresponds to a €14,000 ($15 \times 1820 \times 0.5$) loss in annual labor earnings, or €1,100 per month. Leaving employment altogether represents a €27,000 annual earnings loss, or €2,300 per month. As a result, making such decisions for a €200 or €400 monthly allowance requires a large preference for child-rearing activities and leisure.

G.5 Contribution to lifecycle profiles of labor supply: additional margins

Salaried employment Figure G.12 replicates this simulation exercise, considering (a) hours worked across all salaried jobs, including those outside of hospital nursing, measured in full-time units, and (b) the corresponding salaried employment rate. As for hours worked, the dashed line representing the counterfactual lifecycle profile progressively diverges from the solid line corresponding to the observed profile, similarly to Figure 2. The comparison between the two profiles suggests that the causal effect of motherhood explains a 0.05 full-time unit decrease in hours worked across all salaried jobs over the first ten years of a career. If motherhood led hospital nurses to shift part of their hours worked to other jobs, this contribution would significantly exceed the impact of motherhood on hours worked as a hospital nurse. However, the opposite is true, with the two quantities being nearly identical. This confirms that the main contribution of motherhood to hours worked in the salaried sector is a reduction in hours as a hospital nurse, without any shift to other salaried positions.

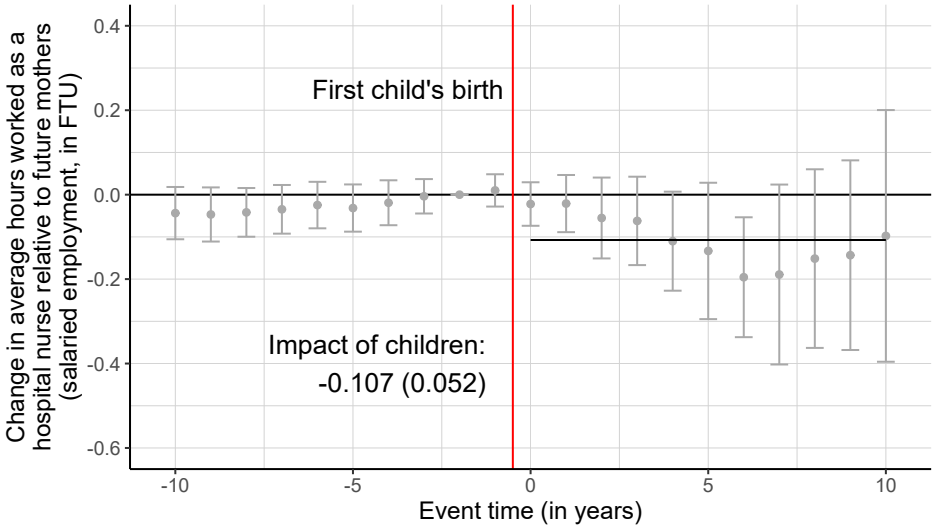
Figure G.12(b) strengthens this interpretation when considering the salaried employment rate. The comparison between the observed and simulated profiles suggests that motherhood contributes less than one percentage point to the decrease in the salaried employment rate of hospital nurses over the first ten years of a career. Since the data also show that it does not contribute to the decrease in the probability of holding a hospital nurse position, this implies that the increase in the share of individuals holding other salaried jobs is not related to child-related labor supply decisions.

Salaried healthcare jobs Figure G.13 further confirms this view by considering the observed and counterfactual average profiles of (a) hours worked as a salaried healthcare worker, including but not limited to hospital nurse jobs; and (b) the probability of holding a salaried health-related job. The counterfactual profile, where the impact of motherhood is set to 0, progressively diverges from the observed profile. This indicates that motherhood does contribute to the decline in hours worked in the healthcare sector over the course of a career. However, the counterfactual profile also displays a clear decrease, implying that the observed decline is not entirely explained by child-related decisions. The difference between the observed and counterfactual declines over the first ten years of a career amounts

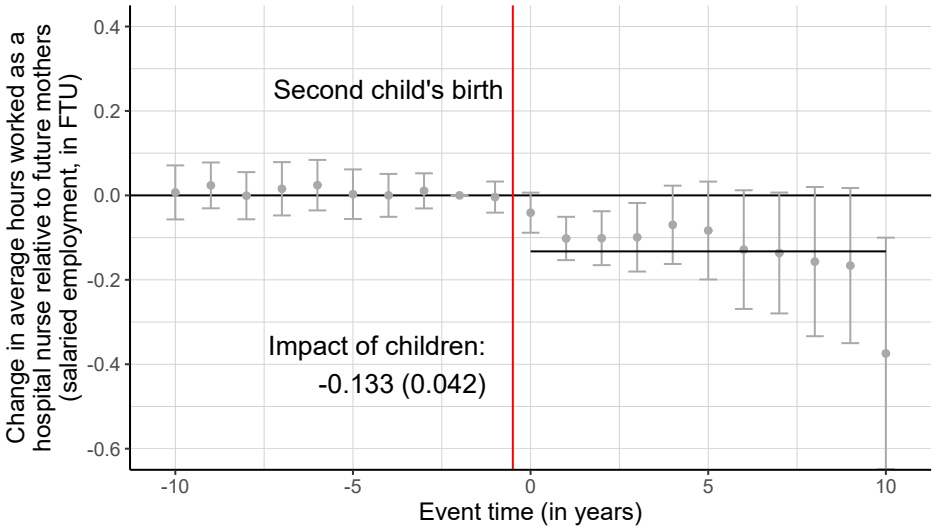
to 0.05 full-time units. This quantity is nearly the same as the difference between the observed and counterfactual profiles in hours worked as a hospital nurse: shifting hours from hospital nurse jobs to other health-related jobs has little to do with motherhood. Figure G.13(b) finally shows that the observed and counterfactual profiles regarding the probability of working as a healthcare worker are completely unrelated to motherhood: the two profiles are exactly the same.

Figure G.9 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals, by fertility margin

(a) Extensive margin (first child)



(b) Intensive margin (second child)

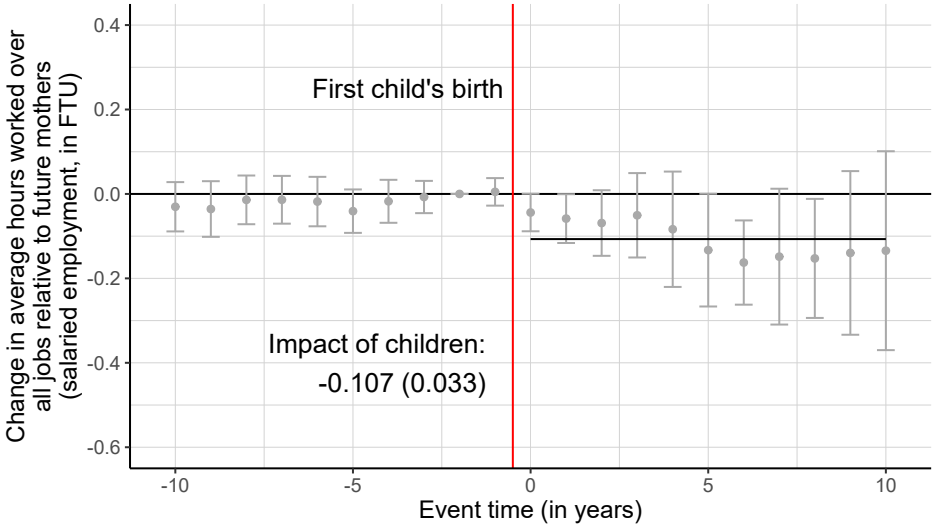


Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse, in full-time units, by time since first child's birth. Hours worked as a hospital nurse are not conditional on working as a hospital nurse, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

