I am a labor economist focused on understanding why women earn substantially less than men despite decades of progress in educational attainment and labor force participation. My work highlights parenthood as a crucial factor driving a wedge between male and female earnings. I study how children affect women's careers both before and after they arrive. My research makes three contributions. First, I provide causal evidence that the career effects of motherhood depend on whether births occur at planned or unplanned times. Second, I show that women's post-childbirth career choices cannot be understood from wages alone, because women place substantial value on workplace amenities related to temporal and spatial flexibility and mothers use these amenities to invest in time with children. Third, I show that expectations about future family formation affect women's careers long before they become mothers, through employer expectations, career advice, and mentorship networks.

The causal impact of motherhood

In a paper conditionally accepted at the *American Economic Review,* "**The Labor Market Returns to Delaying Pregnancy**," I, together with Juanna Joensen, Eva Johansen, and Gregory Veramendi, study how children impact women's careers. How motherhood affects women's careers has long been a central question in labor economics, but researchers have struggled to answer it. The challenge arises because if motherhood is associated with large earnings changes, we might expect women to time their births to mitigate earnings losses. Women may time births to avoid critical investment periods, such as completing a degree, waiting until they receive a promotion, etc. In this case, the impact of endogenously timed births on women's careers gives an incomplete picture of tradeoffs women face when considering children over the lifecycle. To better understand these tradeoffs, we study unplanned pregnancies.

Comparing the universe of Swedish women in 2005-2011 who become pregnant soon after purchasing a long-acting reversible contraceptive (LARC) to those for whom the LARC works as intended, we find that unplanned pregnancies have substantial, negative, and lasting consequences on the careers of previously childless women. Seven years after the LARC, earnings are 15% lower than if the unplanned pregnancy had not occurred. In the long term, earnings losses are driven by changes in the skills women accumulate following an unplanned pregnancy, rather than by changes in hours or employment. At the end of this period, the probability of working in an occupation with higher skill requirements is almost 20% lower than if the unplanned pregnancy had not occurred. Turning to other measures of well-being, we find that unplanned pregnancy increases fertility (beyond the focal birth) but has no significant impact on anti-anxiety or anti-depression prescriptions.

These reduced-form estimates of the impact of unplanned *pregnancy* on labor market outcomes are challenging to compare to existing estimates of the impact of *childbirth*, which are generally estimated using event-study research designs centered around the birth. To isolate the causal effect of children, we develop a dynamic instrumental variables (IV) strategy to estimate effects of children which vary with child age, accounting for the fact that women in the control group have children later as well as non-compliance with treatment assignment via abortion. This methodology could be applied to many other settings (for example, in health interventions) in which treatment effects vary with time since treatment, and non-compliance with treatment assignment varies over time. Our results suggest that having an unplanned one- to six-year-old is

associated with income reductions of 20-30% relative to not having children, approximately the size of the raw gender earnings gap in Sweden in this period and larger than event-study associations between childbirth and earnings. Younger women and women enrolled in an educational program at the time of the unplanned pregnancy see the largest earnings losses.

We assess whether our findings generalize beyond the subset of women using LARCs, as these women may be especially motivated to delay pregnancy. First, we examine unplanned births among women using Short-Acting Reversible Contraceptives (SARCs)—primarily oral birth-control pills. We classify a birth as unplanned if the woman filled a new prescription for oral contraceptives shortly after conception, or if she sought an abortion consultation but decided not to terminate the pregnancy. These alternative classifications yield the same conclusion: unplanned births lead to substantial and persistent career impacts with point estimates similar in magnitude to our main results among LARC users. In contrast, the impact is less than half the size of our baseline estimates of earnings losses due to "planned" births—estimated among women undergoing In Vitro Fertilization (IVF) treatments—and unplanned births among women who already have children. Further, planned and higher-order unplanned births have no discernible impact on women's occupations. Taken together, our research provides new evidence on how children shape women's careers. The contrast between planned and unplanned first births suggests that women mitigate the labor market effects of motherhood through birth timing. The smaller effects of higher-order unplanned births suggest that motherhood induces a persistent shift in lifestyle, after which additional children have more limited labor market effects.

Motherhood and amenities

Unplanned pregnancies change the trajectories of women's careers, especially for younger women. Less is known about whether these changes reflect external constraints or internal shifts in preferences. On the one hand, motherhood may change women's preferences, aspirations, or desire to spend time with their children. On the other hand, school schedules, childcare availability, and work schedules may make it difficult for women to combine children with their prior career plans. In new work "**Remote Work as Childcare: Implications for Parental Earnings,**" with coauthors Dmitri Koustas, Ithai Lurie, and Stephanie Karol, I study the impact of a technological change that had the potential to revolutionize the relationship between children and women's careers. Remote work breaks the physical tie between workers and workplaces. To the extent that parents are constrained in their potential productivity by the physical demands of childrearing—including juggling doctors' appointments, sick children, and misaligned school and work schedules, remote work may uniquely benefit parents. However, by allowing parents to perform paid work from home, remote work also reduces their incentive to purchase childcare services in the market.

