PRELIMINARY—COMMENTS WELCOME

THE PSYCHIC COST OF CHILDREN

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ABSTRACT

We use longitudinal data on couples in Australia from 2001-12 and Germany from 2002-12 to examine how demographic events affect perceived time and financial stress. Consistent with the view of measures of stress as proxies for the Lagrangean multipliers in models of household production, we show that births increase time stress, especially among mothers, and generally also raise financial stress, with somewhat larger effects of first births. The monetary equivalent of the costs of the extra time stress is very large. While the departure of a child from the home does reduce parents' time and financial stress, its negative impacts on the tightness of the time and goods constraints are smaller than the positive impacts of a birth.

Insanity is inherited—we get it from our children. [Mark Twain]

I.   Background

We address the question of whether the addition of a child to a family imposes costs that are not accounted for in the immense literatures on the cost of children and on equivalence scales, and thus whether there are hitherto unaccounted factors that affect the decision to have a child and increase the perceived costs of rearing a child. The literature on equivalence scales focuses solely on the monetary costs of children (e.g., Muellbauer, 1977; Pollak and Wales, 1979; Bourguignon, 1999). The sparser literature on the time costs of children (e.g., Gustafsson and Kjulin, 1994; Bradbury, 2008) engages in accounting exercises, totalling up the amounts of time that each parent devotes to child care, and perhaps valuing them, and examining gender differences and secular changes in time allocated to child care.

Hamermesh and Lee (2007) constructed and estimated a model describing cross-section differences in the extent of expressed time stress. The theoretical basis was Becker's (1965) model of the use of time and goods to produce commodities that contribute to a household's utility. The theoretical part of the study identified time stress as the Lagrangean multiplier on a household's time constraint and linked financial worries to the Lagrangean multiplier on its goods constraint. Using cross-section data from Australia, Germany, Korea and the U.S., they found that individuals with higher Beckerian full incomes expressed greater feelings of time stress, consistent with a more tightly binding time constraint, and that they were less likely to express concerns about money (consistent with a looser goods constraint).

Our approach here combines these two strands of the literature: We examine the extent to which people find that the time and goods constraints in their utility maximization bind more tightly when a child is added to the household. We are not examining generalized

responses to a birth, such as happiness or life satisfaction (see, e.g., Baetschmann *et al*, 2012), nor are we examining emotional responses to particular aspects of child-rearing (e.g., Connelly and Kimmel, 2013). Instead, we study how a specific life event—the birth of a child—affects empirical analogues of parameters that arise within a family's welfare maximization. We thus develop a new dimension on the cost of children; and, because additional time loosens the time constraint while additional income loosens the goods constraint, our approach allows us to extend the measurement of the monetary and time costs of children. We complement the examination of the impact of births on the household's utility maximization by studying what might be viewed as the obverse of a birth—the departure of a child from the household.

To obtain these estimates we need data sets that contain respondents' views of the time and monetary stress that they perceive, our analogues to the Lagrangean multipliers in their utility maximization. Longitudinal data are also required, since in order to identify the effect of an addition to the household we need a household-specific baseline against which to compare the empirical counterparts to the multipliers. Fortunately, since 2001 the Household, Income and Labour Dynamics in Australia (HILDA) Survey has collected annual information from a panel of respondents on their perceptions of time and financial stress. Also, since 2002 the German Socio-Economic Panel (SOEP) has collected similar information biennially. We use both data sets in the empirical work here, thus providing a check on the specific cognitive implications of the questions and on culture-specific differences in couples' responses to the birth of a child.

II. Theoretical Motivation and Considerations

Consider a household that combines goods (a vector X_j) and time (a vector T_j) inputs, where j is a commodity, to produce a vector of commodities Z_j (j=1,…, N), that determines its utility:

(1) $U = U(Z_1(X_1,T_1), \ldots , Z_N(X_N,T_N))$.

The maximization of this utility function, given the technologies of household production and the household's wage rate W, unearned income I, and the vector of goods prices that it faces, P_j, yields a utility-maximizing vector of demands for both time and goods inputs into the production of each commodity.

The demands for time and goods inputs are functions of these prices. Similarly, the household's Lagrangean multipliers on time λ and goods μ are functions of the parameters facing the household — the wage rate, unearned income and goods prices. We can thus write each as:

(2a) $\lambda_t = \lambda(W_t, I_t, P_{jt}; X_t)$;

(2b) $\mu_t = \mu(W_t, I_t, P_{jt}; X_t)$,

where the vector X contains other shifters of these Lagrangean multipliers, and t is some time period. Comparing across households, we make the standard assumption that all households face the same goods prices, so that these can be ignored here and in the empirical work. The usefulness of the model comes from its prediction that higher W and I both raise λ and lower μ.

We could estimate (2) directly from survey respondents' answers on their perceived time pressure. Some individuals may, however, always feel pressured, and others may feel less pressured, even in the face of the same objective circumstances. Also, the amount of pressure generated by the birth may depend on its interaction with the family's existing demographic structure. Taking these considerations together, and linearizing (2), we can rewrite the model as:

(3a) $\lambda_{it} = \lambda_{it-1} + \beta_1 W_{it} + \beta_2 I_{it} + \beta_3 \Delta K_{it} + v_{it}$,

(3b) $\mu_{it} = \mu_{it-1} + \gamma_1 W_{it} + \gamma_2 I_{it} + \gamma_3 \Delta K_{it} + \eta_{it}$,

where ν and η are normally distributed error terms, i denotes an individual, and ΔK, the focus of the study, denotes the change in the family's demographic structure, including most importantly the addition of a child.

A potentially important issue here is the problem of the endogeneity of births in a year in response to stress (both time and financial) in that year. To model this potential endogeneity in this context, let us assume that, along with many other things described by the vector of variables X, both expected time stress and expected financial stress affect the probability of having a child. Let S* be the upper limit to perceived time stress beyond which people will decide not to have a child, and let F* be the analogous upper limit to financial stress. Then assuming that the couple has complete control over its fertility, the probability that a child is born is the joint probability:

(4) $\Pr\{\Delta K_{i,t+1}=1\} = \Pr\{ [\alpha E(\Delta X_{i,t+1}) + \beta S_{it} + \varepsilon_{it} < S^*],[\gamma E(\Delta X'_{i,t+1}) + \delta F_{it} + \theta_{it} < F^*] \}$,

where ε and θ are normally distributed and presumably are not independent, and α, β, γ and δ are parameters describing this probability. Equation (4) can be rewritten as the bivariate probit:

(5) $\Pr\{\Delta K_{i,t+1}=1\} = \Pr\{ [\varepsilon_{it} < S^* - \alpha E(\Delta X_{i,t+1}) - \beta S_{it}],[\theta_{it} < F^* - \gamma E(\Delta X'_{i,t+1}) - \delta F_{it}] \}$.

There are several ways of dealing with this potential endogeneity. We could expand beyond estimating (3a) and (3b) jointly to estimating them jointly with the selection equation (5). The difficulty with this approach lies in finding exclusion restrictions appropriate for the five equations (the financial and time stress of each spouse, and fertility). An alternative approach would argue that any biases to the estimates of the impact of a birth on time and financial stress that are caused by the potential endogeneity of births will be negative. That is, those parents who expect smaller increases in stress are those who are more likely to have a child. Thus we would expect that any estimated positive impacts of a birth on stress that we find will understate the "treatment effect" that would be observed if births were distributed

randomly across the population of couples arrayed by the impact of births and changing stress.

III.   Data and Descriptive Statistics

Both surveys that we use are nationally representative longitudinal sets of data describing the populations of the country studied. The HILDA Survey asks the following question of survey participants: "How often do you feel rushed or pressed for time?" with possible answers "almost always," "often," "sometimes," "rarely" and "never." Thus we currently can index t = 2001, 2002, …, 2012, which, allowing for lagged values, enables us to estimate autoregressions based explicitly on (3a) for eleven years of births. Participants are also asked to rate their satisfaction with their financial situation on an eleven-point (0 to 10) scale ranging from "totally dissatisfied" to "totally satisfied", allowing us to estimate autoregressions based explicitly on (3b). To provide comparability with the scale on time stress, we collapse the responses to this latter question into five categories.[1] Thus the autoregressions that we estimate track the Lagrangean multipliers λ and μ.

We currently have six waves of data from the SOEP with the necessary information, t = 2002, 2004, …, 2012, allowing, with the required lag, for five biennia of births. Biennially the SOEP has included the question: "Think about the last four weeks. How often during this period did it happen that you felt rushed or under time pressure?" with possible responses "always," "often," "sometimes," "almost never" and "never." Perhaps because of the differences in phrasing in the SOEP or in how the answers are elicited,[2] the distribution of responses to this question is tilted more heavily toward being less rushed for time than in the

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[1]From the 0 (dissatisfied) to 10 (satisfied) we recode responses 0-2 as 5 (4.9 percent of the sample), 3-4 as 4 (9.3 percent), 5-6 as 3 (28.2 percent), 7-8 as 2 (45.2 percent), and 9-10 as 1 (12.4 percent). Here and throughout this study we weight all sample observations by their sampling weights.

[2]The SOEP uses a four-week reference period and employs a multi-mode approach, with data collected by both interviewer and via self-administration, whereas in the HILDA Survey this question is always administered as part of a separate self-completion questionnaire.