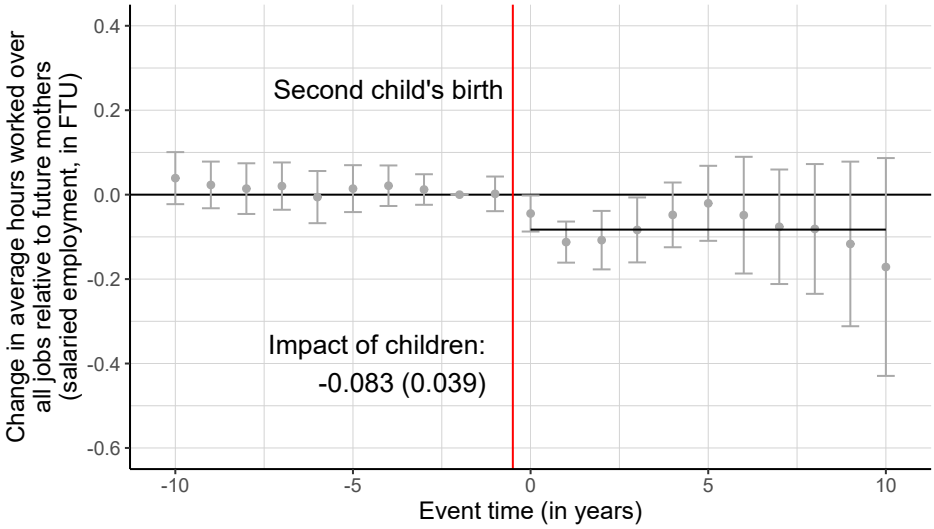
Source. Insee, DADS-EDP panel.

Figure G.10 – Event-study estimates of the impact of children on mothers' labor supply: total labor supply in the salaried sector, by fertility margin

(a) Extensive margin (first child)

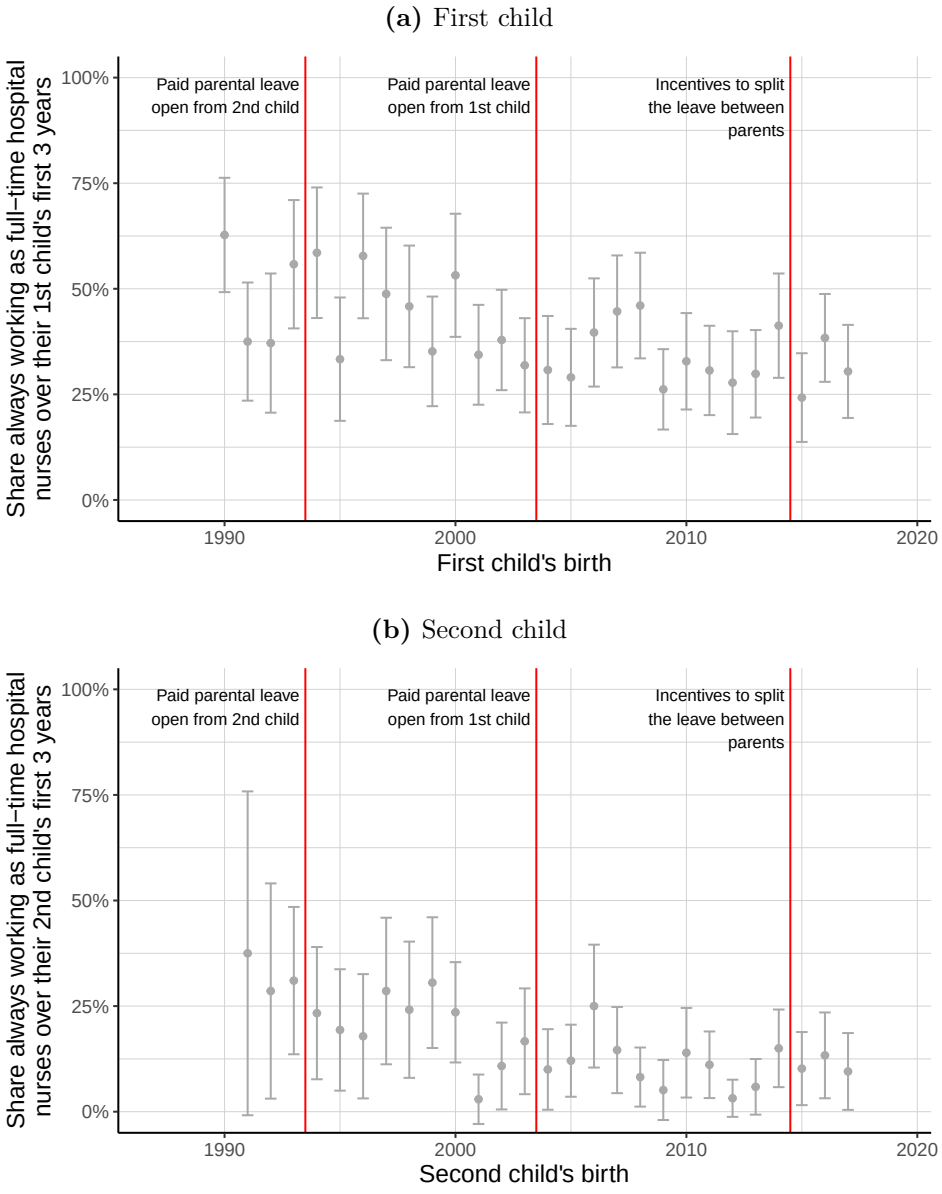


(b) Intensive margin (second child)



Event-study estimates of the impact of children on mothers' hours worked in the salaried sector, in full-time units, by time since first child's birth. Hours worked are not conditional on salaried employment, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

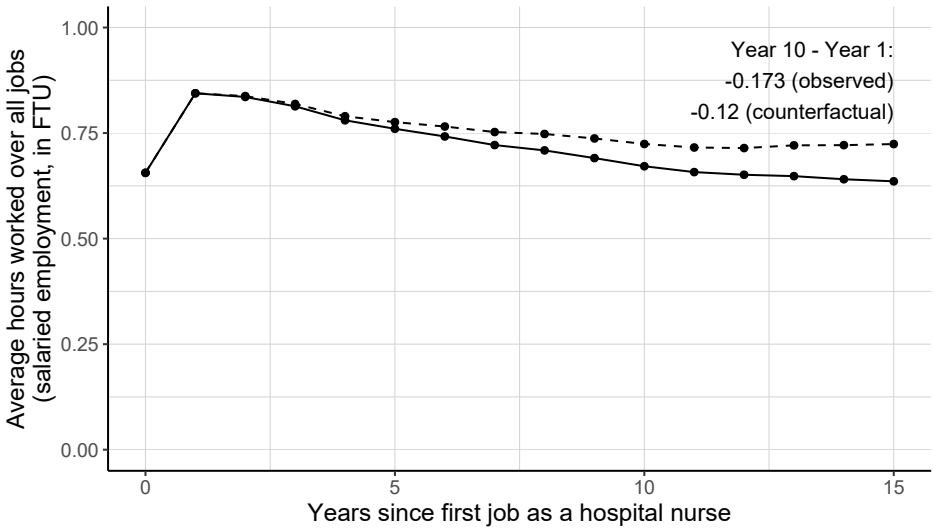
Figure G.11 – Share of hospital nurses with at least one part-time work or non-employment episode over the first three years with children: time-series



