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Supplementary Information for

The Persistence of New Parents in Science and Engineering?

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This PDF file includes:

Supplementary text
Tables S1 to S2
Figs. S1 to S5

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Supplementary Information Text

Additional Methods and Materials Information

SESTAT Data

SESTAT is a comprehensive, nationally-representative system of data on scientists and engineers with college and advanced degrees. We applied and received a license for the restricted-use version of the SESTAT data files through the National Center of Science and Engineering Statistics (NCSES). We accessed the data via an online data enclave hosted by the National Opinion Research Council (NORC) at the University of Chicago.

We use the most recent SESTAT surveys available. SESTAT is the only nationally representative longitudinal data set with enough respondents employed in STEM to provide a sufficient sample size for this analysis. Other recent longitudinal data sets (e.g., the National Longitudinal Survey of Youth; the National Survey of American Families) have too few respondents who are STEM professionals to conduct a meaningful analysis of parenthood effects within STEM. In their study of parenthood effects on retention in academia, Mason et al. (2013) used NSF's Survey of Doctoral Recipients (SDR) which includes a large number of scientists and engineers. However, SDR only has data from STEM professionals with doctoral degrees. In contrast, SESTAT includes STEM workers across degree levels and employment sectors; doctoral recipients in academia make up only 6% of the SESTAT sample.

All analyses use replicate weights acquired from NCSES. Replicate weights provide appropriately weighted statistical output that takes into account SESTAT's complex survey design. We use the jackknife command in SAS to handle these weights because it is able to accommodate replicate weights with more than one multiplier.

Operationalization of Control Measures

The logistic regression models in the main document control for a number of demographic and employment factors that may impact respondents' likelihood of remaining in STEM or leaving for other paths. These controls include respondents' age (in years), highest level of education (BS, MS, PhD as separate dichotomous indicators [yes=1, no=0]), and whether they have a non-employed spouse or partner who presumably is available to take on more of the childcare responsibilities (yes=1, no=0). We also include indicators for race/ethnicity (respondents could indicate more than one): black, Hispanic, Asian, white, other nonwhite (yes=1, no=0). Finally, we control for respondents' work sector (dichotomous indicators for university, government, public sector, and private sector; yes=1, no=0), and their broad STEM field (computer and mathematical sciences, life sciences, physical sciences, or engineering, yes=1, no=0). Table 3 models include a control for whether new parents had an additional child during the study period (yes=1, no=0).

Descriptive Statistics

Tables S1 and S2 present weighted means and standard errors for new parents and childless respondents. Table S1 presents descriptive statistics for all respondents in each category and Table S2 includes only respondents in these categories who continued to work full-time in 2010 (whether in STEM or not). The rightmost column in each table presents the significance of two-tailed difference of means tests between new parents and childless respondents. Compared to childless respondents, new parents are less likely on average to

be white, to work in the university or government sectors, and to have only a bachelor's degree. New parents are more likely than childless peers to have a master's degree, to be younger, and to have a spouse or partner that does not work.

Career Trajectories of New Parents and Childless Respondents

To better understand the divergence of the career trajectories of new parents from their childless peers, we further compared these trajectories in supplemental analyses. First, we examined the proportion of new parents versus childless respondents who had left full-time STEM work each survey year. Figures S1 and S2 present the actual weighted proportions of new fathers and new mothers, respectively, who had left full-time STEM employment each survey year (solid lines). The figures also present the predicted proportion of childless respondents who had left full-time STEM employment each year, holding variation by education level, demographics, sector, and other controls constant (i.e., at the means for new fathers and new mothers, respectively). These predicted values for childless respondents are more directly comparable to the attrition rates of new parents because they standardize potential variation by demographics, education level, and other factors across the two groups. To produce these values, we ran logistic regression models predicting the likelihood each year that childless men and women would leave full-time STEM employment using the controls listed in Table 1. We then calculated the outcome of the regression equations holding the independent variables at their respective means for new mothers and new fathers. These values are plotted as dotted lines in Figures S1 and S2.

Consistent with the multivariate results in Table 1, these figures indicate that an attrition gap between new parents and otherwise similar childless respondents emerges in 2006, immediately after the birth or adoption of new parents' first child. The biggest divergence between new parents and childless respondents differs slightly by gender. For women, this divergence happens in 2006, immediately after the birth or adoption of their first child, and remains relatively constant. For men, the biggest divergence is a few years' delayed, not peaking until 3-5 years later. We speculate that this delay in the attrition gap among men is likely the outcome of fathers' negotiation of childcare with their partners; given gendered norms around childcare discussed in the main text, the possible incompatibility of full-time STEM jobs with these caregiving responsibilities may not set in for most fathers until a few years after they become parents.