HILDA Survey.[3] The SOEP asks all respondents the same question about financial stress as the HILDA Survey, and we treat responses exactly the same.[4] Thus, except for relying on biennial observations, the estimates of the determinants of the analogues of λ and μ are based on similar questions in the two data sets. Replacing the one-year by a two-year lag in (4a), we can estimate equations for Germany that resemble those for Australia very closely.[5]

Table 1 presents the statistics describing the couples included in the sub-samples from the HILDA Survey and SOEP over which we estimate (3a) and (3b). In both sub-samples we exclude couples in which the wife is over age 45 here and in all subsequent tables involving the examination of the impacts of births. In the HILDA Survey sub-sample wives report being significantly more stressed for time than their husbands (paralleling the greater time stress perceived by women generally in Hamermesh and Lee, 2007), but both spouses feel roughly the same financial stress. Over 10 percent of the couples produced a child between successive interviews (and thus between responses on time and financial stress); and the majority had other children present too. During the average week the husbands spent 46 hours during working (in paid employment) and commuting, while their wives spent nearly 25 hours per week in these market-related activities. Time spent in household production was exactly reversed, so that reported (not from time diaries) total market and non-market work time was almost identical for the spouses (see Burda *et al*, 2013).[6] Average total annual

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[3]In the SOEP the distribution (never to always) is 5.8 percent, 15.1 percent, 39.2 percent, 33.9 percent, and 6.0 percent. In the HILDA Survey the comparable distribution is 0.8 percent, 10.3 percent, 40.1 percent, 36.0 percent, 12.8 percent.

[4]The percentages of observations in the five recoded categories in the SOEP are 6.2 percent, 13.7 percent, 27.4 percent, 40.8 percent and 11.9 percent, remarkably similar to the distribution of responses to this question in the HILDA Survey.

[5]We use PanelWhiz (Hahn and Haisken-deNew, 2013) to create the sub-samples that underlie all our calculations.

[6]The measure of household production constructed from the HILDA Survey data is the amount of time in a typical week spent on household errands, housework, outdoor tasks, caring for children (including the children of other people, if unpaid) and caring for disabled or elderly relatives. In contrast, the SOEP only allowed us to include time spent on a typical weekday. The list of activities, however, was similar, and included running errands, housework, child care, helping other persons in need of care, repairs to the house/car, and garden work.

earnings in the couples were around A\$84,000, while average unearned income among these couples was about A\$17,000.[7]

The descriptive statistics from the SOEP for this sample show quite similar patterns on time stress. Wives are significantly more stressed for time than their husbands. However, husbands feel more financial stress than their wives. About one-eighth of the couples experience a birth during a biennium over the time period 2002-12. In line with popular perception, husbands report more market work time than their wives, and wives report significantly more home production time on weekdays. Average annual earnings of the couples are roughly €53,000 per year, which is consistent with published data, but average unearned income, at about €7,100 per year, may be low (although these are prime-age intact couples).[8]

IV.   **Preliminary Examination of Patterns of Stress**

We will initially estimate equations (3a) and (3b) separately for each spouse including a number of controls. Since, however, one spouse's perceived pressure is likely to be affected by idiosyncrasies in the other's, and since time pressure and financial pressure are structurally related through the household production process, in the end we will also estimate (3a) and (3b) jointly. As a first step toward this, and to obtain a picture of how a birth/adoption alters the time and goods constraints, we examine transitions of the empirical counterparts of λ and μ. Consider columns (1) and (3) of the top panel of Table 2, which show the fractions of the samples for which time stress increased, remained the same or decreased over a year in the HILDA Survey sub-sample, separately by gender and by the indicator for the addition of a child to the household.[9] Husbands in households adding a child are more likely than other husbands to feel increasingly stressed for time. Comparing the changes in time stress for men

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[7]In 2007, the mid-point of the sample, the Australian dollar was worth about \$US 0.79.

[8]In 2007 the euro was worth about \$1.34.

[9]The full 5x5 transition matrices underlying these statistics are presented in the Appendix.

in the HILDA Survey yields a test statistic of $\chi^2 (2) = 15.99$ (p < .001). Wives' time stress is even more greatly increased on average by the birth of a child: The same test for Australian women in this table yields $\chi^2 (2) = 24.97$ (p < .001).

Columns (2) and (4) in the upper panel of Table 2 show the same changes (over two-year periods) calculated for the couples in the SOEP. For men the results look quite similar, and the trivariate distributions (more, the same or less time stress) are only barely distinguishable ($\chi^2 (2) = 3.96$, p = .14). Among wives, however, the patterns differ greatly, with a much greater fraction exhibiting increases in time stress if a birth has occurred in the biennium ($\chi^2 (2) = 8.17$, p = .02 on the trivariate distributions).

In columns (1) and (3) of the bottom panel of Table 2 we present the analogous patterns of changes in perceived financial stress from the HILDA Survey, again separately for husbands and wives by the indicator for the addition of a child to the household. As with time stress, adding a child increases financial stress for both spouses. Also as with time stress, perceived financial stress increases more among new mothers than new fathers. Comparing households without and with a birth in the HILDA Survey, husbands in the latter group are more likely to perceive an increase in financial stress than those in the former group ($\chi^2 (2) = 25.55$, p < .001), but the difference between the changes in financial stress among wives is larger and even more statistically significant ($\chi^2 (2) = 37.68$, p < . 001).

Columns (2) and (4) in the bottom panel of Table 2 present the same calculations for biennial transitions in financial stress from the SOEP. For both spouses there are more increases in financial stress among those couples that experience a birth. Among men we cannot reject the hypothesis that the trivariate distributions are the same ($\chi^2 (2) = 4.18$, p = .12). For their wives the difference in the distributions is highly statistically significant ($\chi^2 (2) = 11.18$, p = .004).

We can expand upon these one- or two-year transitions by examining averages of time and financial stress for each year before and after a birth, thus accounting for any changes in stress that might be missing from the models that include only one year of lags (but excluding the vector X, and not based on comparisons to couples without a birth in a particular year or biennium). Figure 1a presents these measures for both husbands and wives in couples that produced a child, from four years before the birth through four years after, in the HILDA Survey. The picture is of clear increases in both types of stress for both spouses after a birth; but paralleling the results for Australia in Table 2, the graph suggests that the increases are greater for the wife than for her husband and greater for time than for financial stress. Indeed, the wife's time stress continues to rise steadily each year after the birth, while her financial stress remains constant. The husband's time and financial stress both diminish, although they remain higher than they were on average before the birth.

The patterns in the figure suggest care in interpreting the parameter estimates of (3a) and (3b): For women, but not for men, there is a clear "Ashenfelter dip" in both time and financial stress in the year before the birth, especially so for time stress (Ashenfelter, 1978). Indeed, perhaps the temporary decrease in stress increases the couple's interest in having a child, as the discussion surrounding equations (4) and (5) suggests. Regardless, these findings indicate that estimates of the determinants of current stress that include only one lagged value will overstate the impact of the birth for women. For men there is no pre-birth dip in time stress, but financial stress is much lower in the pre-birth year.

In the SOEP, for which the patterns of time and financial stress before and after a birth are shown in Figure 1b, there is no evidence of dips in either time or financial stress in the biennium before a birth. There may in fact be no dips, but perhaps our inability to detect any is due to the relative infrequency with which the data on time and financial stress are collected.

V.   Estimates of Models of Stress

Table 3a lists least-squares estimates of analogues to (3a) and (3b) using the HILDA Survey. We include and report on the impacts of each spouse's time allocation, weekly earnings (and thus, since work hours are included, implicitly the full prices of their time), and the family's unearned income.[10] More time spent at market work or in household production increases time stress for each spouse, with market work being especially stressful. (Given a fixed time budget, this means that shifting away from leisure or personal time increases time pressure.) A higher hourly wage appears to have no impact on time stress in these estimates, but among women, who do most of a household's purchasing, having a higher-earning husband or greater unearned income increases time stress, providing some support for the idea that households combine time and goods.

The birth of a child significantly increases the perceived time stress of both husbands and wives. The impact, however, is three times greater on the wife's time stress than on her husband's, confirming the evidence from the changes in time stress shown in Table 2. Independent of the wife's greater shift from leisure/personal time to household production that raises her time pressure when a child is born (since the equation held the allocation of time constant), the very fact of the birth has a much larger effect on the time pressure that she perceives than on that of her husband.

While the changes in Table 2 suggested that both husbands and wives perceive additional financial stress with a birth, holding constant for time allocation and full incomes this conclusion almost disappears for husbands. For wives, however, we still find that a birth increases financial stress, even given any changes in earnings that may occur simultaneously, although the impact is barely statistically significant. If we include only lagged financial stress and the indicator for a birth, husbands' stress does increase, and nearly significantly so,

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[10]Also included is a vector of indicators of the number and ages of other children in the household. In addition, we estimated each model using an ordered probit, with no qualitative difference from the least-squares estimates reported in Table 3a.

while the impact on his wife's financial stress becomes even larger and even more statistically significant. The main conclusion here is that a birth causes a greater increase in the wife's perception of financial stress than in the husband's, just as it did with the spouses' time stress.

It is well known that women's time in the market and in home production responds to a birth (by decreasing and increasing respectively), so that the impacts of time use on stress are quite likely in part generated by the birth itself. To circumvent what is essentially a problem of spurious correlation, we re-estimate the models in Table 3a without the time-use variables. The impacts of a birth on husbands' time stress and both spouses' financial stress are essentially unaffected by this deletion. The parameter estimate on wives' time stress drops from +0.211 to +0.168, a not quite statistically significant decline but one that is still fairly substantial. The overall conclusion, however, is that relatively little of the impact of the birth on stress works through a re-allocation of time. Most is inherent in the changed circumstances in the nature of the household's combination of goods and time that are generated by the addition of a child.