In partnership with the IRS and U.S. Treasury Department, we leverage previously unstudied data on claims of childcare tax credits in the US to understand the relationship between earnings and childcare following the pandemic. Use of paid childcare has declined by about 10% relative to pre-pandemic years across a variety of surveys, as well as in our administrative data on childcare purchases reported to the IRS. In aggregate, we find that most of the decline in the use of paid childcare occurs among families in which the mother has a job that can be done from home. In an econometric decomposition, this factor outweighs all others—grandparental availability, universal

pre-k expansions, changes in the price of childcare, and fathers' characteristics—in explaining aggregate changes in the use of paid childcare.

Because these aggregate patterns may reflect endogenous sorting across jobs and benefits, we next compare workers' outcomes using variation in access to remote work predicted by their pre-pandemic firm and occupation. We match information on the remote-work policies and other characteristics of almost five thousand firms with tax records. Our research design studies the paths of individuals based on their firm and occupation in 2019, the year before remote work arrangements became prevalent due to the global pandemic. Consistent with the aggregate evidence, we estimate that remote work is associated with a 13 percent reduction in the use of paid childcare through 2024 among mothers of children 0-13 years old who in 2019 had an occupation suitable to remote work. The declines are smaller for fathers compared to mothers and for those in occupations less suitable to remote work, while parents of school-age children see the largest declines in paid childcare use. Turning to employment outcomes, we find that remote work is associated with greater retention and lower earnings, but equally so for parents and non-parents. Pooling across years and comparing parents to non-parents, we can rule out even small wage differences associated with access to remote work for parents—point estimates of the relative impact of remote work access on mothers' earnings are zero, relative to non-mothers, and we can rule out effects larger than 1.5% or smaller than -1.5%. While this major technological change had the potential to reduce conflict between work and parenting, it ultimately caused a shift towards more time with children among those who had them, and left the earnings gap associated with motherhood unchanged.

Earnings alone, however, give an incomplete measure of compensation when workers value job amenities. If mothers accept lower wages in exchange for greater temporal or spatial flexibility, then wages will understate the benefits of workplace amenities. This motivates a broader measure of compensation that incorporates workers' willingness to pay for amenities. In "**Gender Differences in Amenities, Wages, and Firm**," joint with Nabanita Datta Gupta, Kerstin Holzheu, and Kristian Stamp Hedeager, we explore the possibility that women are paid in amenities rather than wages, by combining survey data on firm-level amenities—including the ability to set one's hours, ability to work from home, and whether the job includes evening work—with administrative and firm account data in Denmark. We find that when they become mothers, women move to firms that are less desirable according to two metrics. First, we extract a firm-specific pay component using a wage decomposition across all workers and firms, finding that women move to lower-pay firms after their first birth. Next, we extract a revealed-preference metric of relative firm popularity following Sorkin (2018), but separately by gender. We find that, after their first birth, women move to firms that men prefer less. However, consistent with a strong role of compensating differentials, controlling for the information we have on amenities at those firms almost eliminates this sorting to lower-pay firms and away from firms preferred by men.

To quantify the value of these amenities directly, we then conduct an additional vignette study of workers in which we elicit WTP for the amenities in our LFS data. Unlike many purely hypothetical studies, we ensure that workers are incentivized to truthfully reveal their preferences because they are sent information about vacancies which may interest them based on their selections. We find that amenities are important in explaining the gender pay gap: the gender gap in total compensation, inclusive of the value of amenities related to workplace flexibility, is 16

percentage points, almost twenty-five percent smaller than the baseline gender earnings gap. The WTP of mothers for temporal flexibility is larger than that of non-mothers, reinforcing a decline in total compensation after childbirth.

A key unresolved question is whether differences in mothers' and fathers' willingness to pay for workplace amenities reflect labor-market constraints or preferences. Mothers may avoid evening work because childcare is unavailable, or they may prefer schedules that allow them to spend more time with their children. Across all the amenities we study, we find no relationship between grandparental proximity (measured in the year before childbirth) and the post-childbirth changes in these amenities. This matters because, as I show in "**Remote Work as Childcare: Implications for Parental Earnings**," there is a positive association between grandparental distance and use of paid childcare. Women work less in the evening after having children, but this decline is independent of grandparental proximity. This result, along with our findings on the impact of remote work on women's careers, suggest that overall, a technology that has the potential to mitigate the impact of children on women's careers is unlikely to close the gender earnings gap unless women's preferences become more similar to men's.