Second, we conducted supplemental analyses to understand the role family responsibilities may play in why parents and childless individuals leave STEM. We turned to a set of questions that asked a subset of respondents—those who left STEM and work in non-STEM jobs in 2010 they report are "not related" to their highest degree—their reason for changing career paths. We examine questions that asked respondents to choose from a variety of factors to explain why they were not working in a field related to their degree in 2010. "Family-related reasons" was one of the reasons they could have selected, along with changing career interests, job location, pay and promotion, and working conditions. Because these questions were not asked of all respondents, further restricting the sample size, we pooled all new parents who had their first child during the study period (2003-2010) rather than between only the first and second survey waves.

Figure S3 presents results on two measures: (a) the proportion of childless respondents and new parents who said that "family-related reasons" was *a* factor in their career change, and (b) respondents who reported that "family-related reasons" was one of the *top two reasons* for this change. The figure presents means pooled by gender and separately for women and men. Here, the difference by parenthood status is stark: 49% of new parents—71% of new mothers and 38% of new fathers—reported that family was one

of the reasons for their career change. Only 4% of childless respondents (5% of women, 4% of men) did so. Similarly, 48% of new parents—69% of new mothers and 36% of new fathers—said family was one of the top two most important reasons for this change, compared to only 5% of childless persons (3% of women and 5% of men). These differences between childless respondents and new parents are statistically significant at the $p<.05$ level based on two-tailed t-tests. Although Figure S3 represents only a subset of respondents who left STEM, it indicates that family was a reason for many new fathers' and the majority of new mothers' departure from STEM for full-time work elsewhere.

Life Sciences versus Other STEM Fields

As life sciences are the most gender balanced fields in STEM, it is instructive to understand whether patterns of attrition among new parents in the life sciences are comparable to those in other STEM fields. We re-ran models in Table 3 replacing the STEM discipline controls with a single dichotomous indicator of whether respondents were employed in the life sciences. We find, perhaps in contrast to assumptions about the relative family-friendliness of more gender-balanced STEM fields, that new parents in the life sciences are less likely to stay in STEM full-time after their first child net of controls (life sciences indicator B= -.813, p=.036) and more likely to leave the workforce entirely (life science indicator B=2.556, p=.001). Rerunning these models with an interaction term between gender and the life sciences indicator, we did not find significant gender differences in the effect of being in the life sciences on the likelihood that new parents would leave STEM. More research is needed to understand the nuances of the effects of parenthood within each STEM field.

Trajectories of New Parents with Only One Child

Finally, we replicated our analyses in Figures 1 and 2 among parents who had only one child. Figures S1 and S2 present the trajectories of new parents who had a child between 2003 and 2006 but did not have additional child(ren) during the study period (N=532). Although we might predict that many new parents—especially new mothers—would re-enter full-time employment in STEM after their single child reached school age, this does not appear to be the case: once single-child parents have left full-time employment in STEM, few seem to return by 2010, when their child is school-aged (between 4-7 years on average).

Table S1. Univariate and bivariate statistics comparing full-time STEM professionals in 2003 who became new parents between 2003-2006 or remained childless 2003-2010.

	New parents between 2003 and 2006 (N=841)		**Respondents who remained childless 2003-2010** (N=3365)		***p***
	Mean	*Std. Error*	Mean	*Std. Error*	
Women	.205	*.024*	.230	*.013*	
White	.661	*.025*	.772	*.012*	***
Hispanic	.061	*.014*	.044	*.006*	*
Asian	.216	*.019*	.129	*.009*	***
Black	.067	*.016*	.050	*.007*	*
Other nonwhite	.009	*.007*	.009	*.003*	
Engineering	.372	*.021*	.298	*.012*	
Math and computer sciences	.419	*.030*	.433	*.018*	
Life sciences	.087	*.012*	.125	*.011*	***
Physical sciences	.122	*.022*	.114	*.010*	
Age in 2003	34.07	*.425*	39.82	*.258*	***
University sector	.076	*.009*	.132	*.011*	***
Government sector	.092	*.017*	.154	*.012*	***
Highest degree: Bachelor's Degree	.619	*.031*	.656	*.014*	**
Highest degree: Master's Degree	.262	*.023*	.205	*.012*	*
Highest degree: Doctorate	.119	*.010*	.127	*.006*	
R has non-working partner	.344	*.028*	.114	*.010*	***
R had addl child(ren) between 2006 and 2010	.367	*.032*	n/a		n/a

*** p<.001; ** p<.01; * p<.05; + p<.10; two-tailed t-tests; SESTAT restricted-use data.

Table S2. Univariate and bivariate statistics comparing full-time STEM professionals in 2003 who (a) became new parents between 2003-2006 and were employed full-time in 2010 or (b) remained childless 2003-2010 and were employed full-time in 2010.