Table 3b presents the same estimates for the SOEP sample. Unsurprisingly, given the biennial data here, the size of the impacts of lagged stress are less than in Table 3a. More important, while the birth has a large and significant positive impact on the wife's time stress, unlike in the HILDA Survey it has almost no impact on her husband's time stress. Neither spouse's financial stress is significantly affected by the birth, however, which is not very much different from the results for men obtained using the HILDA Survey.

Here too, given their weekly earnings, an extra hour of market work in a week raises both spouses' perceived time stress; but while it has significant negative effects on the husband's perceived financial stress, it has no impact on the wife's. Consistent with the role of the husband as the major earner, while his financial stress is barely affected when his wife

works more, hers decreases substantially when her husband works more (at the same hourly earnings). Additional time spent in home production raises the wife's time stress. Given each spouse's time use, when either spouse earns more per hour (has a higher full income) the time stress of each spouse increases, albeit not statistically significantly; and unsurprisingly each spouse's financial stress diminishes significantly.

Excluding the time-use measures hardly alters the estimated parameters on the indicator of a birth in the equations describing time stress nor in those describing financial stress. In the former the estimate for men rises slightly to +0.042, while for women it rises to +0.173. The estimates for this indicator in the financial stress equation both remain tiny and statistically insignificant.

The amount of stress felt by new parents may be greater among first-time parents than others. To examine this possibility we added an indicator for first-birth to all the equations. In the equations describing time stress in the HILDA Survey the coefficients on this indicator were 0.113 (s.e. = 0.058) and 0.069 (s.e. = 0.064) for men and women respectively; in the equations describing financial stress their counterparts were -0.012 (s.e. = 0.073) and 0.112 (s.e. = 0.062). In the SOEP the extra impacts of a first child on time stress were 0.115 (s.e. = 0.084) for husbands and 0.047 (s.e. = 0.088) for wives; for financial stress the additional impacts were 0.052 (s.e. = 0.084) and -0.048 (s.e. = 0.104). A fair conclusion is that there is some weak evidence that a first child adds more to time stress than subsequent children, but the extra effect is small.

While these results follow the motivation in Section II, perhaps there are individual-specific responses to a birth that are not captured by the mere inclusion of lagged terms in stress of the time-use measures. To allow for this possibility we re-estimate the models using person fixed effects. In the HILDA Survey the parameter estimates on the indicator for a birth in the past year are: 0.084 (s.e. = 0.029); 0.254 (s.e. = 0.035); 0.0064 (s.e. = 0.035); and 0.054

(s.e. = 0.036). In the SOEP these estimates are: 0.057 (s.e. = 0.033); 0.231 (s.e. = 0.033); -0.021 (s.e. = 0.035); and -0.035 (s.e. = 0.038). These comparisons show that allowing for idiosyncratic individual behavior in no way alters the conclusions implied by the basic estimates presented in Tables 3 and, indeed, increases the estimated impacts of a birth on parents' time stress. A couple that has a birth in a given year sees larger increases in the partners' time and financial stress in that year compared to other years in which it does not produce a child.

As an extension to these basic estimates we examine whether the changes in time and financial stress occasioned by a birth depend on the presence of older children in the household. We thus interact the birth indicator with the vector of indicators for older children and re-estimate the time and financial stress models for husbands and wives. In the HILDA Survey these interactions (four in each model) are in each case not statistically significant as a group or individually. In the SOEP when a birth occurs and a child under age 5 is present, the mother does feel more time stress; but that is the only interaction that even approaches statistical significance. The estimates make it clear that the magnitudes of the effect of a birth on time and financial stress hardly vary with the ages or numbers of older children present in the household.

As noted earlier, one spouse's idiosyncratic responses to a birth may interact with the other's, and each spouse's perceived time pressure may be related to his or her perceived financial stress. To account for these possibilities we re-estimate the models in (3a) and (3b) jointly and for both spouses simultaneously using Seemingly Unrelated Regressions (SUR); i.e., estimating a model with four equations. We do not report the results, as the crucial parameter estimates change only slightly from those reported in Tables 3 in either of the two

data sets.[11] They suggest that, while the spouses' responses may be related, the deterministic impacts of the birth on their time and financial stress are not affected by any spillovers that are excluded from the equations.

These estimates differ little from the single-equation estimates in Tables 3 because the residuals in the four equations are, with few exceptions, only very weakly correlated. Thus in both samples, once we account for the X variables, lagged stress and the birth measure, the only significant correlations are between the spouses' financial stress ($r = +0.30$ in the Australian data, $r = +0.40$ in the German data) and between their time stress in the SOEP ($r = +0.19$).

Does the effect of a birth on time and financial pressure increase or diminish over time? To answer this question for Australia we estimate ARMA(1,3) models of the impact of a birth on perceived time and financial pressure. All estimates include the same controls as in Table 3a. Rather than reporting the parameter estimates, we instead present in Table 4a the impulse responses, measured in standard-deviation units (of the reported time and financial pressures), to the birth of a child. The results are not strictly comparable to those in the previous tables, since specifying three lags in births reduces the number of usable observations.

The estimates suggest that for both husbands and wives the immediate, albeit small, impacts of a birth on financial pressures quickly become negative as time passes. While we showed that time stress increases instantaneously more for wives than for husbands, after three years the increase in stress is actually greater for the husband. Accounting for lagged responses, we cannot reject the hypothesis that in the longer run the addition of a child to the household increases the time stress of both spouses by the same amount.

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[11]Excluding all the controls and performing the same exercise leaves the coefficients essentially unchanged from their least-squares counterparts.

With the biennial data in the SOEP the specification of the lag structure must be different. Recognizing that we can only observe effects at lags of 2, 4, 6 years, etc., we estimate ARMA(1,2) models of the impact of a birth on stress, including (two-year) lagged stress and indicators of a birth in the most recent biennium or in either of the previous two biennia. The impulse responses, again measured in standard deviation units, are shown in Table 4b. Despite the differences in the timing of the responses in the SOEP, as in Table 4a we find that the long-run effects of a birth on time stress are no different between husband and wife. While these results corroborate the others on time stress, however, on financial stress the results are much different. In the German data both spouses' long-run financial stress is increased by the birth, but the effect on the husband's is much greater than that on the wife's.

Not surprisingly there are some major differences in the results between the two data sets. Partly they occur because of the different frequencies at which stress is measured; and we can examine the extent to which the difference in the frequency of the data on stress is generating the different results by aggregating births in the HILDA over two years and re-estimating the models describing current time and financial stress, using the same controls and a two-year lag in time stress. Given this temporal aggregation, we lose nearly half the observations (but none of the births), as we are only using observations from 2004, 2006, …, 2012. The results of estimating the models using this aggregation look somewhat like those reported in Table 3a, although the coefficient on births describing women's time stress is somewhat reduced (but remains statistically significant). The difference in the frequency of the questions on stress between the two panel data sets explains some of the differences in the results across the two countries/data sets but far from all.

The results may also differ because the questions eliciting time stress and the measures of time inputs differ across the surveys. We cannot account for those discrepancies.

Nonetheless, there is a remarkably consistent pattern throughout the results. A birth generates initial and growing time stress in the new mother. While the initial impact on the husband's time stress is smaller, in the end the effects on both spouses seem similar. There is much less evidence of an increase in perceived financial stress felt by either spouse.[12]

VI.   The Stress Cost of Children

Since the largest immediate effect of a birth is on the time stress felt by new mothers, in attempting to monetize the costs of stress we concentrate on that particular form of stress. While we propose three approaches to calculating the monetary equivalent of the additional time stress felt by mothers that is generated by a birth, there are undoubtedly many other simulations beyond those examined here that might be proposed. But at least these three do give an indication of the magnitude of the monetary amounts needed to compensate for the psychological burden of the birth.

In all of the simulations we ask the question: what is the monetary transfer or infusion of earnings that would reduce the new mother's financial stress by an amount equal to the increased time stress generated by the birth? The measures of subjective stress (time and financial) are not directly commensurate, so we calculate all effects in standard-deviation units. We conduct simulations to answer three questions:[13]

Simulation 1: What transfer of weekly earnings from the husband to the wife would reduce her financial stress by the same amount that the birth has increased her time stress?

Simulation 2: What increase in the wife's weekly earnings would decrease her financial stress by the same amount that the birth has increased her time stress?

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[12]Our findings are captured in a letter from a mother of two pre-school children (July 5, 2002, from Hannah Ebin), "With the kids and the house, I often feel I have four hours of tasks and only two hours to do them in."

[13]The difference among Simulations 1, 2 and 3 is that under Simulation 1 total household earnings remain unchanged, whereas in the others it increases.

Simulation 3: What increase in the husband's weekly earnings would decrease

the wife's financial stress by the same amount that the birth has increased her

time stress?

We perform all three simulations for both the HILDA Survey and SOEP using the estimates

in Tables 3. In addition to calculating these one-time transfers/infusions immediately after a

birth, we also calculate their cost per married couple if each couple, regardless of whether it

experiences a birth in the year (biennium in the SOEP), were to pay taxes annually into a

fund that would finance the transfers.

We show the results of these simulations in Table 5. The effects are remarkably large,

especially in the first simulation, where even in the HILDA Survey the required average

transfer is nearly three times the average husband's annual earnings. Clearly, there is no

reasonable transfer of earnings from husband to wife that can compensate for the increased

time stress that she experiences with the new child. The other possible changes would be

more feasible, but might require infusions of income from outside the household, and these

infusions could represent substantial increases in government activity. Thus even the least

costly (Simulation 2, and Simulation 3 in the SOEP) would require payments during the first

year of each child's life whose annual cost to every couple (the few new parents and all other

couples), in the neighborhood of US$3000 per year, would represent a substantial increase in

the burden of taxes/transfers.

