Intra-Household Specialization in Housework in the United States and Denmark

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**Objective.** Focusing on housework activities, we hypothesize that the degree of specialization is influenced by economic notions of efficiency, as well as by time constraints and egalitarian values. **Methods.** Employing time-use data on U.S. and Danish couples, we construct a composite index measure of intra-household specialization. We analyze the comparability of reported time use and our specialization index using different types of data, and then model specialization using a multivariate two-limit Tobit. **Results.** We find evidence that Danish households specialize less than U.S. households and that children, particularly preschool-aged children, are associated with significantly increased specialization in the United States but not in Denmark. **Conclusions.** We postulate that the more egalitarian social structure in Scandinavia is a driving force behind the lower rate of specialization observed in Denmark. Further, we believe the subsidized child-care services provided by the Danish welfare system reduce the impact children have on specialization in ordinary housework tasks.

A key advantage to multiperson households is their ability to benefit from specialization and the division of labor. A prominent example of such intra-household specialization is the “traditional” household with a stay-at-home housewife and a career-focused husband. However, even in modern households and even considering only the set of housework tasks, specialization occurs, with each partner frequently contributing substantial time but to different tasks. Economic theory suggests that the degree of intra-household specialization in housework will be a function of the costs and benefits associated with such specialization. Sociological models place more emphasis...
on household value systems. Of particular interest is whether households
that are more egalitarian minded might specialize less, such that household
values trump household economics. As Denmark is widely reputed to be a
more egalitarian society than the United States, we compare the degree of
intra-household specialization in housework between these two countries
using a measure of intra-household specialization in housework that
accounts for task specificity.

The U.S. data we employ provide relatively detailed questionnaire
information on time use, while the Danish data provide both bare-bones
questionnaire data on participation as well as detailed 48-hour time diary
records. We find that the precise level of specialization differs systematically
based on the type of time-use data employed. Specifically, participation-
based measures yield lower estimates of specialization than more detailed
questionnaire data, which in turn yield lower estimates of specialization than
time-diary-based data. Nevertheless, our analysis reveals that there is less
specialization in Danish than in U.S. households, as would be expected if
household values play an important role in time allocation decisions.
Econometric analysis reveals substantial similarities in the relation between
household characteristics and specialization within the United States and
Denmark. The most notable difference is the fact that children are associated
with more specialization in the United States but not in Denmark.

Data

We employ U.S. data from the second (1992–1994) wave of the National
Survey of Families and Households (NSFH)¹ and Danish data from the
2001 Danish Time Use Survey (DTUS). All estimates from the NSFH are
weighted to adjust for the oversampling of recently married and cohabiting
households, but the results from unweighted analysis are substantially
similar. The Danish sample originates from a representative sample of the
relevant Danish adult population drawn from the administrative registers at
Statistics Denmark and as such is unweighted. In both Denmark and the
United States, we restrict the sample to heterosexual couple households in
which both partners are no older than age 60, not enrolled in school, and
not missing information on personal and household characteristics. The
youngest respondent was over age 19 in the NSFH and age 20 in the DTUS.
Our initial samples consist of 4,863 couples from the United States and
1,326 from Denmark. As we need time-use data from both partners to
calculate the degree of specialization, neither the more recent American
Time Use Survey (ATUS) nor the 1987 Danish Time Use Survey (1987

¹We focus on the second wave because the first wave of NSFH time-use data had sub-
stantial missing data problems and the third wave was collected from a much more restricted sample.
DTUS) can be used for this analysis as each collects data from only one person per household. Analysis of the substantially smaller and earlier 1985 American Use of Time (1985 AUT) survey yields substantially similar results.

The NSFH time-use data are derived from questionnaires that ask each partner to report how much time they and how much time their partner “normally spends” on specific housework activities during a week. We choose to use the data as reported by women for both partners. There is some evidence that women provide more accurate estimates than men (Kan, 2006; Lee and Waite, 2005; Kamo, 2000) and generally researchers have relied more heavily on questionnaire reports provided by women. There is also evidence, particularly in the United States, that responses can differ systematically by the gender of the respondent (Davis and Greenstein, 2004; Fuwa, 2004; Batalova and Cohen, 2002; Winkler, 2002; Lee and Waite, 2005). Results here using data as reported by men are substantially the same and available on request.