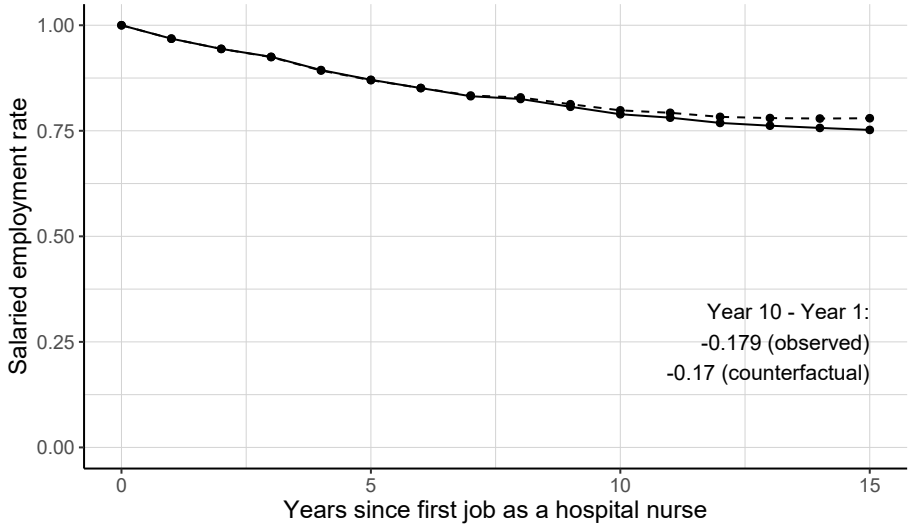
Share of female hospital nurses with children who work continuously full-time as hospital nurses over the first three years with children, by year of birth of their children.
Source. Insee, DADS-EDP panel.

Figure G.12 – Contribution of children to the lifecycle profile of nurses' labor supply: total labor supply in the salaried sector

(a) Hours worked over all jobs



(b) Salaried employment rate



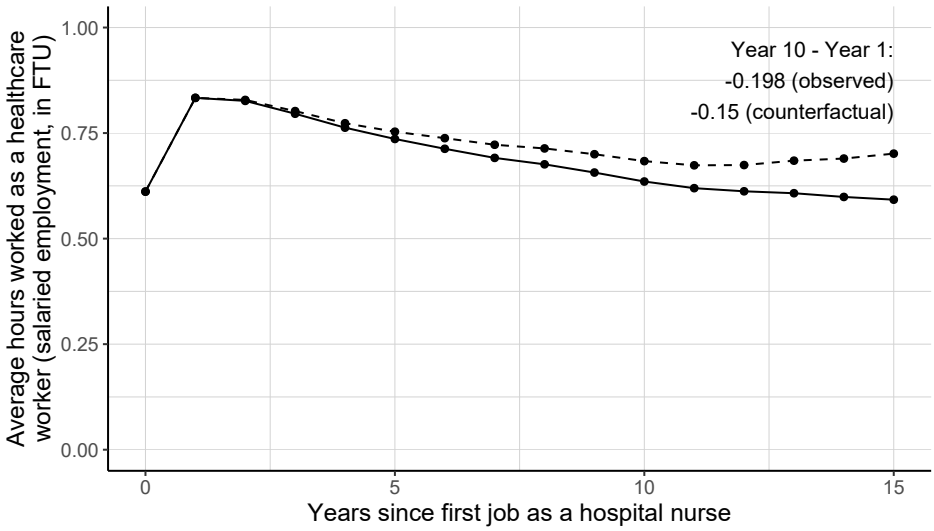
Realized and counterfactual average hours worked in the salaried sector, in full-time units, and salaried employment rate, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on salaried employment, but incorporate the participation margin (0 hours worked).

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

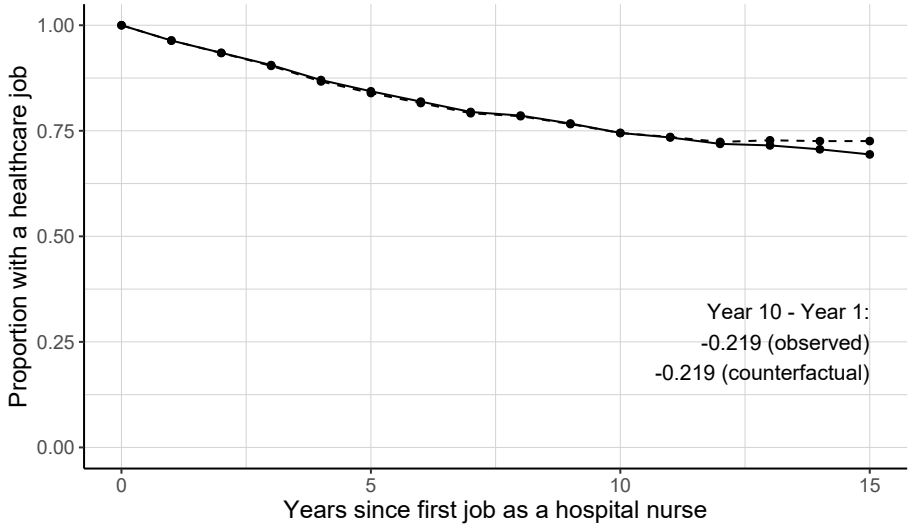
Source. Insee, DADS-EDP panel.

Figure G.13 – Contribution of children to the lifecycle profile of nurses' labor supply: labor supply as a healthcare worker

(a) Hours worked as a healthcare worker



(b) Proportion working as a healthcare worker



Realized and counterfactual average hours worked in the salaried sector as a healthcare worker, in full-time units, and proportion with a healthcare-related job, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on working as a healthcare worker, but incorporate the participation margin (0 hours worked).

Note. Data are not available before year 1995. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

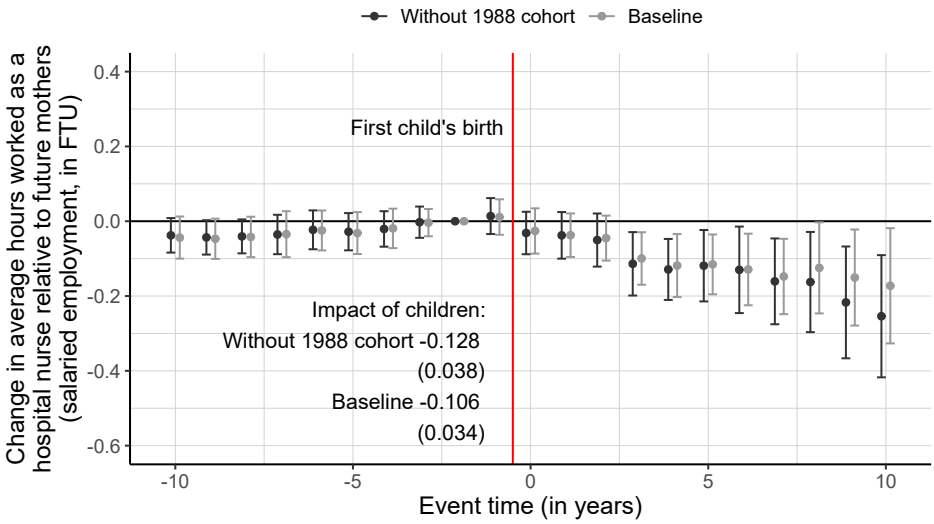
Source. Insee, DADS-EDP panel.