These simulations suggest that the psychological cost of a new child is huge in

comparison to the monetary cost and, even more so, to the value of time that the new mother

father expend on the addition to the family. While other simulations would generate different

monetary comparisons to the time stress experienced by new mothers, given our estimates it

is doubtful that any reasonable simulation would suggest that these costs are small.

VII.   Experimenting with the Endogeneity of a Birth

While we have argued that selectivity into child-bearing will bias downward our estimates of the impact of a birth on time and financial stress, we cannot demonstrate that proposition empirically; it is a sensible theoretical assertion about behavior. Our estimates would thus be even more convincing if we could find a satisfactory instrument for birth. Regrettably, neither of the data sets has any other variables that one could not easily argue also affect time and/or financial stress directly, and other variables that might predict birth (age, number of children of various ages, spouses' earnings and time allocation) are also predictors of time/financial stress. The finding of a pre-birth dip in women's time stress, however, might make it an appropriate instrument to identify a five-equation model of this process (describing each spouse's time and financial stress and also the birth).

The pre-birth drop in women's time stress may be behavioral. As implied in (5), unusually low time and financial stress should induce couples to select into the population of new parents. There is also biomedical evidence that women with low stress, as measured by low values of a particular biological marker, are more fecund (Louis *et al*, 2011). While we cannot distinguish the behavioral from the biological in either of our data sets, the two effects work in the same direction.

For the HILDA Survey we estimated an equation describing the probability of a birth that included the lagged change in each spouse's time and financial stress, plus the lagged indicators of the number of children in each of the four age categories.[14] In a linear-probability model the parameter estimates on the husband's (wife's) lagged change in time stress are 0.0077 (s.e. = 0.0044) (-0.0170 (s.e. = 0.0044)); those on the husband's (wife's) lagged change in financial stress are -0.0098 (s.e. = 0.0043) (-0.0012 (s.e. = 0.0042)).

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[14]The parameter estimates change minutely if we add each spouse's earnings and the household's unearned income to the specification.

Observing stress only biennially in the SOEP makes that data set a weak candidate for investigating this predictor; and Figure 1b showed that unsurprisingly the dip in women's time stress between time periods t-4 and t-2 was much smaller than the dip observed between t-2 and t-1 in Australia. Nonetheless, we used the SOEP to estimate a linear model describing the probability of a birth as a function of each spouse's changes in time and financial stress between periods t-4 and t-2 (i.e., including four measures of lagged changes in stress). The estimated impacts on the probability of a birth were all small and statistically insignificant, and were unexpectedly positive.

Regrettably in both data sets the predictive power of the lagged measures of stress is quite weak: In Australia the adjusted R^2 in predicting whether a birth occurs is only 0.050; in the SOEP it is 0.024. The lagged stress terms would be very weak instruments, so we do not go further and use them to endogenize births. Nonetheless, the findings here are fascinating, suggesting in the HILDA Survey that declines in the wife's time stress and in her husband's financial stress help to induce the couple to have a child.

VIII.   Emptying the Nest

The theoretical motivation in Section II was based on the addition of a child and demonstrated how that demographic change would cause the time and goods constraints facing the household to bind more tightly. The reverse change, the departure of a child, should have the reverse effect: It should decrease the tightness of the constraints and lower measures of their empirical analogues—perceived time and financial stress. To examine this potential asymmetry, we investigate whether the reverse effects exist and are equal but of opposite sign to those demonstrated above.

Because very few children depart their parents' households when the mother is age 45 or less, we expand both samples by removing the restrictions on the mother's age. The averages of the crucial outcomes change substantially (compared to the averages shown in

Table 1).[15] In the Australian data the average time stress is 3.10 and 3.31 for men and women respectively, while the average financial stress is 2.36 and 2.32. In the SOEP the means of time stress are 2.65 and 2.84, and of financial stress are 2.61 and 2.52, for men and women respectively.

In Table 6 we present statistics describing changes in husbands' and wives' time and financial stress depending on whether a child departed the household that year (within two years after a departure in the SOEP), thus listing the results in the same way as those for births shown in Table 2. In seven out of eight comparisons (husbands-wives, HILDA-SOEP, time and financial stress) those people who had a child leave the household were more likely to experience a decrease in stress, and less likely to experience an increase, than those who did not. The only exception is the change in financial stress among wives in the HILDA Survey.

In general, the results mirror those shown in Table 2 for births: A departure generally reduces stress. Comparing the results here to those in Table 2, however, shows that the differences in changes in stress between those who do or do not experience the demographic event are much smaller for departures of children than they are for births. Indeed, the trivariate distributions are not statistically different from each other for time stress among men and financial stress among women in either the Australian or the German data. While the differences in the impacts of births and departures on time stress are more pronounced among wives, even there the magnitudes of the differences and their statistical significance are far below those of their counterparts in Table 2.[16]

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[15]Without this expansion of the sample sizes we would observe very few departures of children, and those few would be highly non-randomly selected. Changing the sample definition obviously alters the age mix of the respondents. Thus in the samples used earlier the average ages of wives in the HILDA Survey and the SOEP were 35 and 37 respectively. Removing the age restriction raises these respective averages to 48 and 52. Throughout this section we also exclude observations for years (biennia in the SOEP) in which a couple experienced a birth.

[16]Restricting departures to those that result in an empty nest (where no children remain the household) does not alter the conclusion. The differences between those with and without a final departure remain small.

We can explore the dynamics of time stress around this demographic event, as we did for births in Figures 1, by considering averages of time and financial stress +/- four years around a child's departure. The results are shown in Figures 2, constructed exactly as their analogues for births. The first thing to note is that, unlike for births in the HILDA Survey, here we find no pre-event dip in either time or financial stress. Rather, in both surveys and for both husbands and wives, time stress appears to diminish more or less steadily from at least two years before a child departs the household; and it continues decreasing in all cases for two years after. In both surveys, and for both spouses, financial stress also decreases from at least two years before the event; but the decrease stops or even reverses itself within two years after the departure.

While these results corroborate the prediction that having a child leave the house loosens time and goods constraints, they suggest that the responses to what might seem like opposing events are in fact asymmetric. Births tighten the constraints much more than departures loosen them. Moreover, the results imply that, unlike births, departures are associated with a nearly steady diminution of time stress both before and after the event, with generally similar effects on financial stress.

IX.   Conclusions and Implications

Using data from longitudinal surveys for Australia and Germany, we have demonstrated that a birth causes a rise in mothers' time stress that is not dissipated over the first few years of her child's life. There is some evidence of a similar effect on fathers' time stress; and we find some evidence that a birth increases spouses' financial stress. This demonstration is not that births affect such inchoate concepts as well-being or life satisfaction. Rather, by analogizing time stress to the Lagrangean multiplier on the household's time constraint, and financial stress to the multiplier on its goods constraint, the

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results are consistent with a model with households maximizing their utility in the face of their full income.

The magnitudes of the impacts of a birth on time stress are substantial, especially for a new mother. Calculating the extra earnings that the mother would have to receive to reduce her financial stress by as much as the birth increases her time stress suggests that the monetary equivalent of the time stress of a birth on average is huge. Demonstrating the magnitude of this additional cost of children argues for substantial subsidies to new parents to offset these nonmonetary, but measurable costs of children.

The results also provide weak evidence of the expected asymmetry in demographic events, in that a child's departure from the household generally reduces time and financial stress. But these negative effects on stress appear to be much smaller than the positive effects of a birth. Implicitly, the pleasure of having children is sufficient to offset the implicit additional lifetime stress that they cause parents. This is obvious; but the novelty here is the demonstration of the magnitudes and time paths of that stress.

Because of the limitations of the data, our ability to examine the dynamic effects of births and of departures from the household on time and financial stress within a general model of household production has been limited. While this research suggests that having children generates a permanent lifetime increase in perceived stress, the long-term effects of a birth on stress could only be analyzed with longer sets of longitudinal data than are currently available. That and linking the impacts of births on time and financial stress to spouses' bargaining behavior remain potentially fruitful avenues for additional study.

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Table 1. Descriptive Statistics: Couples (Means and Standard Deviations)

Variable[*]	HILDA (N=12,375)		SOEP (N=7,525)	
	Husband	**Wife**	**Husband**	**Wife**
Time stress	3.41	3.58	3.14	3.25
	(0.85)	(0.88)	(0.97)	(0.95)
Financial stress	2.50	2.48	2.67	2.56
	(0.99)	(0.98)	(1.05)	(1.06)
Child born in year / Born in last 2 years	0.10		0.12	
	(0.30)		(0.33)	
Child 0-4	0.53		0.17	
	(0.79)		(0.40)	
Child 5-10 / Child 5-9	0.44		0.50	
	(0.69)		(0.68)	
Child11-15 / Child 10-14	0.37		0.37	
	(0.67)		(0.62)	
Child16-18 / Child 15-24	0.18		0.18	
	(0.45)		(0.43)	
Work and commute time / Work time	46.21	23.96	40.43	20.05
	(17.99)	(20.32)	(15.87)	(17.60)
Home production time per week / Home production time per weekday	24.90	48.77	3.73	9.65
	(19.11)	(34.24)	(3.10)	(7.10)
Earnings: A$ per week / Earnings: €per week	1097	274	738	274
	(887)	(312)	(560)	(312)
Unearned income: A$ per week / Unearned income: €per week	332		136	
	(974)		(254)	

*The first variable label describes the HILDA measure, the second the SOEP measure.