An alternative choice would be to use only self-reports. However, we feel that one individual’s reported time use may not be comparable with another’s if different individuals perceive time differently and so have a different “bias” to their questionnaire reporting. A total of 3,675 women provide complete and credible data on housework for their household. 2

The DTUS is relatively unique in providing two separate measures of housework time. One is based on questionnaire data that provide information not on the time spent on each housework task but on who participates or contributes to each task (participatory questionnaires). These participatory data are derived from the question: “Who does the following activities in your household?” No individual measures of time accompany these responses, though an aggregate measure of time spent on housework is included for each partner. A sample of 1,318 Danish households provides answers to the participation questions. The other data are time diary data that ask each partner within the household to record all their activities during a weekday and a weekend day. Respondents report the starting and ending times of each activity in 10-minute intervals throughout a 24-hour period. The activity questions are open ended and coded into standardized activities following the recommendations for European time-use surveys (Eurostat, 2000). We consider a diary to be complete if activities are recorded for at least 23 of 24 hours. By this measure, 711 households provide a complete set of four time diaries: two diaries from each partner in the household. We use a weighted sum of these diary reports that assigns a weight of 5 to the weekday and a weight of 2 to the weekend surveys, in order to construct a measure of weekly time use from the diary data that is comparable to the weekly measure available from the NSFH and the Danish questionnaires.

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2We deem unreasonable any report suggesting that an individual spent more than 70 hours a week on housework and any report suggesting neither partner spends any time on housework.
Housework constitutes a diverse set of tasks. We focus on some of the most time-intensive housework activities while also trying to capture the less frequent tasks that are typically more male dominated (South and Spitze, 1994). Thus we consider meal preparation, dishes, cleaning of the residence, laundry, home maintenance, driving chores, and shopping. The NSFH data provide separate measures for each of these seven housework activities. The Danish questionnaires distinguish between gardening and home maintenance, and identify three different driving activities (Driving to School/Day Care, Picking up from School/Day Care, and Driving Children to/from Other Activities) all related only to children. These tasks are combined to match the NSFH categories. The Danish time-use diaries also distinguish between gardening and home maintenance activities, but lump all time spent driving children together. However, they further distinguish between laundry and “ironing and mending,” which are combined here to create comparable categories. The key difference between the Danish and U.S. measures is likely that the U.S. measure of driving chores includes driving of adults.

Any time spent preparing food for, cleaning up after, and, certainly, driving children is incorporated, but child-care activities per se (such as physical care and reading) are not. This exclusion is justified by evidence that the decision to allocate time to child-care is quite distinct from the decision to spend time on either housework or employment (Kimmel and Connelly, 2007), likely in part because time with children involves aspects of both production and consumption.

Sample mean housework data are presented separately by gender in Table 1 for each of the seven household tasks and for the total. The first two columns report mean weekly hours reported from the U.S. questionnaire data. On average, women in the United States report spending almost 31 hours per week on housework while they report their partners spending only about 13 hours. The second two columns convert these hour measures to participatory measures to more closely match the Danish participatory questionnaire data. This conversion is accomplished by substituting a 1 for any reported time in an activity. Thus, over 96 percent of women in the United States report spending some time every week on dishes as compared with 64 percent of men. In total, U.S. women report spending some time on six of these seven tasks while men are reported to spend time on only about four. By comparison, the Danish questionnaire data (presented in the third two columns) indicate that both men and women engage in somewhat fewer activities. This difference is largely attributable to differences in driving, an activity in which substantially fewer Danes report participating, although fewer Danes also report time spent on meals, laundry, or cleaning as compared to Americans. Only in the case of home maintenance activities do Danes report more participation. The final two columns provide the sample means for the Danish time diary data and show that Danish women spend substantially less time on housework overall than U.S. women (17.6 hours a week vs. 30.8) and less time on every activity except shopping. Danish men
report spending a bit less time than U.S. men on housework (11.0 vs. 12.8 weekly hours), but more time on meals and shopping. Gender differences are apparent in both countries, with women spending more time and reporting more participation on all but home maintenance activities as compared to men in both countries.

**Measuring Intra-Household Specialization**

However, the sample means can hide the actual degree of intra-household specialization. Specialization occurs when household members divide up tasks and individually allocate their time to only a subset of activities, rather than divide their time more evenly across all tasks. Aggregating time spent across tasks to construct a single share measure will understate the degree of intra-household specialization if different individuals perform different household tasks. A few studies model the share of time contributed by one individual task by task (Twiggs, McQuillan, and Ferree, 1999), but face the