	(a) New parents between 2003 and 2006 who stayed employed full-time in 2010 (N=741)		**(b) Respondents who were childless 2003-2010 and stayed employed full-time in 2010** (N=2949)		***p***
	Mean	*Std. Error*	Mean	*Std. Error*	
Women	.158	*.022*	.213	*.013*	
White	.655	*.028*	.774	*.012*	***
Hispanic	.059	*.015*	.042	*.006*	*
Asian	.220	*.021*	.121	*.009*	***
Black	.072	*.018*	.047	*.007*	*
Other nonwhite	.010	*.007*	.010	*.003*	
Engineering	.382	*.021*	.339	*.018*	
Math and computer sciences	.429	*.034*	.419	*.017*	
Life sciences	.070	*.010*	.126	*.012*	***
Physical sciences	.119	*.024*	.116	*.010*	
Age in 2003	34.13	*.474*	39.38	*.270*	***
University sector	.075	*.011*	.133	*.012*	***
Government sector	.091	*.018*	.121	*.013*	***
Highest degree: Bachelor's Degree	.608	*.033*	.645	*.017*	
Highest degree: Master's Degree	.271	*.031*	.208	*.014*	**
Highest degree: Doctorate	.120	*.011*	.135	*.006*	
R has non-working partner	.363	*.029*	.111	*.010*	***
R had addl child(ren) between 2006 and 2010	.359	*.031*	n/a		n/a

*** p<.001; ** p<.01; * p<.05; + p<.10; two-tailed tests; SESTAT restricted-use data.

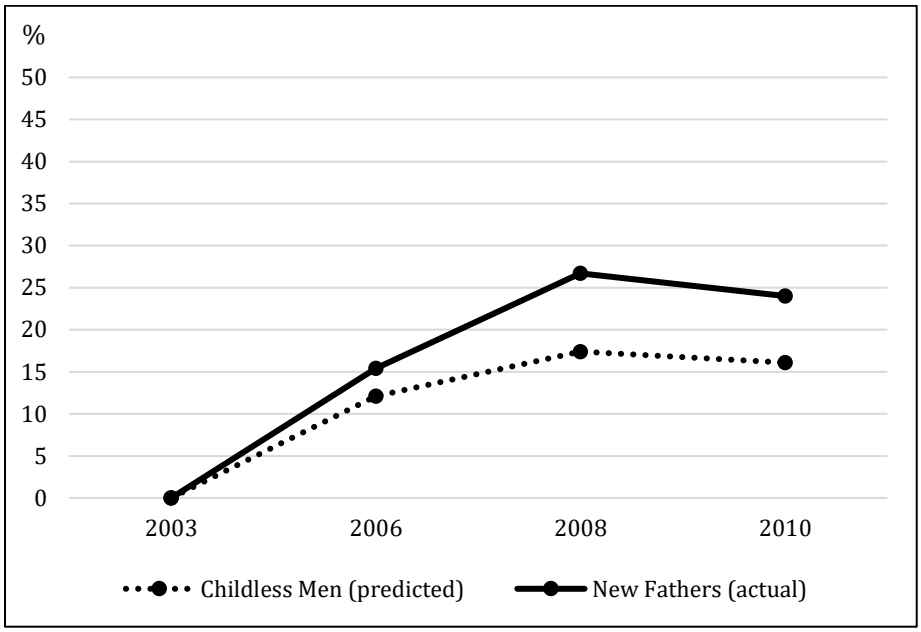

Fig S1: Percent of men who had left full-time STEM employment by survey year, among new fathers (weighted frequencies, n=679) and childless men (predicted values, n=2691).

NOTE: Lines represent the percentage of men who had left full-time STEM employment each survey year. The solid line represents the actual weighted percentage of new fathers who left full-time STEM employment each year. The dotted line represents the predicted values for childless men each year, holding variation between fathers and childless men by education, demographics, sector, and other factors constant (i.e., at the means for new fathers). Predicted values were calculated by inputting the means for new fathers on each control measure into logistic regression equations predicting the likelihood that childless men would leave full-time STEM employment each survey year.