Table 2. Year-to-Year Transition Matrices on Stress, with or without Birth, HILDA 2001-12, SOEP 2002-12*

No Birth:	HILDA (N=11,203)	SOEP (N=6,571)	HILDA (N=11,228)	SOEP (N=6,567)
Birth:	(N=1172)	(N=954)	(N=1216)	(N=958)
		Time Stress		
Change in Stress	Men, No Birth		Women, No Birth	
Increase	22.2	29.1	22.2	28.7
Same	54.8	43.0	53.8	43.5
Decrease	23.0	27.9	24.0	27.8
	Men, Birth		Women, Birth	
Increase	25.7	28.6	32.5	37.8
Same	55.6	46.0	49.5	38.2
Decrease	18.7	25.4	18.0	24.0
		Financial Stress		
Change in Stress	Men, No Birth		Women, No Birth	
Increase	22.6	27.1	23.6	25.2
Same	53.2	49.3	50.0	48.3
Decrease	24.2	23.6	26.4	26.5
	Men, Birth		Women, Birth	
Increase	28.3	27.9	31.0	34.3
Same	51.2	51.3	50.2	41.5
Decrease	20.5	20.8	18.8	24.2

*The numbers of observations differ slightly for men and women in each category because we condition on item non-response on the control variables used in subsequent regressions.

Figure 1a. Time and Financial Stress Before and After Birth of a Child, HILDA 2001-12
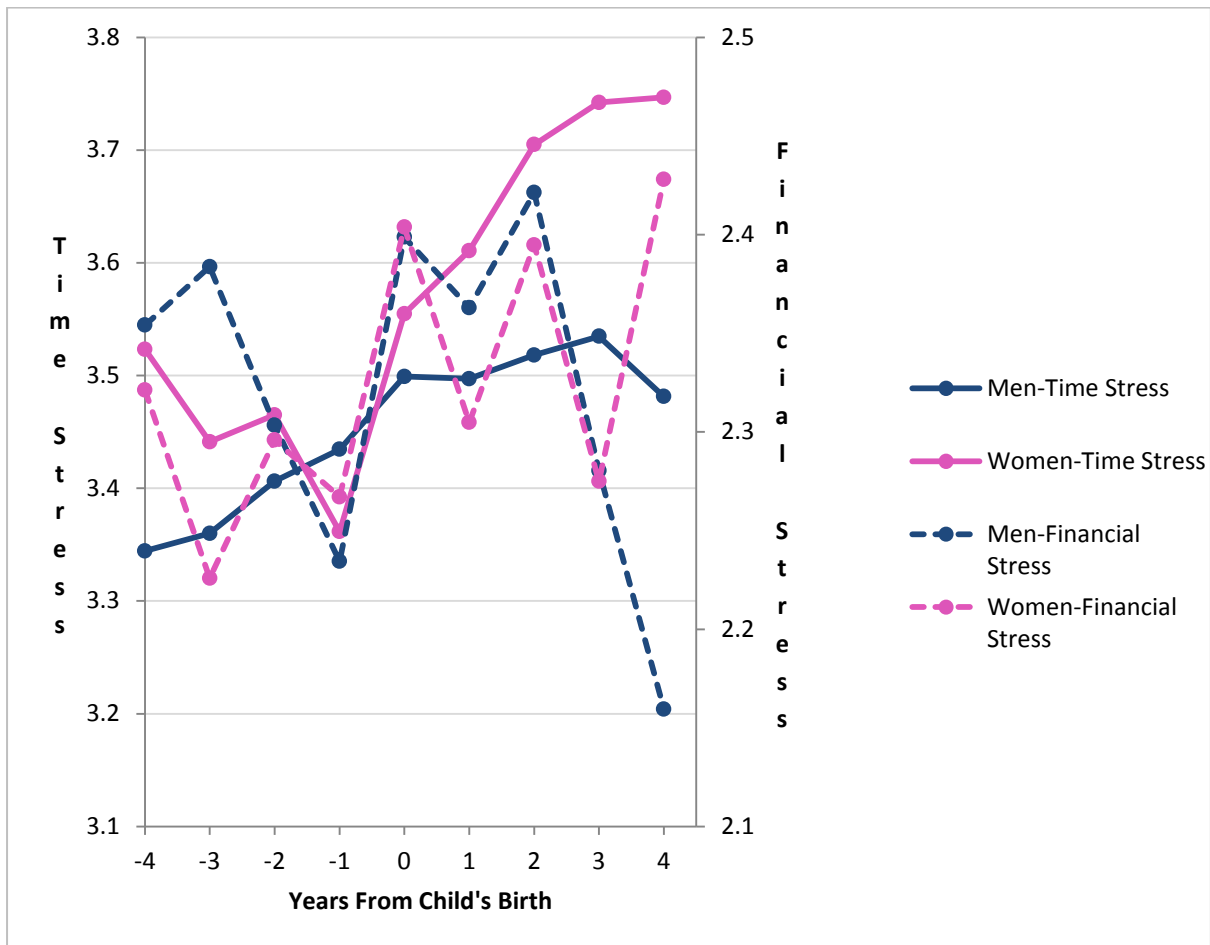
Figure 1b. Time and Financial Stress Before and After Birth of a Child, SOEP 2002-12
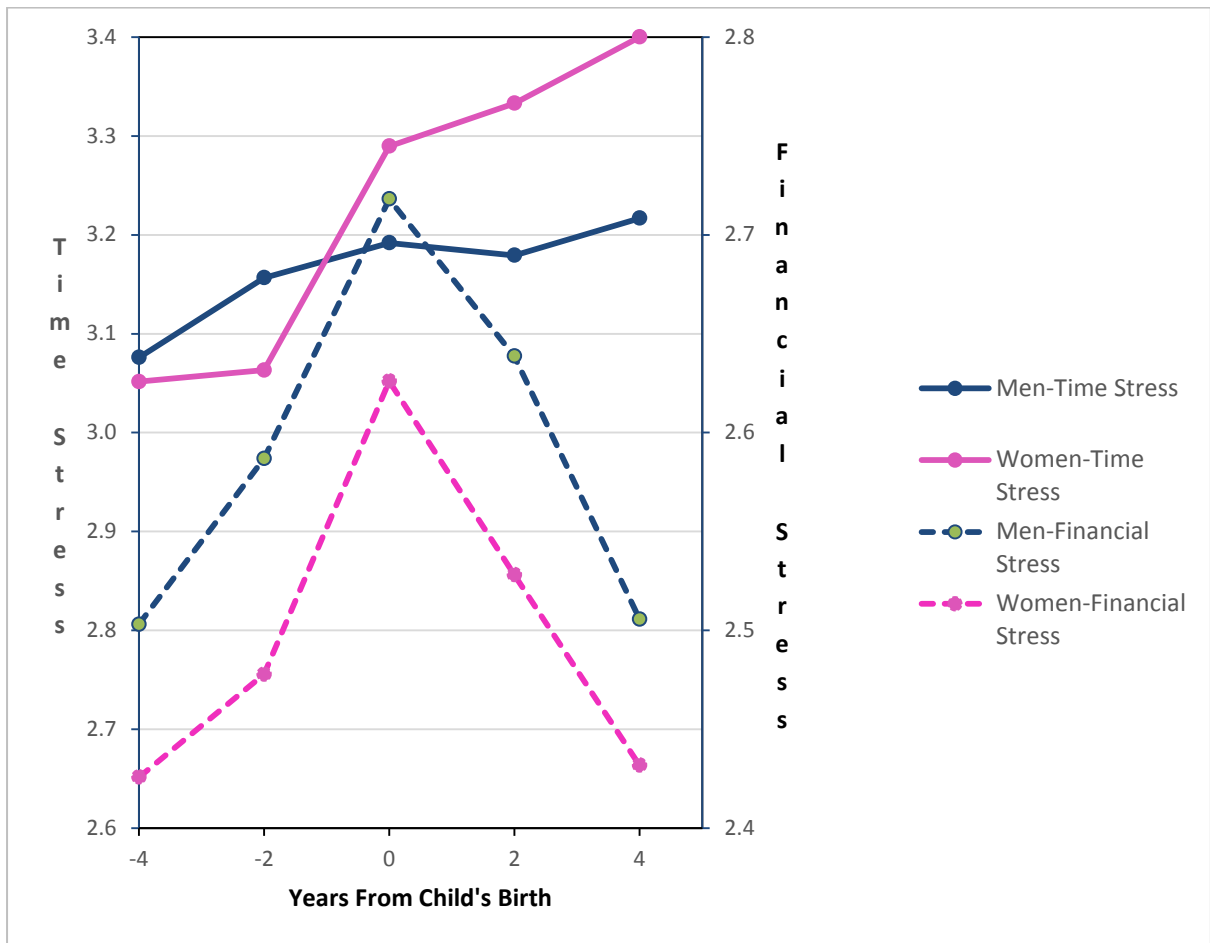
Table 3a. LS Estimates of the Determinants of Time and Financial Stress, HILDA* (N = 7376)

Ind. Var.:	Time Stress (5 to 1)		Financial Stress (5 to 1)	
	HUSBAND	**WIFE**	**HUSBAND**	**WIFE**
Lagged stress	0.567	0.532	0.559	0.536
	(0.013)	(0.015)	(0.015)	(0.014)
Birth in past year	0.073	0.211	0.030	0.058
	(0.032)	(0.040)	(0.041)	(0.040)
Work and commute time/week (own)	0.007	0.009	-0.003	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Home production/week (own)	0.002	0.002	0.001	-0.0001
	(0.001)	(0.001)	(0.001)	(0.0004)
Earnings (own)	-0.018	-0.011	-0.123	-0.176
	(0.011)	(0.022)	(0.013)	(0.025)
Work and commute time/week (partner)	0.001	0.0003	0.0002	-0.002
	(0.001)	(0.0007)	(0.0008)	(0.001)
Home production/week (partner)	0.0002	0.0001	0.0001	0.001
	(0.0004)	(0.0007)	(0.0005)	(0.001)
Earnings (partner)	-0.008	0.012	-0.081	-0.084
	(0.022)	(0.012)	(0.025)	(0.014)
Unearned income/week	0.004	0.017	-0.051	-0.050
	(0.007)	(0.010)	(0.014)	(0.010)
R^2	0.373	0.358	0.411	0.368