The effects of children before motherhood

In the data, women, and especially mothers, earn substantially less than men. Gender differences in experience, schooling, and occupation do not fully explain these gaps, which also appear within firm-by-occupation cells (see for example my paper "**The labor market gender gap in Denmark: Sorting out the past 30 years**" joint with Rune Lesner and Rune Vejlin published in *Labour Economics)*. Many explanations for these differences have been suggested: in laboratory experiments, women are less likely to ask for a raise (Exley, Niederle, and Vesterlund, 2020); motherhood may interfere with working long hours (Goldin, 2014); women may have less bargaining power within the firm, perhaps due to differences in outside options (Card, Cardoso, and Kline, 2017). My paper "**Motherhood and the Gender Productivity Gap**," published in the *Journal of the European Economic Association,* studies how much of the gender pay gap can be explained by differences in output generated by men and women. Simply put, are women producing as much as men for the firm but being paid less? Using Danish matched employer-employee data, I compare the relative pay of men and women to their relative productivity as measured by production function estimation. I find that the gender "productivity gap" is 8 percent, implying that almost two-thirds of the residual gender wage gap is due to productivity differences between men and women. This suggests that differences in pay are largely explained by differences in work, so gender differences in the propensity to ask for a raise given the same performance can explain only a small part of the total residual gender pay gap.

Motherhood plays an important role, yet it also reveals a puzzle: the pay gap for mothers is entirely explained by productivity, whereas the gap for non-mothers is not. In addition, the decoupling of pay and productivity for women without children happens during their prime-childbearing years. These estimates are robust to a variety of specifications for the impact of observables on productivity, and robust to accounting for sorting of women into less productive firms using a control-function approach. Why are childless women paid less than men, despite being as productive as men? My results are consistent with employers statistically discriminating and reducing the wages of women without children in anticipation of motherhood-related interruptions

in the near future. Childless women whom I observe having children within four years and those childless women who are predicted, based on a rich set of observable characteristics, to have children within four years are paid less relative to productivity compared to childless women who do not have children and are not expected to have children in the near future. This research suggests that children affect the productivity of women after they arrive but affect the pay of women even before they arrive.

My next stream of research turns to further understanding the impact children may have on women's careers well before these children arrive. In particular, why do women choose the occupations that are more family friendly before they themselves experience the challenges of combining work and childcare?

In work with Melanie Wasserman which has been conditionally accepted at the *Review of Economic Studies* titled "**Informed Choices: Gender Gaps in Career Advice**," we provide the first causal evidence that gender affects the information an individual receives about careers. We conduct a large-scale field experiment in which real college students seek career information from professionals and find that professionals raise work-life balance issues twice as often when asked the same question by a female student relative to a male student. To identify the causal effect of gender on information received, we randomize whether each of the 10,000 professionals in our sample is contacted by a male or female student and the pre-formulated question each professional is asked. The randomization ensures that student gender is unrelated to professionals' characteristics and the wording of questions. In addition, the online setting allows us to strictly limit which student characteristics are observed by professionals, ensuring that the students are perceived as otherwise similar, aside from their gender. We find that whether or not students specifically ask about work/life balance, student gender affects professionals' provision of this information.

To better understand the source of differences in the information professionals provide to male vs. female students, we conduct an online survey and vignette study of 2,500 professionals. We find that professionals do not provide information in a perfectly altruistic manner, intentionally departing from the preferences of students. Childcare considerations are cited as a major reason for discussing work/life balance with young women, but less so for young men. Finally, using an information intervention among hundreds of college students, we show that information on work/life balance reduces female students' interest in time-intensive positions. Together, the evidence suggests that societal expectations that women will experience work/family trade-offs influence the information transmitted to new labor market entrants, affecting their choices from the outset.

Next, we explore gender differences in students' search for mentorship and career advice. In a paper published in AEA Papers and Proceedings titled "**Do Male and Female Students Use Networks Differently?**" Melanie Wasserman and I use novel administrative data from a student-alumni professional networking website to study gender differences in student network usage, holding network access fixed. Our data include all messages sent on the networking platform, and we can look not only at message attributes such as length or characteristics of senders and recipients, but also the text of the message itself. Focusing on messages sent by students to alumni, we document that male and female students network similarly, in terms of both the number of

messages sent and the specific questions asked. Furthermore, there are only small gender differences in question tone. Despite the similarity in many aspects of the messages sent by male and female students, there is one substantial difference: female students disproportionately reach out to female mentors. In another paper with Melanie Wasserman, titled "**Does Information Affect Homophily?**" published in the *Journal of Public Economics,* we study the source of this same-gender preference in mentoring. The observational data also suggest that this propensity to reach out to female mentors may come at a cost: female mentors are 12 percent less likely than male mentors to respond to messages sent by female students.