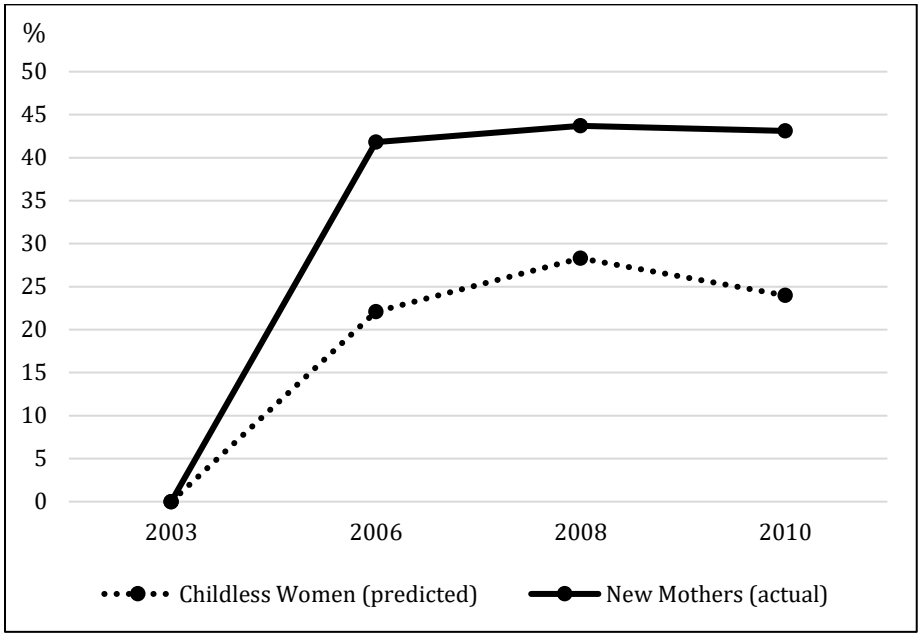

Fig S2: Percent of women who have left full-time STEM employment by survey year, among new mothers (weighted frequencies, n=212) and childless women (predicted values, n=774).

NOTE: Lines represent the percentage of women who had left full-time STEM employment each survey year. The solid line represents the actual weighted percentage of new mothers who left full-time STEM employment each year. The dotted line represents the predicted value for childless women each year, holding variation between mothers and childless women by education, demographics, sector, and other factors constant (i.e., at the means for new mothers). Predicted values were calculated by inputting the means for new mothers on each control measure into logistic regression equations predicting the likelihood that childless women would leave full-time STEM employment each survey year.