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**TABLE 1**

Housework from U.S. Questionnaire and Danish Questionnaire and Diary Data

<table>
<thead>
<tr>
<th></th>
<th>U.S. Questionnaire Data</th>
<th>U.S. Questionnaire Data</th>
<th>DK Questionnaire Data</th>
<th>DK Diary Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time-Use Participatory</td>
<td>Participatory Time-Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women  Men</td>
<td>Women  Men</td>
<td>Women  Men</td>
<td>Women  Men</td>
</tr>
<tr>
<td>Dishes</td>
<td>5.30 (3.83) 3.83</td>
<td>0.97 (0.18) 0.64</td>
<td>0.86 (0.35) 0.79</td>
<td>1.67 (1.49) 1.07</td>
</tr>
<tr>
<td>Meals</td>
<td>8.23 (5.19) 2.43</td>
<td>0.98 (0.13) 0.67</td>
<td>0.90 (0.30) 0.57</td>
<td>5.44 (3.66) 2.67</td>
</tr>
<tr>
<td>Cleaning</td>
<td>6.88 (5.24) 1.63</td>
<td>0.98 (0.15) 0.60</td>
<td>0.92 (0.27) 0.49</td>
<td>3.23 (3.71) 1.43</td>
</tr>
<tr>
<td>Laundry</td>
<td>4.18 (3.09) 0.84</td>
<td>0.97 (0.18) 0.39</td>
<td>0.95 (0.21) 0.31</td>
<td>2.20 (2.37) 0.32</td>
</tr>
<tr>
<td>Home maintenance</td>
<td>1.62 (2.70) 3.79</td>
<td>0.57 (0.50) 0.85</td>
<td>0.68 (0.47) 0.95</td>
<td>1.36 (3.80) 3.16</td>
</tr>
<tr>
<td>Driving</td>
<td>1.87 (2.80) 1.22</td>
<td>0.56 (0.50) 0.44</td>
<td>0.39 (0.49) 0.35</td>
<td>0.92 (1.90) 0.50</td>
</tr>
<tr>
<td>Shopping</td>
<td>2.70 (1.86) 1.53</td>
<td>0.97 (0.17) 0.59</td>
<td>0.93 (0.26) 0.48</td>
<td>2.80 (3.07) 1.88</td>
</tr>
<tr>
<td>Total time/tasks</td>
<td>30.78 (14.85) 12.83</td>
<td>6.00 (10.01) 4.18</td>
<td>5.63 (14.96) 4.06</td>
<td>17.63 (17.63) 11.03</td>
</tr>
<tr>
<td># of observations</td>
<td>3,675 3,675 3,675</td>
<td>3,675 3,675 3,675</td>
<td>1,318 1,318 1,318</td>
<td>711 711</td>
</tr>
</tbody>
</table>

**NOTE:** Standard deviations in parentheses.
problem that all these task-specific decisions must be jointly determined. Still others construct a single composite measure that tries to account for specialization by task as well as heterogeneity across households in the allocation of tasks (Blair and Lichter, 1991; Stratton, 2005).

We take the latter approach and construct a composite index of intra-household specialization in housework that takes a value of 0 when there is no intra-household specialization in the seven housework tasks we observe and a value of 1 when there is complete intra-household specialization. Hence, a value of 0 means that each individual contributes (equally where measured) to each task, and a value of 1 means that each task is performed by only one partner. Where the amount of time spent is reported, the tasks are weighted by the amount of time spent and the index value is equivalent to a measure of the degree to which household housework time would have to be increased to achieve equal sharing.

The specialization index (SI) has the following form:

\[
SI = \frac{\sum_{i=1}^{7} \text{Max}(\text{HW}_i^M, \text{HW}_i^F)}{\sum_{i=1}^{7} (\text{HW}_i^M + \text{HW}_i^F)} - 0.5 \times 2,
\]

where \(\text{HW}_i^M\) and \(\text{HW}_i^F\) indicate the time spent on housework task \(i\) by men and women, respectively. Thus, if both individuals report spending the same amount of time on housework, the ratio of the sums will be one-half and the index value will be 0, whereas if one partner always reports no time in an activity, the ratio of the sums will be 1 and the index value will be 1. Using the sample mean aggregated housework times from Table 1, we obtain an SI measure of 0.41 using the U.S. questionnaire data on time use \([= 2^* ((\text{max}(30.8, 12.8)/(30.8+12.8)) - 0.5) = 2^* ((30.8/43.6) - 0.5)]\) and a mere 0.23 for the Danish diary data. As discussed above, however, aggregating housework time understates specialization because it ignores specialization by task. Using the sample means from the U.S. questionnaire data on time use by task, we obtain an SI measure of 0.55 \([= 2^* (((\text{max}(5.3, 3.8)+\text{max}(8.2, 2.4)+\text{max}(6.9, 1.6)+\ldots)/(5.3+3.8+8.2+2.4+6.9+1.6+\ldots)) - 0.5)]\). The SI measure calculated using the similarly disaggregated sample average Danish time-use data is 0.41. But even using the sample means for the seven less aggregated housework tasks understates specialization because it fails to capture differences in specialization by household. For example, sample means indicate that men and women spend about the same amount of time driving, but it may be that in half the households men do the driving and in the other half women do the driving. Taking all this variation by task and by household into consideration, the specialization index increases to 0.62 using the U.S. questionnaire data and to 0.63 using the Danish diary data on time use (see Table 2).