H Robustness checks

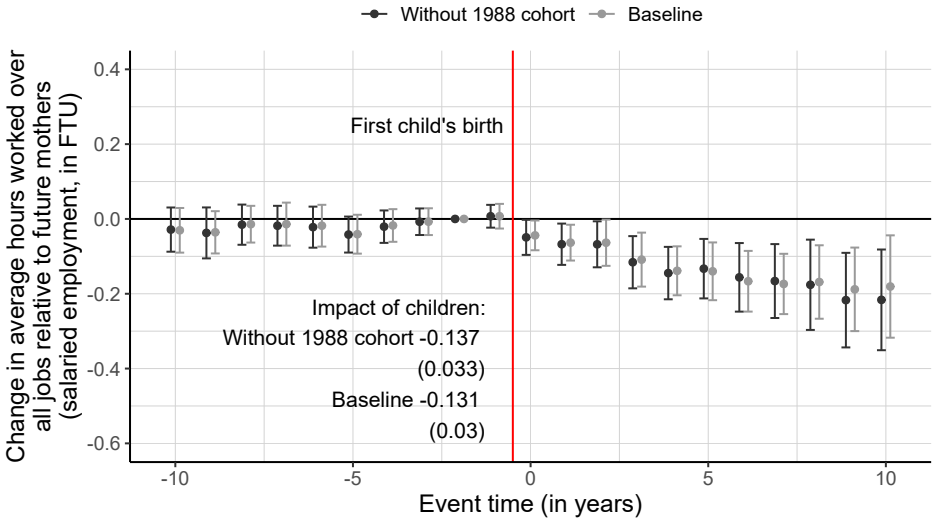
H.1 Left-censoring issue

Figure H.1 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals and hours worked over all salaried jobs – without hospital nurses who began their careers before 1989

(a) Hours worked as a hospital nurse

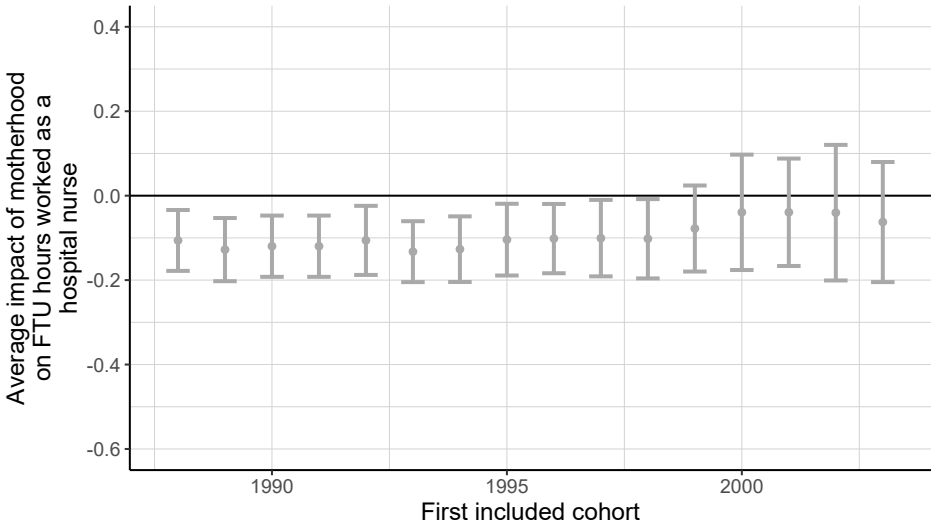


(b) Hours worked over all jobs



Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units, by time since first child's birth. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

Figure H.2 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals – varying restrictions on the estimation subsample

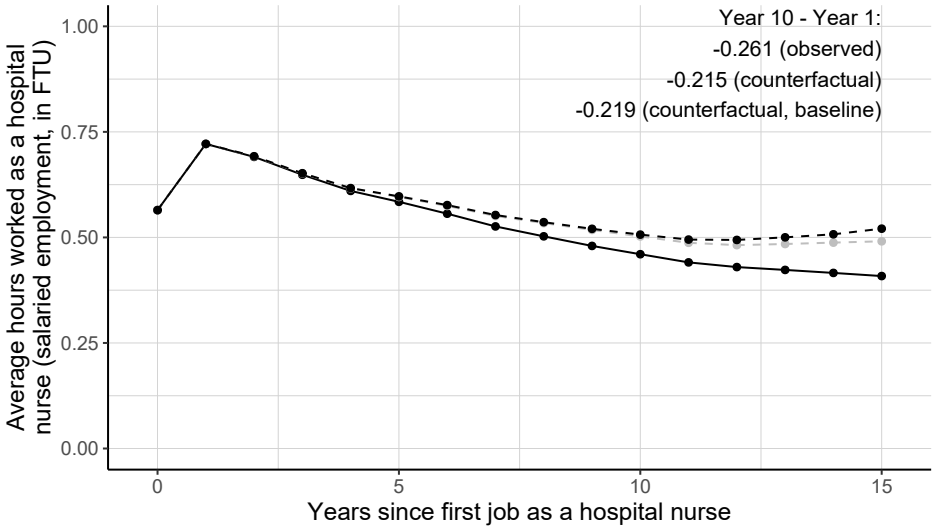


Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units, by first included cohort (first year as a hospital nurse). Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

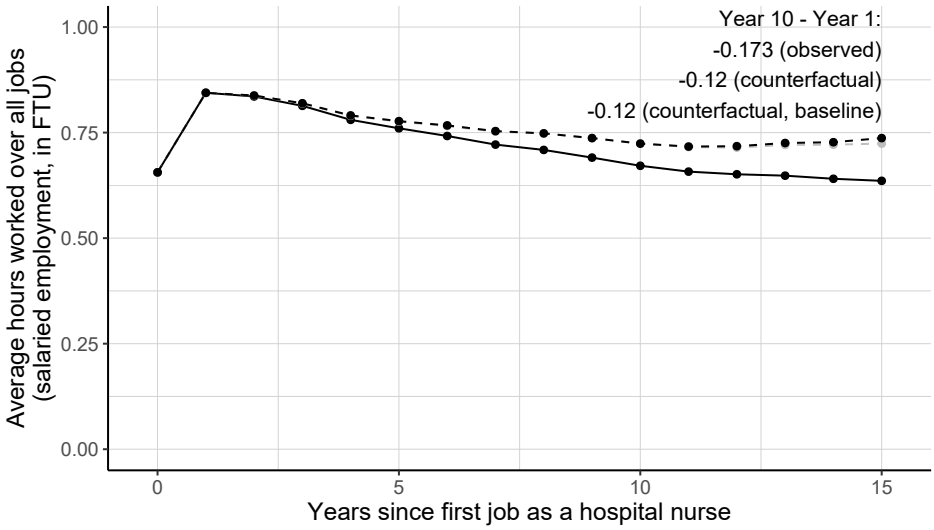
Source. Insee, DADS-EDP panel.

Figure H.3 – Contribution of children to the lifecycle profile of nurses' labor supply: total labor supply in the salaried sector – without hospital nurses who began their careers before 1989

(a) Hours worked as a hospital nurse



(b) Hours worked over all jobs

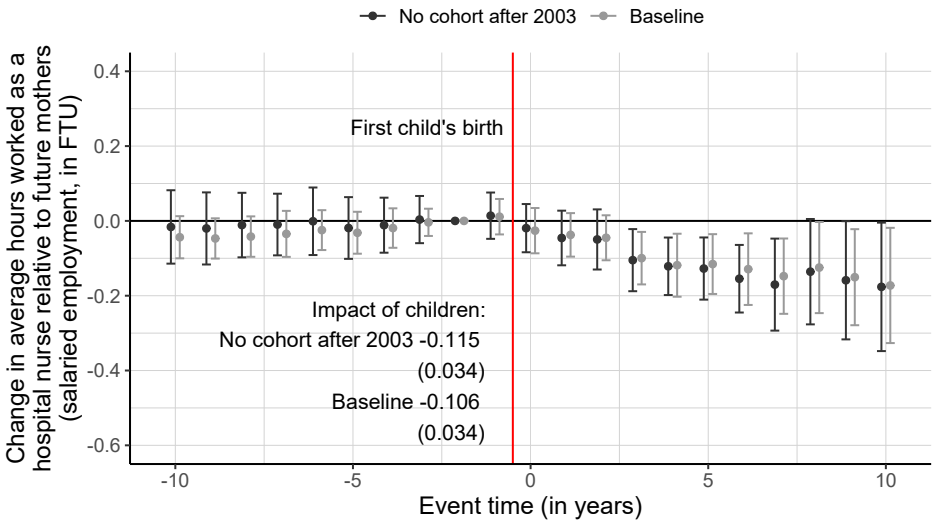


Realized and counterfactual average hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units, by time relative to the first qualified healthcare worker job at a hospital. Hours worked as a hospital nurse are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). The counterfactual profile implied by the baseline event-study estimates appears in grey dashed lines.
Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.
Source. Insee, DADS-EDP panel.