*Also includes a vector of measures of numbers and ages of children. Robust standard errors clustered on person identifiers

Table 3b. LS Estimates of the Determinants of Time and Financial Stress, SOEP* (N = 7525)

Ind. Var.:	Time Stress (5 to 1)		Financial Stress (5 to 1)	
	HUSBAND	**WIFE**	**HUSBAND**	**WIFE**
Lagged stress	0.340	0.346	0.467	0.451
	(0.017)	(0.019)	(0.021)	(0.019)
Birth in past year	0.023	0.170	-0.042	-0.020
	(0.053)	(0.057)	(0.051)	(0.056)
Work and commute time/week (own)	0.014	0.013	-0.006	0.0010
	(0.001)	(0.002)	(0.001)	(0.0017)
Home production/week (own)	0.0023	0.019	0.008	0.011
	(0.006)	(0.003)	(0.006)	(0.003)
Earnings (own)	0.026	0.090	-0.343	-0.381
	(0.027)	(0.069)	(0.050)	(0.088)
Work and commute time/week (partner)	-0.0001	-0.0001	-0.0006	-0.0055
	(0.001)	(0.0012)	(0.0016)	(0.0015)
Home production/week (partner)	0.0034	-0.011	0.0068	0.0024
	(0.0030)	(0.008)	(0.0034)	(0.0070)
Earnings (partner)	0.105	0.018	-0.205	-0.292
	(0.055)	(0.025)	(0.085)	(0.046)
Unearned income/week	-0.051	-0.007	0.134	0.142
	(0.035)	(0.044)	(0.066)	(0.050)
R^2	0.217	0.199	0.373	0.347

*Also includes a vector of measures of numbers and ages of children. Robust standard errors clustered on person identifiers

Table 4a. Lag Structure of Stress in Response to the Addition of a Child, HILDA, N=3883*

Impulse Response in Standard-Deviation Units of Stress

	HUSBANDS		WIVES	
Lag	**Time stress**	**Financial stress**	**Time stress**	**Financial stress**
0	0.0609	0.0608	0.1662	0.0449
1	0.1923	0.0218	0.2433	-0.0668
2	0.3521	-0.0963	0.3111	-0.1720
3	0.4493	-0.2162	0.3086	-0.2468
4	0.5484	-0.2872	0.3073	-0.2883
5	0.6074	-0.3293	0.3065	-0.3113
6	0.6426	-0.3543	0.3061	-0.3241

*Based on equations with three lagged terms in births.

Table 4b. Lag Structure of Stress in Response to the Addition of a Child, SOEP, N=2443*

Impulse Response in Standard-Deviation Units of Stress

	HUSBANDS		WIVES	
Lag	**Time stress**	**Financial stress**	**Time stress**	**Financial stress**
0	0.1601	0.1778	0.2616	0.1114
2	0.2459	0.3845	0.2529	0.1849
4	0.1892	0.3912	0.1808	0.1248
6	0.2398	0.5290	0.2864	0.1754

*Based on equations with two two-year lagged terms in births.

Table 5. Transfers/Extra Income Required to Reduce Wife's Financial Stress Equal to the Increase in Her Time Stress (in SD Units) from a Birth: Simulations from the HILDA and SOEP

Simulation	Description	Annual one-time cost per new-parent household		Annual cost per married couple	
		HILDA ($)	SOEP (€)	HILDA ($)	SOEP (€)
1	Earnings transfer from husband to wife	133,287	104,232	13,062	8,339
2	Increase wife's earnings	69,673	25,576	6,828	2,046
3	Increase husband's earnings	145,981	33,893	14,306	2,711

Table 6. Year-to-Year Transition Matrices on Stress, with or without Child Departures, HILDA 2001-12, SOEP 2002-12

No departure:	HILDA (N=23,869)	SOEP (N=19,039)	HILDA (N=23,608)	SOEP (N=18,968)
Departure:	(N=987)	(N=1214)	(N=987)	(N=1214)
Change in Stress	**Men, No Departure**		**Women, No Departure**	
Increase	20.8	26.4	21.4	27.5
Same	56.6	45.9	55.5	45.3
Decrease	22.6	27.7	23.1	27.2
	Men, Departure		**Women, Departure**	
Increase	19.2	26.3	17.7	24.3
Same	57.2	45.3	57.5	46.7
Decrease	23.6	28.4	24.8	29.0
	Financial Stress			
Change in Stress	**Men, No Departure**		**Women, No Departure**	
Increase	22.2	25.9	22.4	25.3
Same	54.0	50.4	52.9	50.1
Decrease	23.8	23.7	24.7	24.6
	Men, Departure		**Women, Departure**	
Increase	18.8	25.2	21.2	24.9
Same	56.3	48.2	54.9	49.3
Decrease	24.9	26.6	23.9	25.8

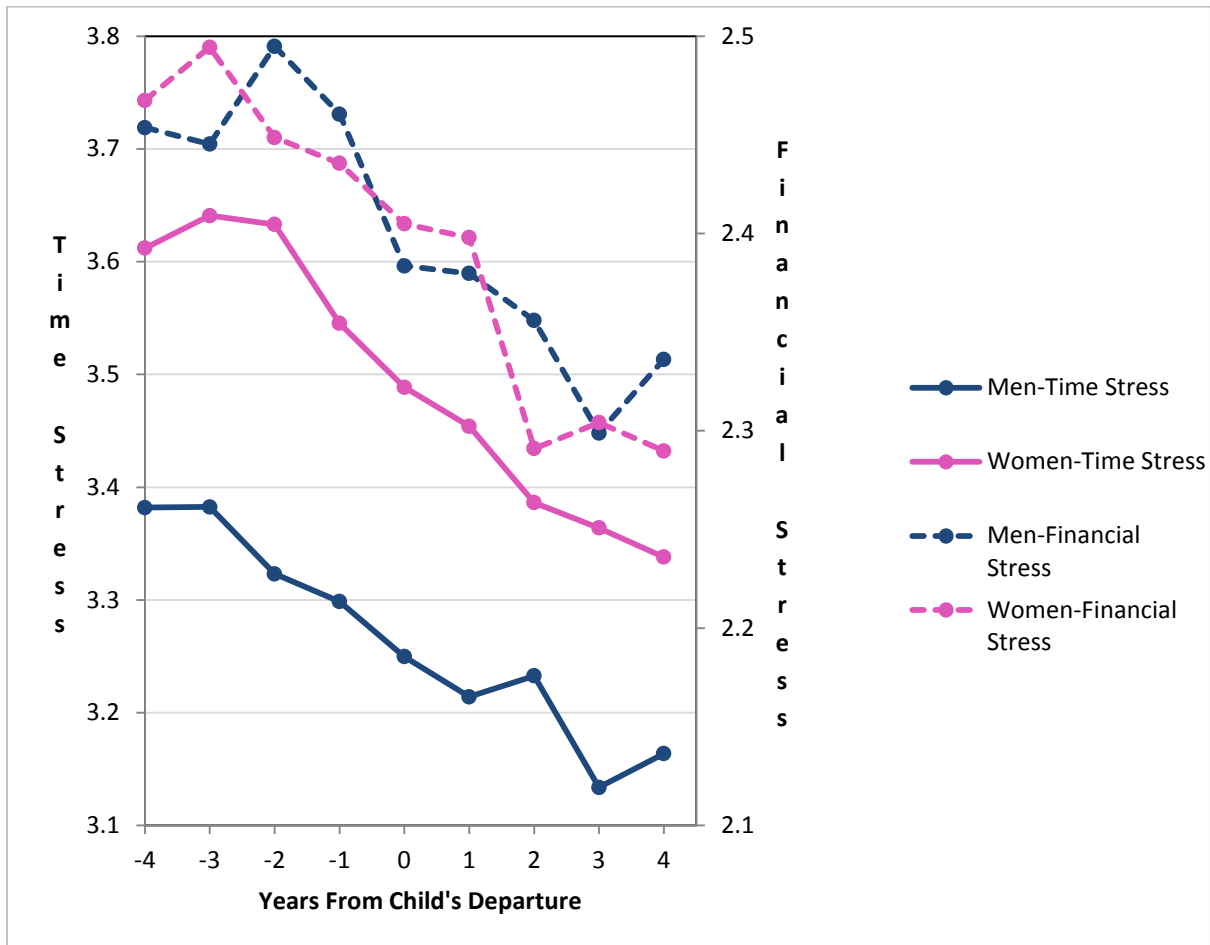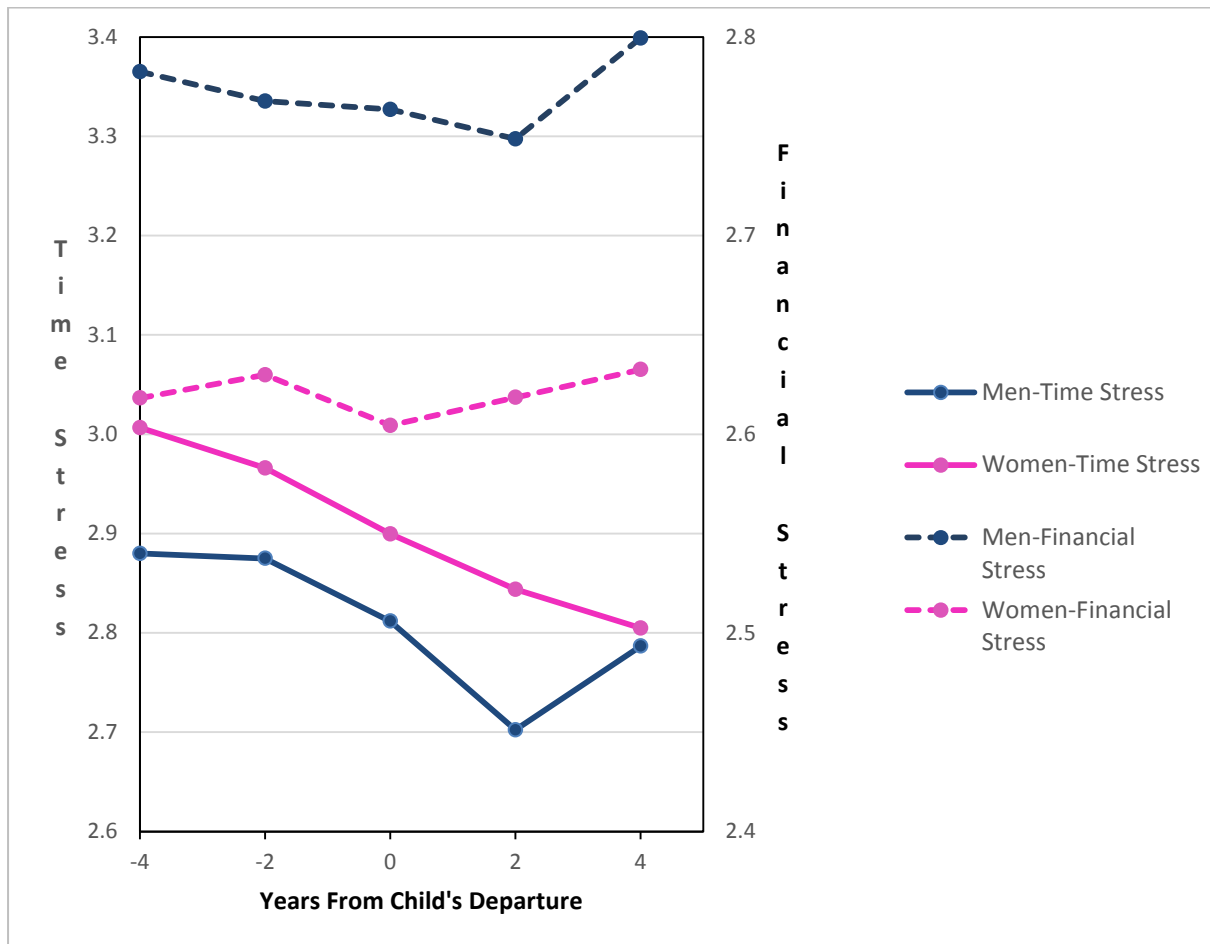**Figure 2a. Time and Financial Stress Before and After Departure of a Child, HILDA 2001-12**