The SI measure using the participatory data is calculated such that the numerator takes a value of 1 for those single-activity tasks ("meal
Intra-Household Specialization in Housework

TABLE 2
Specialization Index Values from U.S. Questionnaire and Danish Questionnaire and Diary Data

<table>
<thead>
<tr>
<th></th>
<th>U.S. Questionnaire Data</th>
<th></th>
<th>U.S. Questionnaire Data</th>
<th></th>
<th>DK Questionnaire Data</th>
<th></th>
<th>DK Diary Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time-Use</td>
<td>Participatory</td>
<td>Time-Use</td>
<td>Participatory</td>
<td>Time-Use</td>
<td>Participatory</td>
<td></td>
</tr>
<tr>
<td>Full sample mean</td>
<td>0.62</td>
<td>0.44</td>
<td>0.35</td>
<td>0.63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributional analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.00–0.19</td>
<td>4.76%</td>
<td>28.11%</td>
<td>39.23%</td>
<td>1.55%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.20–0.39</td>
<td>14.07%</td>
<td>19.32%</td>
<td>27.85%</td>
<td>14.49%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.40–0.59</td>
<td>24.84%</td>
<td>23.43%</td>
<td>16.54%</td>
<td>29.96%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.60–0.79</td>
<td>29.90%</td>
<td>12.05%</td>
<td>12.59%</td>
<td>30.94%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.80–1.00</td>
<td>26.42%</td>
<td>17.09%</td>
<td>3.79%</td>
<td>23.07%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of observations</td>
<td>3,675</td>
<td>3,675</td>
<td>1,318</td>
<td>711</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Intra-Household Specialization in Housework

preparation,” “dishes,” “cleaning,” “laundry,” and “shopping”) that the respondent indicates are performed by only one partner, one-half when both partners contribute, and 0 if neither participate. When two or more activities are aggregated to create a single task (as is the case for “home maintenance” and “driving”), an average value of specialization is constructed across these activities. The denominator consists of the number of different tasks performed within the household. This specialization index is not as “smooth” as those constructed from the NSFH time-use data or from the DTUS time diary data because it captures only extreme levels of participation and because it weights each activity equally. If both partners spend some time on an activity, no matter how unbalanced that time is, the bias will be for the participatory measure to report shared activity and hence to understate specialization. The bias attributable to the equal weighting of tasks is more difficult to sign. If there is more specialization in those activities that take more time, the participatory index will impart a further downward bias to the specialization measure, while less specialization in those activities that take more time will overstate actual specialization.

In fact, the participatory-based specialization index values reported in Table 2 do indicate far less specialization (0.44 in the United States and 0.35 in Denmark) and much more bunching at 0 (no specialization) than the time-use-based measures. This is true even when comparing the two Danish indices for the same 711-person diary-based sample (results available on request). Additional analysis using the U.S. data (results available on request) indicates that this lower measure of participation is largely due to the all-or-nothing classification of the participatory measure and not the equal weighting of activities.
Nonparametric Analyses

The results reported in Table 2 suggest that specialization is similar cross-country (0.62 in the United States vs. 0.63 in Denmark) when calculated from time-use data, but greater in the United States than in Denmark (0.44 vs. 0.35) when calculated using participatory data. Besides differences likely to arise between the time-use and the participatory-based measures of specialization, there are other cross-country differences in the data that are worth noting.

First, while in general time diary methods are believed to provide a more accurate accounting of time spent than any type of questionnaire data (Robinson, 1985), time diary data only capture activities performed during the diary days. These days are not necessarily representative of the usual tasks performed by each partner over the course of a week. Of particular concern is the fact that short time diaries will capture specialization not only by task but also by day (as, e.g., when partners take turns doing dishes). We partially assess the magnitude of this bias by recalculating our Danish time-use specialization index using each of the two 24-hour diaries separately. We find that the index value rises approximately 10 percent to 0.72 for weekdays (0.69 for weekends) when using only one 24-hour diary. This result suggests that the index is indeed biased upward as a result of the short nature of the sample period. Thus, while the time-use-based index measures reported in Table 2 are similar between countries, we believe that the Danish time-use-based specialization index is biased upward and that there is greater specialization in the United States. This conclusion is supported by the participatory measures.