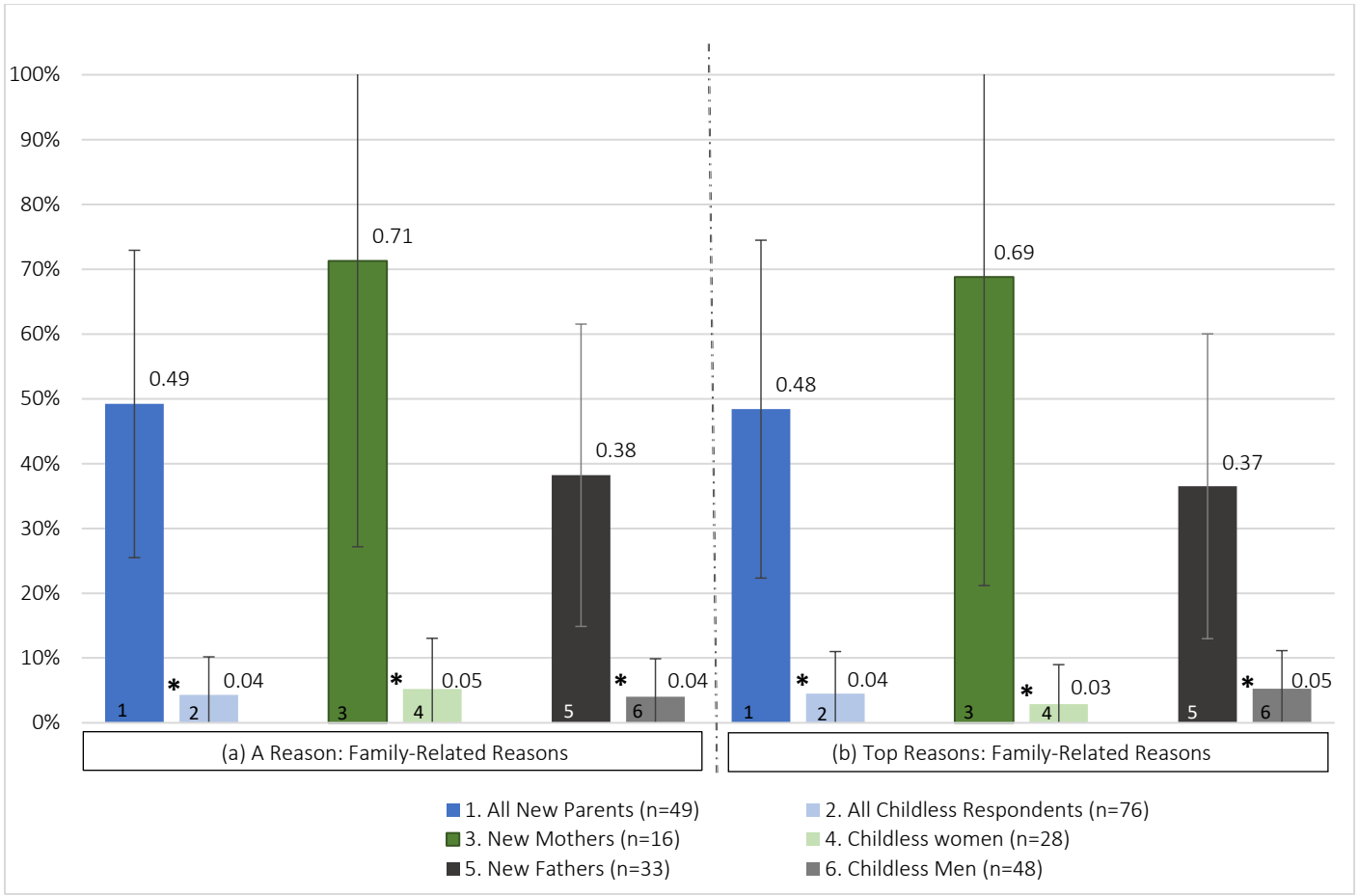

Fig S3: Proportion of new parents and childless respondents who reported that family was (a) a reason and (b) one of the top two reasons they left full-time STEM employment for full-time work elsewhere.

NOTE: Bars represent the proportion of respondents (weighted with replicate weights) in each category who gave family responsibilities as (a) a reason (left panel) or (b) one of the two most important reasons (right panel) for their career change. Measures were available only for respondents who left STEM for full-time work outside of STEM that they report is "not related" to their highest degree. In this figure, the "new parent" category includes all respondents who had their first child between 2003 and 2010. Error bars represent 95% confidence intervals; asterisks indicate significant differences between the two groups based on two-tailed t-tests (* p<.05).