Figure 2b. Time and Financial Stress Before and After Departure of a Child, SOEP 2002-12

Table 1a. Year-to-Year Transition Matrices on Time Stress, with or without Births, HILDA 2001-12

Stressed for Time:		HUSBAND				
		No child born or adopted in year				
		Always				Never
		5	4	3	2	1
Always	5	45.0	42.0	10.8	2.1	0.1
	4	11.9	55.9	29.3	2.5	0.2
	3	2.4	22.5	61.2	13.1	0.8
	2	0.7	7.8	48.0	40.9	2.6
Never	1	1.6	4.4	39.0	40.0	15.0
		Child born or adopted in year				
		Always				Never
		5	4	3	2	1
Always	5	50.9	37.5	11.6	0.0	0.0
	4	13.7	63.4	21.3	1.4	0.2
	3	3.8	28.2	55.5	11.8	0.7
	2	1.4	9.2	50.2	36.0	3.2
Never	1	10.6	11.9	21.6	19.5	36.4
		WIFE				
		No child born or adopted in year				
		Always				Never
		5	4	3	2	1
Always	5	51.5	38.2	9.0	1.1	0.2
	4	14.6	54.5	28.0	2.7	0.2
	3	4.0	26.9	57.8	10.8	0.5
	2	1.9	9.1	44.5	40.5	4.0
Never	1	0	5.0	30.5	44.4	20.1
		Child born or adopted in year				
		Always				Never
		5	4	3	2	1
Always	5	55.3	31.7	12.4	0.6	0
	4	17.8	52.8	27.2	2.0	0.2
	3	7.5	31.3	51.5	8.9	0.8
	2	4.6	12.8	48.2	34.0	0.4
Never	1	0	33.1	34.2	32.7	0

Table 1b. Two-Year Transition Matrices on Time Stress, with or without Births, SOEP 2002-12

		HUSBAND				
		No child born or adopted in biennium				
Stressed for Time:		Always				Never
		5	4	3	2	1
Always	5	27.6	41.3	23.2	5.8	2.1
	4	6.7	48.3	34.0	8.3	2.7
	3	2.6	26.8	50.1	16.0	4.5
	2	2.1	16.8	41.5	29.5	10.1
Never	1	2.7	12.1	30.7	27.6	26.9
		Child born or adopted in biennium				
		Always				Never
		5	4	3	2	1
Always	5	46.1	27.1	26.3	0.5	0.0
	4	5.2	54.0	29.6	8.7	2.5
	3	3.3	29.2	49.3	13.3	4.9
	2	0.2	22.8	34.4	30.7	11.9
Never	1	3.2	9.2	25.2	37.2	25.2
		WIFE				
		No child born or adopted in biennium				
		Always				Never
		5	4	3	2	1
Always	5	23.6	47.7	18.7	8.2	1.8
	4	9.2	51.8	31.3	5.8	1.9
	3	3.7	28.9	47.5	15.8	4.1
	2	2.5	15.7	42.6	28.5	10.7
Never	1	2.9	13.2	31.4	29.0	23.5
		Child born or adopted in biennium				
		Always				Never
		5	4	3	2	1
Always	5	17.1	60.6	22.3	0	0
	4	10.1	48.0	30.2	9.6	2.1
	3	1.7	36.5	45.3	14.9	1.6
	2	6.8	32.3	37.1	15.9	7.9
Never	1	5.6	22.7	22.6	29.4	19.7

Table 2a. Transition Matrices on Financial Stress, with or without Births, HILDA 2001-12

		HUSBAND				
		No child born or adopted in year				
Financial Satisfaction:		Dissatisfied				Satisfied
		5	4	3	2	1
Dissatisfied	5	42.3	25.7	25.2	5.8	1.0
	4	15.4	29.2	35.7	18.4	1.3
	3	3.9	13.0	45.2	35.2	2.7
	2	0.7	2.6	20.2	65.1	11.4
Satisfied	1	0.9	1.2	7.8	40.2	49.9
		Child born or adopted in year				
		Dissatisfied				Satisfied
		5	4	3	2	1
Dissatisfied	5	31.8	23.8	27.4	11.5	5.5
	4	13.5	28.8	33.2	22.3	2.2
	3	4.0	13.4	45.1	35.1	2.4
	2	0.9	3.8	25.3	63.8	6.2
Satisfied	1	0.2	2.9	7.2	48.6	41.1
		WIFE				
		No child born or adopted in year				
		Dissatisfied				Satisfied
		5	4	3	2	1
Dissatisfied	5	30.4	27.3	28.0	12.0	2.3
	4	13.9	27.1	38.3	18.4	2.3
	3	3.5	12.8	45.4	34.7	3.6
	2	1.0	3.6	21.0	61.1	13.3
Satisfied	1	0.4	1.4	7.3	42.2	48.7
		Child born or adopted in year				
		Dissatisfied				Satisfied
		5	4	3	2	1
Dissatisfied	5	22.5	26.4	42.0	9.1	0
	4	14.6	23.2	37.3	23.0	1.9
	3	5.5	15.2	48.2	28.3	2.8
	2	1.6	3.2	30.2	57.4	7.6
Satisfied	1	0.7	0.6	9.4	39.8	49.5

Table 2b. Transition Matrices on Financial Stress, with or without Births, SOEP 2002-12

		HUSBAND				
		No child born or adopted in biennium				
Financial Satisfaction:		Dissatisfied				Satisfied
		5	4	3	2	1
Dissatisfied	5	44.0	24.4	22.5	5.7	3.4
	4	13.8	33.6	34.3	16.4	1.9
	3	6.0	18.0	43.2	29.5	3.3
	2	1.5	5.7	22.2	60.5	10.1
Satisfied	1	1.1	3.4	13.8	37.1	44.6
		Child born or adopted in biennium				
		Dissatisfied				Satisfied
		5	4	3	2	1
Dissatisfied	5	52.7	33.3	7.4	6.6	0
	4	8.0	42.4	34.8	12.6	2.2
	3	4.0	15.5	48.2	31.1	1.2
	2	2.4	10.0	23.2	57.5	6.9
Satisfied	1	0	5.9	7.6	42.6	43.9
		WIFE				
		No child born or adopted in biennium				
		Dissatisfied				Satisfied
		5	4	3	2	1
Dissatisfied	5	35.6	29.4	19.4	13.1	2.5
	4	11.1	30.6	35.2	19.0	4.1
	3	5.1	17.8	39.1	34.0	4.0
	2	1.0	6.2	19.8	60.5	12.5
Satisfied	1	1.1	2.0	11.9	33.4	51.6
		Child born or adopted in biennium				
		Dissatisfied				Satisfied
		5	4	3	2	1
Dissatisfied	5	44.7	19.2	28.0	6.4	1.7
	4	10.2	27.6	31.3	29.8	1.1
	3	7.8	24.5	32.6	31.9	3.2
	2	2.6	6.9	25.4	52.9	12.2
Satisfied	1	1.2	8.4	7.8	45.8	36.8

DATA APPENDIX

A. HILDA Survey

The sample comprises individuals who:

- are married or in a *de facto* relationship in the current wave and the previous wave;
- are not in a same-sex relationship;
- are in a relationship with the woman between 18 and 45 years of age (inclusive);
- indicate they have the same partner in both waves (and both partners agree);
- live in the same household (with no other persons other than dependents);
- report valid responses for time stress and financial stress in the current and previous wave; and
- report valid responses for them or their partner giving birth to (or adopting) a child in the previous 12 months – and both partners agree.