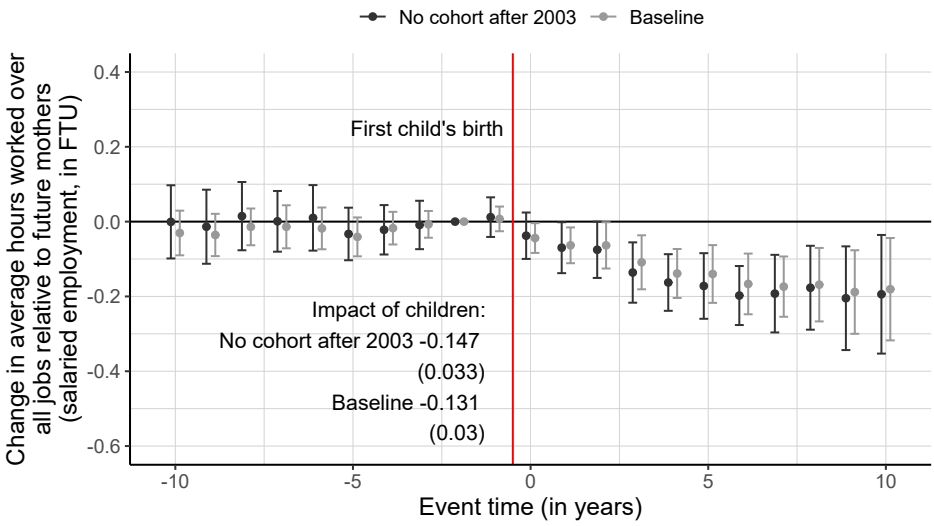
H.2 Right-censoring issue

Figure H.4 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals and hours worked over all salaried jobs – without hospital nurses who began their careers after 2002

(a) Hours worked as a hospital nurse

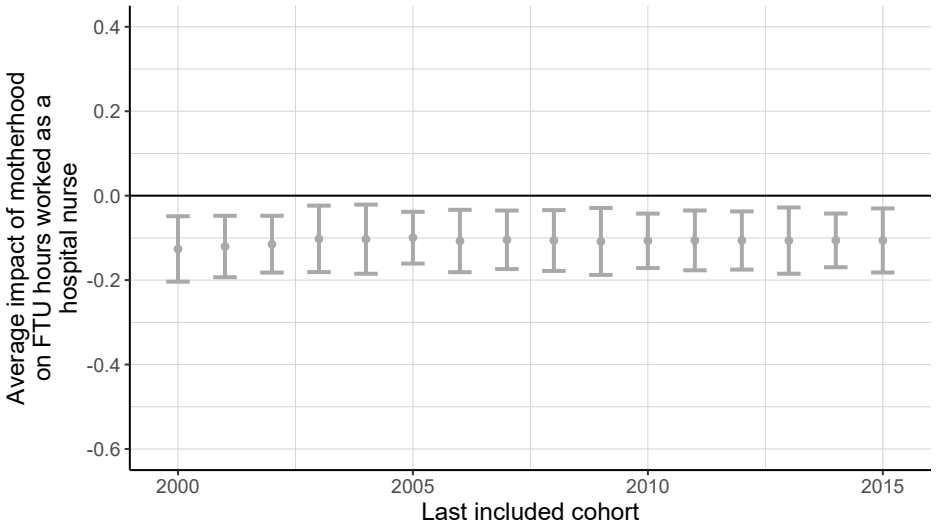


(b) Hours worked over all jobs



Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units, by time since first child's birth. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

Figure H.5 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals – varying restrictions on the estimation subsample

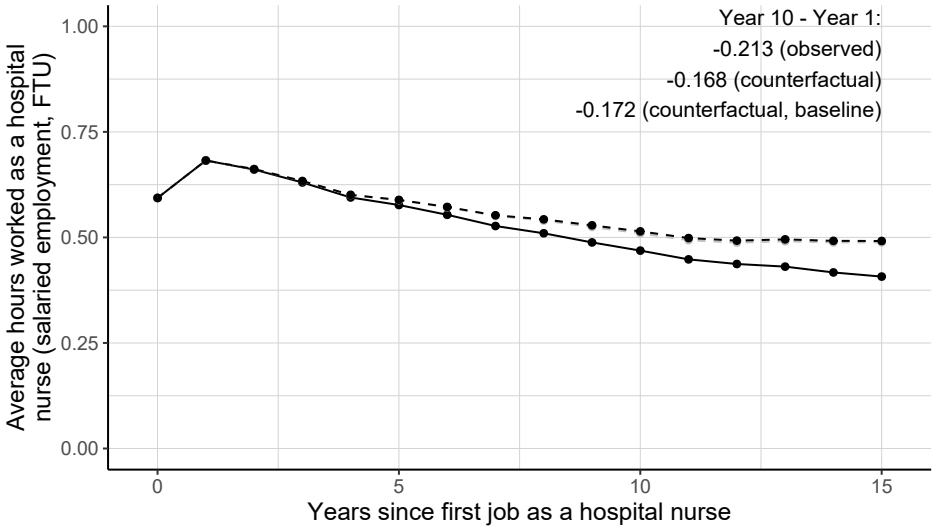


Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units, by last included cohort (first year as a hospital nurse). Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.

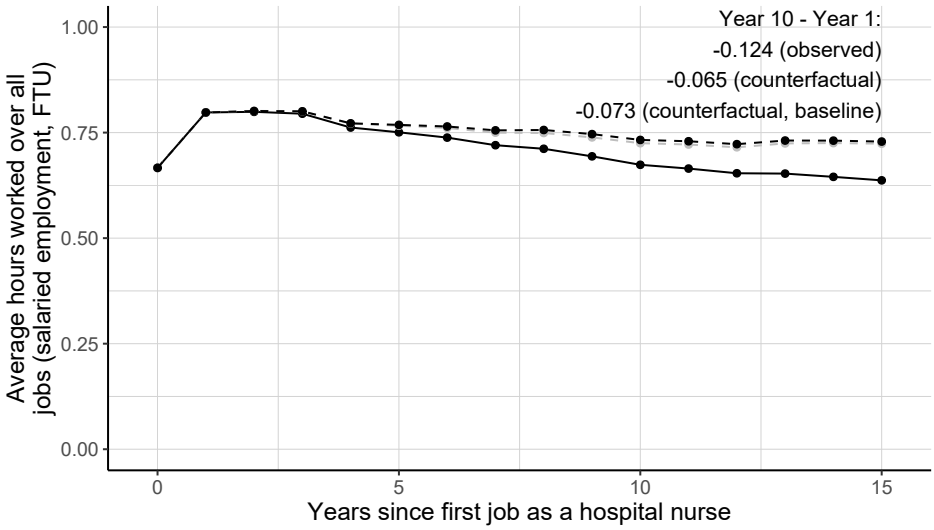
Source. Insee, DADS-EDP panel.