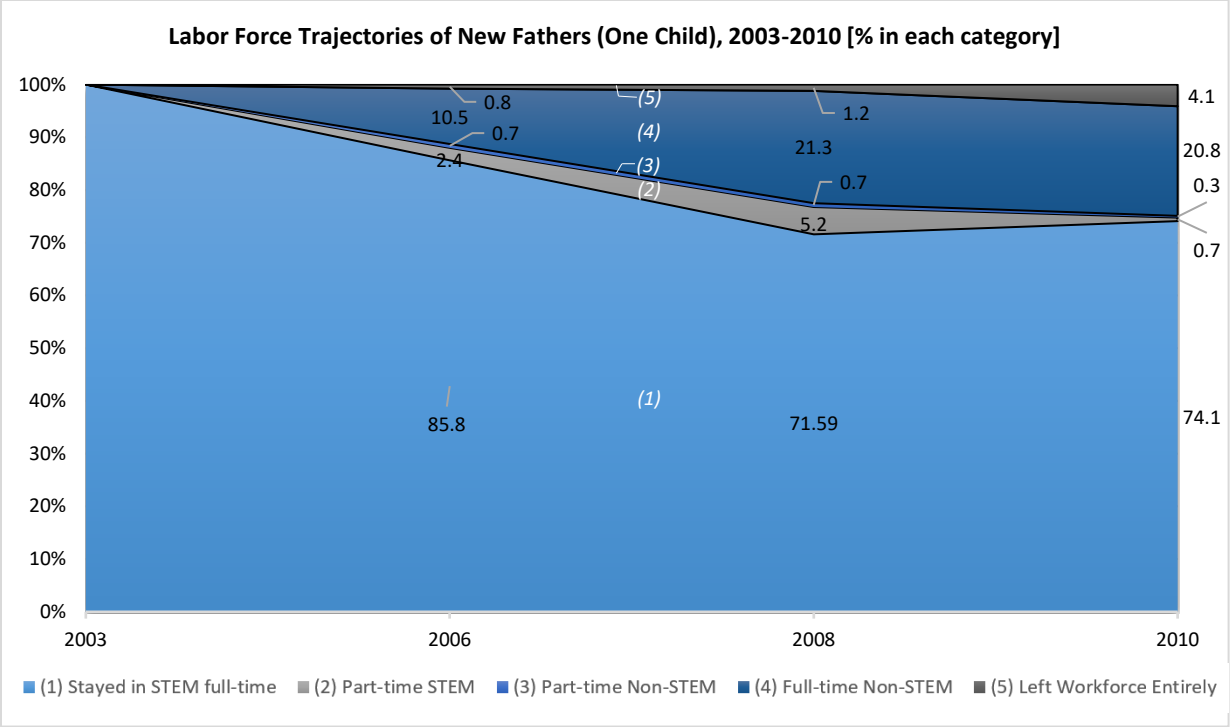

Fig S4: Labor force trajectories of men STEM professionals employed full time in 2003 who had their first child between 2003 and 2006 and did not have another child between 2006 and 2010.

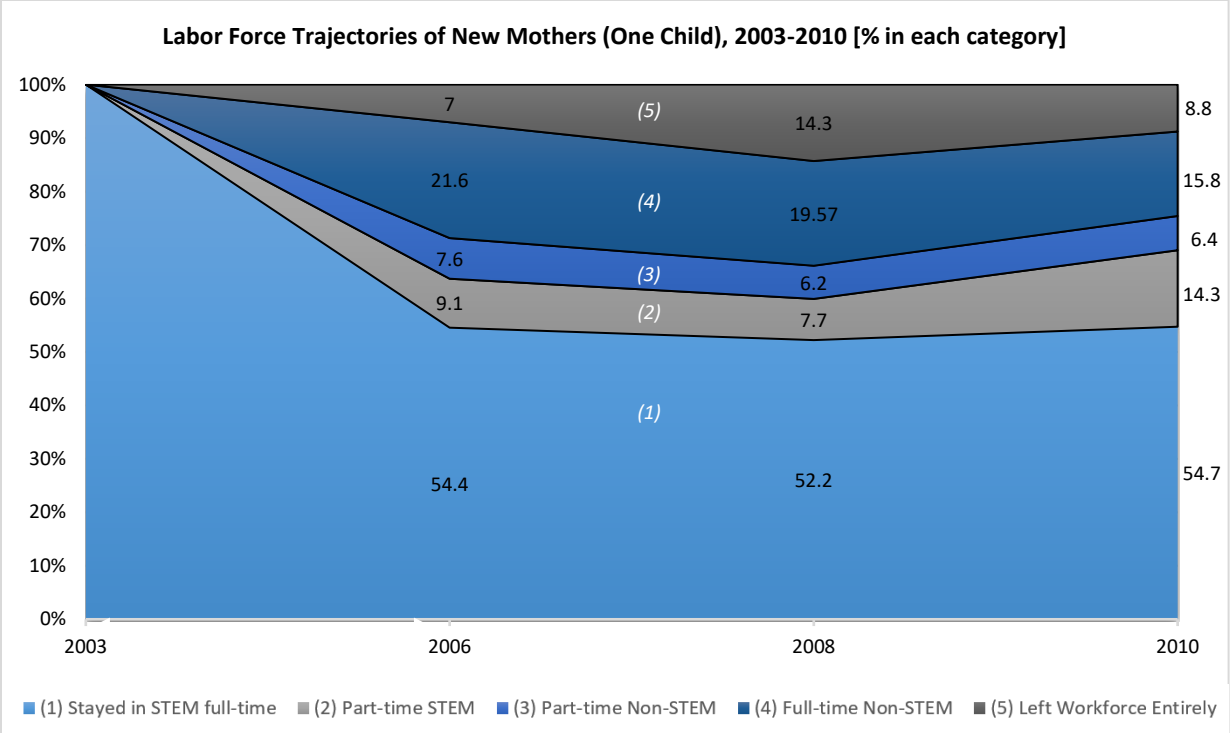

Fig S5: Labor force trajectories of women STEM professionals employed full time in 2003 who had their first child between 2003 and 2006 and did not have another child between 2006 and 2010.