To causally identify students' preferences for mentor characteristics, we implement a hypothetical choice preference elicitation survey that incentivizes truthful responses. In the survey, students are shown pairs of hypothetical mentors' profiles and asked to select which mentor they prefer (Wiswall and Zafar, 2018). We find that female students are willing to trade off occupational match in order to access a female mentor. However, this willingness to pay for female mentors declines to zero when information on mentor quality is provided. The evidence suggests that female students use mentor gender to alleviate information problems, but do not derive direct utility from it. These results have implications for the design of initiatives that match on shared traits: if it is not costly to provide additional information on the characteristics students value (primarily friendliness and knowledge of job opportunities), then programs may generate substantial efficiency gains by providing this information to students and expanding the mentor pool rather than restricting the mentor pool to female mentors.

Related work on fertility and firms

I also have a new paper "**Post-*Roe* Planning: The Effect of *Dobbs v. Jackson* on Contraceptive and Sterilization Choices,"** joint with Daisy Lu, a PhD student at Harris. We study the relative impact of the 2022 *Dobbs* decision on both men's and women's decisions to undergo sterilization procedures, as well as women's choice of birth control. We find overall modest effects of the ruling in our population of privately insured individuals. Though we do see substantial increases in the rate of sterilization for both men and women and in the rate of LARC use for women in the months immediately following the *Dobbs* decision, we do not find lasting effects on the sterilization rate or initiation of LARCs. The magnitude of the cumulative effects is consistent with a perception that the cost of an abortion rose by about $45 post-*Dobbs*, and is driven by younger women, women without children, and women who were using their SARC birth control irregularly, all of which is consistent with a moral hazard response in precautions against unplanned pregnancy among those at highest risk of unplanned pregnancy.

Motherhood has a large impact on careers for Danish women. In my paper under revision for *Industrial Relations*, "**The effect of parental leave extensions on firms and coworkers,**" I ask how time away from the labor force among new mothers affects employers. This question is important because employers may respond to costly work-interruptions by reducing women's wages in anticipation of motherhood (as discussed in my other work) and also because they may assign women to tasks within the firm which are less affected by work interruptions, but which also may be otherwise less lucrative—the "mommy track." To identify the impact of work interruptions on employers, I study a Danish reform which extended the period of fully compensated parental leave by 22 weeks. The policy change imposed no direct costs on firms, was

retroactively applied and unanticipated, and so offers a unique setting in which to study the effects of major expansions of paid parental leave. The expansion has a negative effect on firm survival, but no effect on coworker earnings or other measures of firm financial health in the short or long run. Overall, this paper suggests that longer absences associated with the arrival of a new child lead to small disruptions for firms because maternal labor is concentrated in easily substitutable tasks.

Future Research

My future research will study how expectations, constraints, and household bargaining jointly shape fertility and women's careers. This agenda builds directly on my existing work. Across projects, I ask whether women's post-childbirth labor-market outcomes reflect constraints, inaccurate expectations, preferences over work and family time, and how these are shaped by spousal preferences and opportunities.

A project I'm particularly excited about is a large-scale survey that I and coauthors fielded in the Fall of 2023 of childless Danish men and women concerning their expectations around work and children. We can link our survey to administrative data on the realizations of individuals' labor market outcomes over the course of ten years, in which time most will have entered parenthood. This project seeks to understand what women believe the impact of motherhood will be on their careers, and how accurate they are. No existing dataset allows us to answer this question, and it has been exciting to craft a survey and generate data on this important topic. This research is funded by the Bill and Melinda Gates Foundation through the NBER Gender and Shocks grant, as well as a BFI Gender in the Economy grant, and is joint with Juanna Joensen, Greg Veramendi, Astrid Wurtz-Rasmussen and Basit Zafar.[1] Having built this survey infrastructure, we can re-interview our 24,000 respondents and introduce information interventions about fertility and parenthood. These experiments will help distinguish the role of information gaps from preferences in fertility decisions.

In a second project with Abi Adams and Stephanie Karol, I will study parenthood and household decision making at the very top of the income distribution using US administrative tax data to shed light on some of the basic questions in household economics. At the top of the income distribution, within-household income inequality is high, and female labor-force participation is low. We plan to use tax and divorce-law changes to study whether women's lower earnings and labor-market participation reflect unequal bargaining power, preferences for leisure, or preferences for time with children.

[1] With this team we have done a pilot version of some expectations questions in an AP/NORC poll faculty collaboration, and we introduced questions on this topic into the German socioeconomic survey (GSOEP) in 2022, which is discussed here: https://apnorc.org/projects/men-and-women-have-differing-views-on-who-handles-household-responsibilities-and-the-impact-of-having-a-child-on-parents-careers/

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