Figure H.6 – Contribution of children to the lifecycle profile of nurses' labor supply: total labor supply in the salaried sector – without hospital nurses who began their careers after 2002

(a) Hours worked as a hospital nurse



(b) Hours worked over all jobs

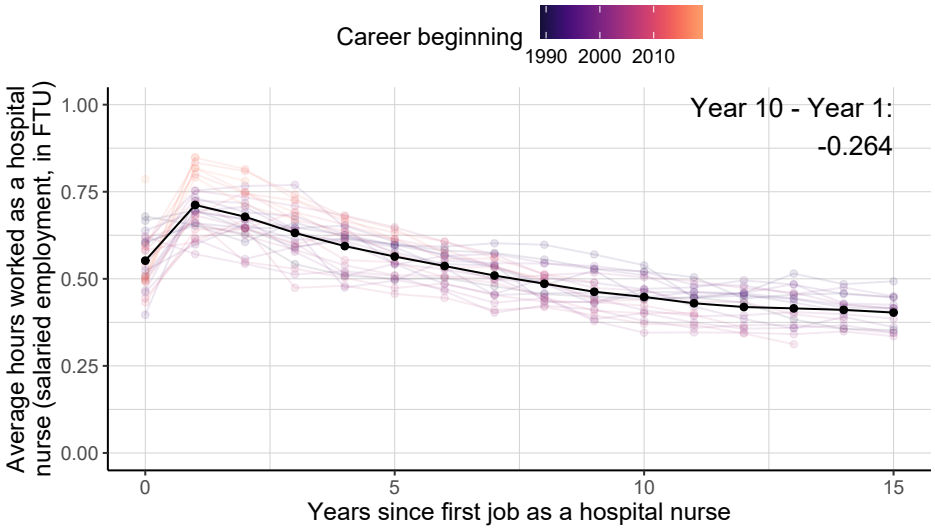


Realized and counterfactual average hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units, by time relative to the first qualified healthcare worker job at a hospital. Hours worked as a hospital nurse are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). The counterfactual profile implied by the baseline event-study estimates appears in grey dashed lines.
Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.
Source. Insee, DADS-EDP panel.

H.3 Hours worked measurement

H.3.1 Inclusion of maternity leaves

Figure H.7 – Lifecycle profile of hospital nurses' labor supply: nursing labor supplied to hospitals, hours worked set to 0 during maternity leaves



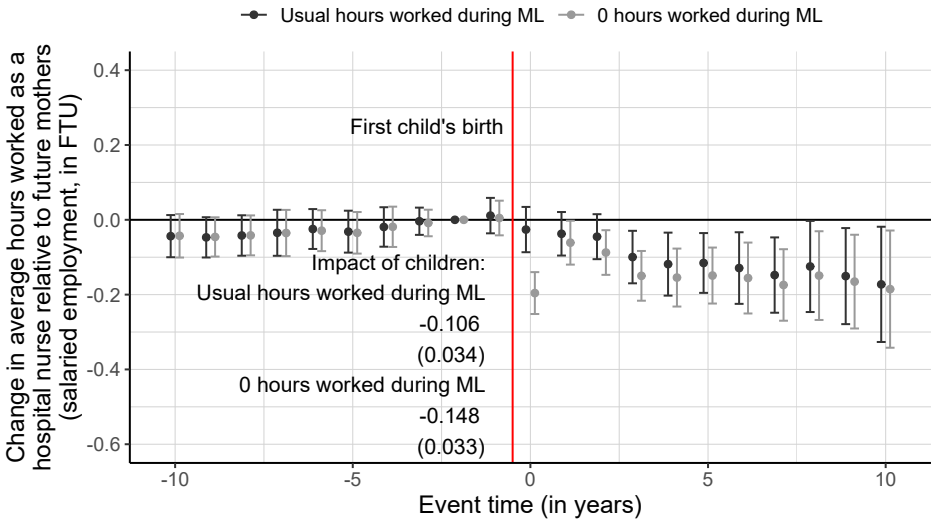
Average hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on holding a hospital nurse position, but incorporate the participation margin (0 hours worked). Hours worked are set to 0 during the imputed duration of maternity leaves (see Appendix C).

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

Source. Insee, DADS panel.

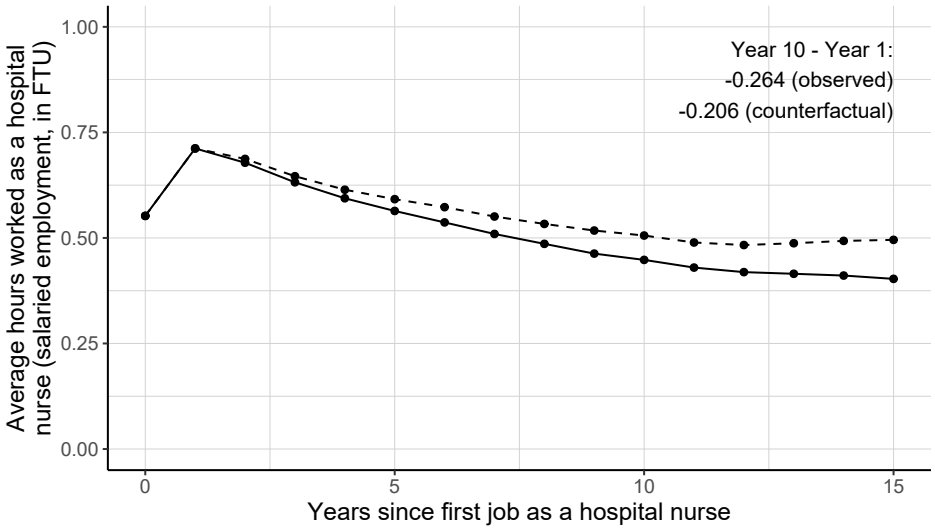
H.3.2 Availability of hours work data

Figure H.8 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals, comparison with the results when hours worked are set to 0 during maternity leaves



Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse, in full-time units by time since first child's birth. Hours worked are not conditional on working as a hospital nurse, but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

Figure H.9 – Contribution of children to the lifecycle profile of nurses' labor supply: nursing labor supplied to hospitals, hours worked set to 0 during maternity leaves



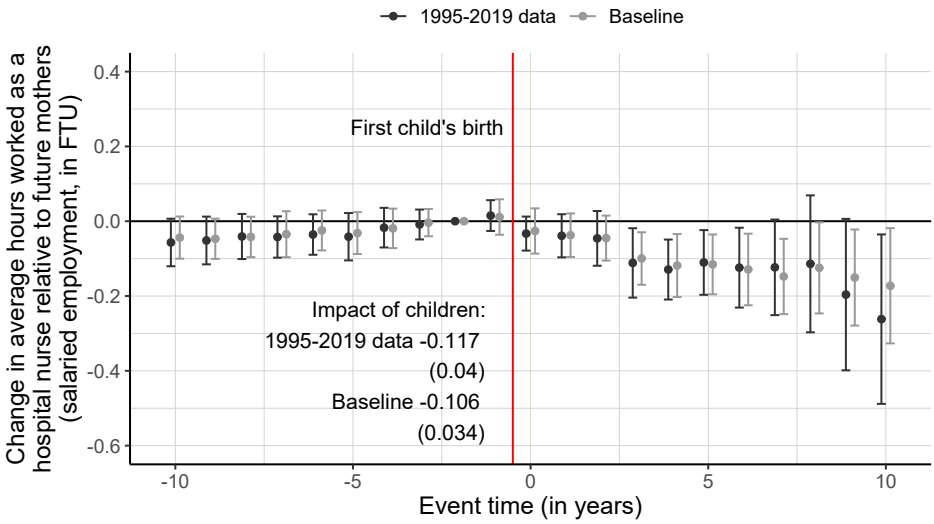
Realized and counterfactual average hours worked as a hospital nurse, in full-time units, and share working as a full-time or part-time hospital nurse, by time relative to the first qualified healthcare worker job at a hospital. Hours worked are not conditional on holding a hospital nurse position, but incorporate the participation margin (0 hours worked). Hours worked are set to 0 during the imputed duration of maternity leaves (see Appendix C).

Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.

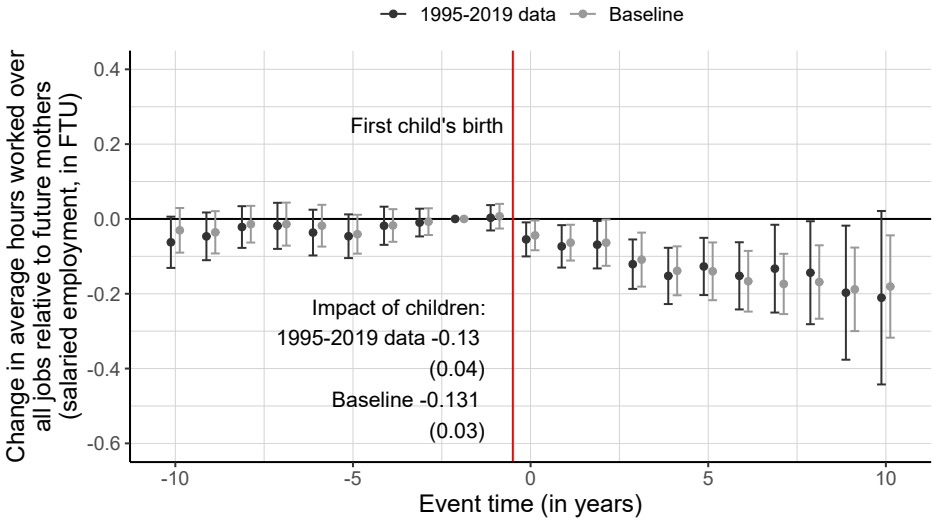
Source. Insee, DADS-EDP panel.

Figure H.10 – Event-study estimates of the impact of children on mothers' labor supply: nursing labor supplied to hospitals and hours worked over all salaried jobs – 1995-2019 time-period

(a) Hours worked as a hospital nurse



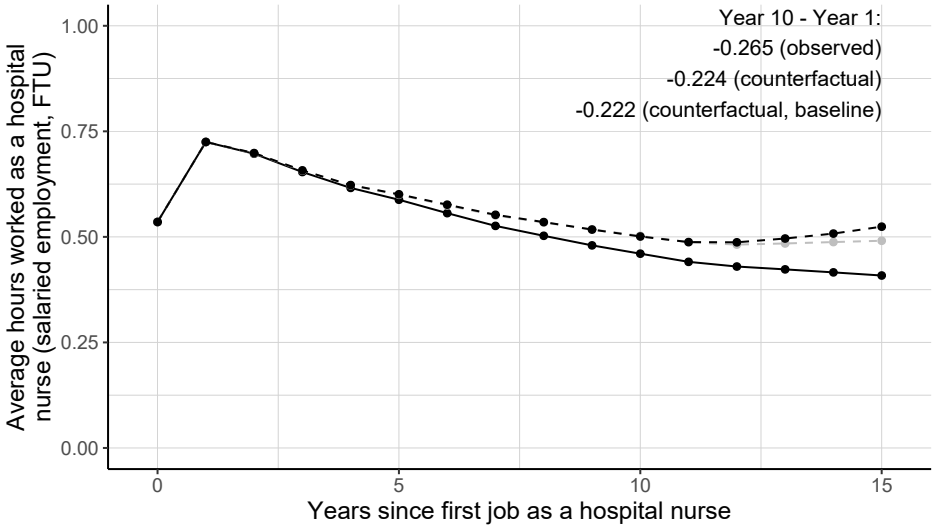
(b) Hours worked over all jobs



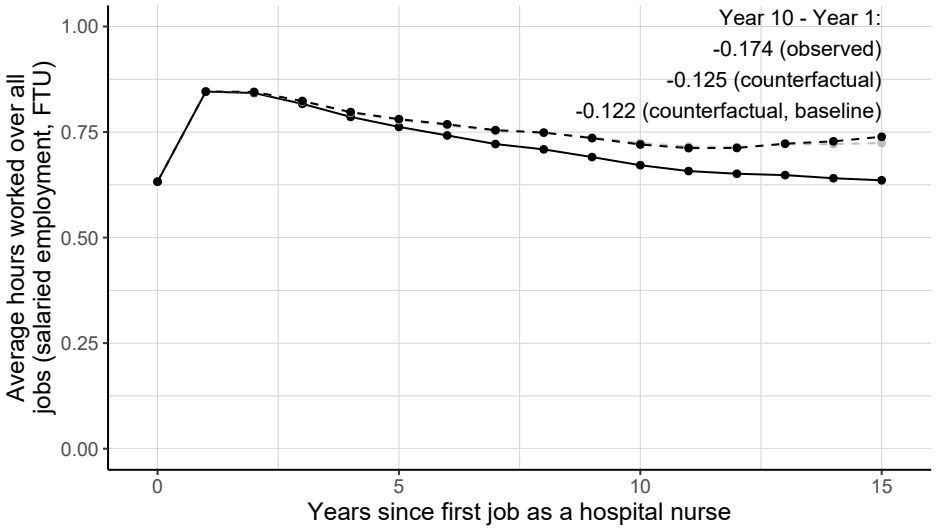
Event-study estimates of the impact of children on mothers' hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units, by time since first child's birth. Hours worked as a hospital nurse (over all salaried jobs) are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). Standard errors are clustered at the individual level and estimated by bootstrap with 200 replications.
Source. Insee, DADS-EDP panel.

Figure H.11 – Contribution of children to the lifecycle profile of nurses' labor supply: total labor supply in the salaried sector – 1995-2019 time-period

(a) Hours worked as a hospital nurse



(b) Hours worked over all jobs



Realized and counterfactual average hours worked as a hospital nurse and over all jobs in the salaried sector, in full-time units, by time relative to the first qualified healthcare worker job at a hospital. Hours worked as a hospital nurse are not conditional on working as a hospital nurse (salaried employment), but incorporate the participation margin (0 hours worked). The counterfactual profile implied by the baseline event-study estimates appears in grey dashed lines.
Note. Data on individuals who got their first hospital nurse job in 1988 or before are omitted from the computation.
Source. Insee, DADS-EDP panel.

I Hospital-level dynamics

I.1 Outflows and part-time transitions dynamics

To assess the dynamics of outflows and part-time transitions at the hospital level, Figure I.1 presents the autocorrelation and partial autocorrelation functions of hours lost due to hospital nurses leaving their jobs or transitioning to part-time schedules, after demeaning with hospital and year fixed effects. Outflows are correlated from one year to the next, but this serial correlation dissipates over longer time spans. This suggests that hospital-level surges in outflows are largely transitory and unlikely to reflect persistent changes in workplace quality.

For part-time transitions, hospital-level shocks appear slightly more persistent, as autocorrelation coefficients fade out after five years. This pattern may reflect changes in management attitudes toward part-time work or peer effects in fertility and labor supply decisions among hospital nurses. However, even in this case, autocorrelation remains limited, falling below 10% in absolute value for time spans beyond one year. Treating these shocks as transitory thus appears reasonable as a first approximation.