With respect to specific variables:

Time stress is constructed from answers to the question '*How often do you feel rushed or pressed for time?*', which is asked in the self-completion part of the survey. Possible answers are: Almost always; Often; Sometimes; Rarely; and Never. The original values attached to these responses range from 1 to 5, respectively, but scores are reversed so that higher values represent higher stress levels.

Financial stress is the answer to the question, asked in the interview portion of the survey, '*I am now going to ask you some questions about how satisfied or dissatisfied you are with some of the things happening in your life. I am going to read out a list of different aspects of life and, using the scale on SHOWCARD [..], I want you to pick a number between 0 and 10 that indicates your level of satisfaction with each. The more satisfied you are, the higher the number you should pick. The less satisfied you are, the lower the number.*' The actual showcard shows a scale represented by a line with equally spaced ticks numbered 0 to 10 (from left to right). Only the two end points of the scale are labelled; 0 denotes 'totally dissatisfied' and 10 denotes 'totally satisfied' (10). The third entry on the list of eight aspects of life the respondent is asked to rate is '*Your financial situation?*'

Birth in past 'year' is our measure of birth/adoption uses information collected in the household relationships grid. This gives a precise indicator for a birth between two waves (on average 12 months apart).

Weekly hours paid employment plus commuting is based on the respondents answer to the question, asked in the self-completion portion of the survey, '*How much time would you spend on each of the following activities in a typical week?*' Among the nine activities listed are '*Paid employment*' and '*Travelling to and from a place of paid employment*'. Respondents are instructed to make sure not to count any activity twice and if they do not spend time on a particular activity they record a zero. If either the paid employment or commuting component is missing, the sum (hours paid employment plus commuting) is also missing.

Weekly hours home production is based on the same question for which weekly hours of paid employment plus commuting is derived. The activities that make up home production are:

- Household errands, such as shopping, banking, paying bills, and keeping financial records (but do not include driving children to school and to other activities).

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- Housework, such as preparing meals, washing dishes, cleaning house, washing clothes, ironing and sewing.
- Outdoor tasks, including home maintenance (repairs, improvements, painting etc.), car maintenance or repairs and gardening.
- Playing with your children, helping them with personal care, teaching, coaching or actively supervising them, or getting them to child care, school and other activities.
- Looking after other people's children (aged under 12years) on a regular, unpaid basis.
- Caring for a disabled spouse or disabled adult relative, or caring for elderly parents or parents-in-law

If any of the six home production components is missing, the sum (weekly hours home production) is also missing.

Wages/Earnings is the derived variable 'Current weekly gross wages and salary - all jobs ($) [imputed] [weighted topcode]', which despite the label is actually the gross weekly in a usual week It is the sum of wages and salary in the main job and other employment. Missing values for these components have been imputed (see Hayes and Watson, 2009). To preserve the weighted mean, top-coded variables have a value substituted which is the weighted average value of all cases which exceed the threshold.

Unearned income is constructed by taking household total gross income from all sources (excluding windfall income) for the preceding financial year and subtracting the component due to salaries and wages. Missing values for the components have been imputed (see Hayes and Watson, 2009). Note that this variable is a lagged variable by construction, although by how many months depends on when the respondent was interviewed (Australia's financial year runs from 1 July to 30 June, whereas the bulk of respondents are interviewed between September and November each year).

Number of children are derived variables constructed from the household relationships grid. They represent the number of dependent children of particular ages in the household (indicated age ranges in the variable names are inclusive), and include partner's children. In the event of a birth between waves, the number of children in the household aged 0 to 4 is reduced by 1 in the wave immediately following the birth only, to ensure the effect of the birth is picked up by the dedicated dummy variable 'birth in last year' and the new addition does not get double counted.

B. German SOEP

The sample comprises individuals who:

- are married or in a de-facto relationship in the current wave and two waves ago;
- are not in a same-sex relationship;
- are in a relationship and the woman is between 18 and 45 years of age inclusive;
- indicate they have the same partner in this wave as they did two waves ago (and both partners agree);
- live in the same household (with no other persons other than dependents);
- report valid responses for time stress and financial stress in the current wave and two waves ago; and
- report valid responses for them or their partner giving birth to (or adopting) a child in the previous 12 months – and both partners agree

With respect to specific variables:

Time stress is based on responses to a question, asked in the individual questionnaire 'Health and Illness' section, that reads: *Please think about the last four weeks. How often did it occur within this period of time, that [...]*. It then asks about 8 specific domains, one of them which reads *"..you felt rushed or pressed for time?"* Possible answers to this question are 'always', 'often', 'sometimes', 'hardly ever', and 'never'. These are recoded from 1 to 5 with higher levels representing greater stress.

Financial stress is derived from answers to the question, asked in the individual questionnaire 'Your current life situation' section: *How satisfied are you today with the following areas of your life? Please answer by using the following scale: 0 means "totally unhappy", 10 means "totally happy". How satisfied are you with [...]*. It then asks about 11 specific domains, one of which reads '*your household income?*' The actual questionnaire shows a scale of equally spaced blocks numbered 0 to 10 (from left to right). Only the two end points of the scale are labelled; 0 denotes 'totally unhappy' and 10 denotes 'totally happy'.

Birth in last two 'years' is based on the penultimate question in the individual questionnaire 'Family situation and background' section asks about 12 specific live events related to family. Specifically, the question reads: *Has your family situation changed since [wave-specific date]? Please indicate if any of the following apply to you and if so, when this change occurred*. One of the 12 family related life events is '*Had a child*'. Due to the interaction of the wave-specific date in the question itself, the date of birth, and the date of the actual interview it is not straightforward to get an indicator for a birth between this and the previous wave, but very easy to establish if a birth occurred between the current wave and two waves ago by using the variable *fnpar0593*.

Weekly hours paid employment is from the individual questionnaire 'Your current employment' section, respondents are first asked about their contractual working hours (if they are employed), followed by the question (which forms the basis of our variable): *And how many hours do your actual working-hours consist of including possible over-time?* with responses required for a week. Unlike the HILDA Survey data, this measure does not include commuting times.

Hours home production is based on a series of variables related to time use. In the section 'Your current life situation' of the individual questionnaire (which also collects the information on satisfaction with household finances) respondents are asked: *What does a typical weekday look like*

for you? How many hours per day do you spend on the following activities? Please give only whole hours. Use zero if the activity does not apply! It then asks about eight specific activities. We construct household production by summing the amount of time spent on: supporting persons in care; running errands; doing housework; caring for children; and doing repairs around the house. If any of the home production components is missing, the sum (weekly hours home production) is also missing.

Wages/Earnings is based on (generated) current gross labour income per month in Euro. The amount is divided by 1000 x 4.3 to obtain weekly amounts in EUR to correspond with the weekly amounts in AUD for the HILDA Survey data. The underlying question on which the variable is based comes from the individual questionnaire 'Your current employment' section and reads: *How high was your income from employment last month? If you received extra income such as vacation pay or back pay, please do not include this. Please do include overtime pay. If you are self-employed: Please estimate your monthly income before and after tax. Please fill in both: gross income, which means wages or salary before deduction of taxes and social security; and net income, which means the sum after deduction of taxes, social security, and unemployment and health insurance.* If the information was missing the data was imputed by the SOEP team (hence the reference to 'generated' in the variable description).

Unearned income is constructed by taking the household's pre-Government income and subtracting household labour income, both of which are annual amounts and apply to the previous calendar year. Household public transfers and Social Security pensions are then added in. This amount is divided by 52 (weeks) and 1000 to obtain a measure expressed in Euros per week. Pre-Government income is the sum of total family income from labor earnings, asset flows, private retirement income and private transfers. Labor earnings include wages and salary from all employment including training, self-employment income, and bonuses, overtime, and profit-sharing. Asset flows include income from interest, dividends, and rent. Private transfers include payments from individuals outside of the household including alimony and child support payments. In order to arrive at unearned income, the component from labor earnings is then subtracted. Specifically, labor earnings is the sum of income from the primary job, any secondary jobs, self-employment, service pay, 13th month pay, 14th month pay, Christmas bonus pay, holiday bonus pay, miscellaneous bonus pay, profit-sharing income, indemnity payments, and commuting expenses or travel grants.

Numbers of children are based on the information in the household question form. In case there has been a birth in between the last two waves (because of information on time and financial stress is collected biannually), the number of children aged 0 to 4 is reduced by 1 in the wave following the birth only, to ensure the effect of the birth is picked up by the dedicated dummy variable 'birth in last two years' and the new addition does not get double counted.