I.2 Transmission to overall nursing hours

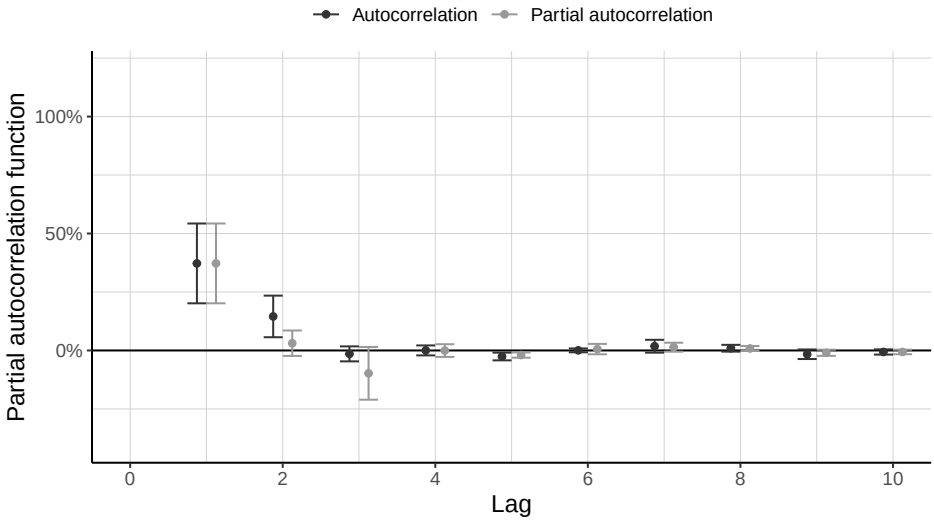
To analyze the dynamics of how these individual decisions affect hospital-level nursing hours, I consider a variation of the baseline regression:

$$\begin{aligned} & \underbrace{H_{j,t+k+1} - H_{i,t+k}}_{\text{Future (Past) change in nursing hours}} \\ = \; & \underbrace{\beta \sum_i (1 - f_{i,t+1} - p_{i,t+1}))(f_{i,t} + p_{i,t}) h_{i,j,t}}_{\text{Current outflows}} \\ & + \underbrace{\gamma \sum_i (f_{i,t+1} - p_{i,t+1}))(1 - f_{i,t} - p_{i,t}) h_{i,j,t+1}}_{\text{Current FT to PT transitions}} \\ & + \lambda_j + \mu_t + \epsilon_{j,t} \end{aligned} \tag{15}$$

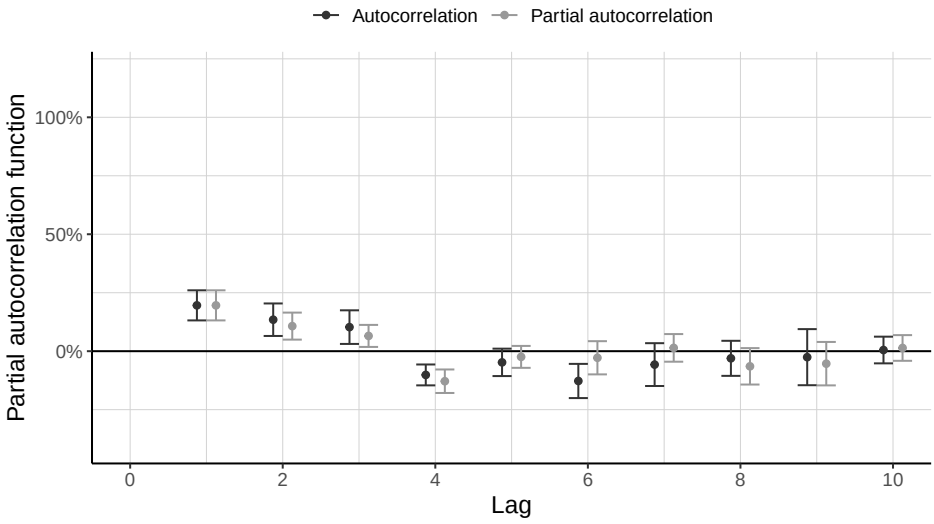
with k an integer. These regressions make it possible to (i) test whether current outflows and part-time transitions are associated with past changes in nursing hours (when $k < 0$), providing a useful placebo test for the paper's approach; and

Figure I.1 – Outflows and part-time transitions dynamics at the hospital level

(a) Outflows



(b) Part-time transitions

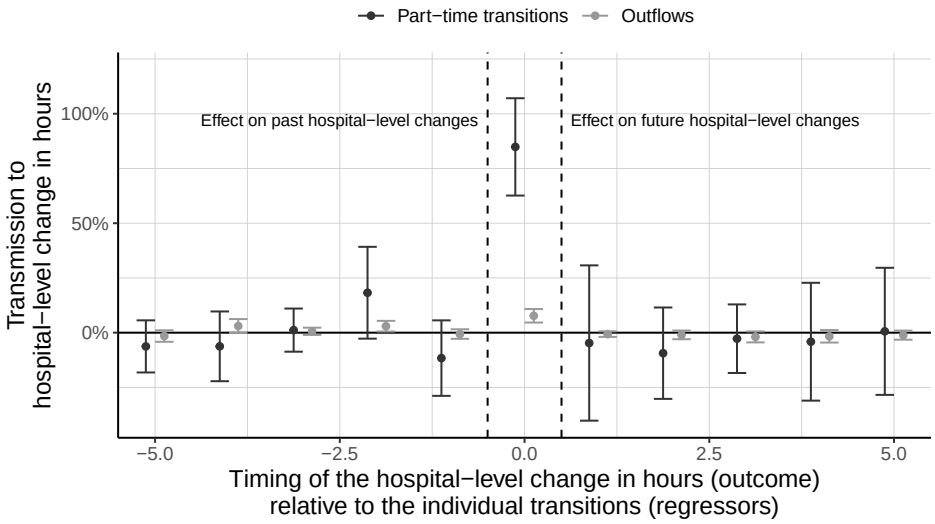


Estimates of the autocorrelation, and partial autocorrelation functions of hospital-level outflows and part-time transitions. Dynamics are considered after demeaning using hospital fixed effects, as well as year fixed effects. Observations with overall relative changes in nursing labor supply below (over) the first (last) decile of the annual distribution are excluded from the estimation. Standard errors are clustered at the hospital level.
Source. Insee, DADS.

(ii) examine whether current individual labor supply decisions influence future changes in nursing hours (when $k > 0$). The latter helps assess whether hours lost due to these events might be offset with some delay rather than immediately.

Figure I.2 presents the estimated coefficients for $k \in [\![-5, 5]\!]$. For $k = 0$, these coefficients correspond to those reported in Table 5. When $k < 0$, they test whether current outflows and part-time transitions predict past changes in overall nursing hours at the hospital level. The results indicate that this is not the case, reinforcing the idea that, conditional on hospital and year fixed effects, current outflows and part-time transitions can be considered plausibly exogenous shocks. When $k > 0$, the coefficients assess whether these transitions predict future changes in hospital-level nursing hours, which would suggest that hospitals offset these losses with some delay due to labor market frictions. However, none of the estimated coefficients are statistically different from zero. This suggests that the hospital-level response to individual transitions is effectively captured by the short-run effects examined in Section 7.

Figure I.2 – Outflows and part-time transitions dynamics at the hospital level



The table displays the estimates of regressions of past and future overall hospital-level supplies of nursing labor, and related adjustment margins, on the yearly change in hospital-level nursing hours due to hospital nurses moving from full-time to part-time schedules, and hospital nurses leaving the hospital workforce. All regressions include hospital fixed effects, as well as year fixed effects. Observations with overall relative changes in nursing labor supply below (over) the first (last) decile of the annual distribution are excluded from the estimation. Standard errors are clustered at the hospital level.
Source. Insee, DADS.