Second, there is evidence that questionnaire data overstate all time spent (Robinson, 1985; Shelton and John, 1996; Lee and Waite, 2005) or overstate time spent on frequent but understate time spent on infrequent activities (Bonke, 2005), and that this differential is generally greater for housework time than for paid work. One reason for this differential is that housework tasks are often performed as a secondary activity (Robinson, 1985; Kitteroed, 2001; Floro and Miles, 2003; Lee and Waite, 2005). Respondents may incorporate this secondary time in responding to questionnaires on time use, but our specialization index is calculated using only

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3This difference in the participation indices likely understates the cross-country difference because two of the seven housework tasks are constructed from multiple activities for the Danish measure and so the Danish measure will likely reflect more specialization as compared to the U.S. measure.

4The time diaries will also capture fewer tasks. Of the seven tasks reflected in our specialization measure, households on average report spending time on 5.4 in the diaries versus 6.3 in the questionnaire data. How this might impact our specialization measure depends on the degree of specialization of the missing tasks.

5This is not the only reason for the differential, as Robinson (1985) reports that time spent sleeping is also higher from questionnaire than from time diary data even though sleeping is never a secondary activity.
the primary time use recorded in the time diaries. As the DTUS time diaries provide information on both primary and secondary time-use activities, we can assess the importance of secondary time uses. Results indicate that while the time spent on housework and the number of different tasks reported increase (5 percent and 2 percent, respectively) when incorporating housework as a secondary activity, the average specialization index does not substantially change, going from 0.63 to 0.62 (results available on request). Hence, time diary measures of specialization are much more sensitive to the number of diary days than to the primary/secondary classification of activities.

Third, the different Danish samples for the questionnaire data (1,318 observations) and the time diary data (711 observations) could explain the different degrees of specialization. Fortunately, the participatory time-use data are available for both samples. The mean SI values calculated using these data for the two samples are virtually identical at 0.348 and 0.349, respectively.

Fourth, our specialization measures focus only on housework activities. As households may also specialize across market and housework sectors, our measures will likely understate actual intra-household specialization. To ensure that the cross-country differences in intra-household specialization we observe are not attributable to the lower prevalence of dual earner couples in the United States, and hence to differences in market/home specialization, we calculate the index value for those U.S. households in which both partners are employed in the market. The index is smaller for this sample (the participatory-based measure is 0.40 compared to 0.44), but still over 15 percent larger than that observed in Denmark.

Finally, we recognize that intra-household specialization may change over time. The DTUS data come from a survey administered in 2001 while the NSFH data come from a survey administered almost 10 years earlier in 1992–1994. We examine this issue by using time diary data from the 1985 AUT and the 2003 ATUS in the United States and from the 1987 and 2001 DTUS in Denmark. These surveys clearly demonstrate that less time is now spent on housework, as time spent per week per couple on these seven activities declined from 34 to 29 hours in the United States and from 31 to 27 hours in Denmark. This change in time use, however, need not also imply a change in intra-household specialization. Unfortunately, neither the 2003 ATUS nor the 1987 DTUS provides information on the time use of both partners, for which reason we cannot calculate a true intra-household specialization measure using these data. Instead, we construct a makeshift measure of intra-household specialization for each of these samples using the sample average time men and women in couples spend on each of the seven housework activities. As discussed earlier, such aggregated measures will understate specialization because they fail to capture within-household specialization. The numbers (reported in Table 3) do show a slight downward trend in specialization in the United States (about a 5 percent decline) and a more remarkable decline (about 20 percent) in Denmark. In each decade, however, specialization is consistently greater in the United States.
than in Denmark. Indeed, specialization appears to be greater in 2003 in the United States than in 1987 in Denmark. Given these results, we do not believe the greater specialization we find in the United States is attributable to the earlier administration of this survey.

In conclusion, we find evidence that there is more specialization in the United States than in Denmark. Looking at the more comparable participatory-based measures, the mean specialization index value is 25 percent higher in the United States and the fraction of households that are highly specialized (having an index value of 0.80 or higher) is three to four times greater in the United States than in Denmark. The fact that a greater fraction of U.S. households report 100 percent specialization (7 percent) than the fraction of Danish households reporting an index value of 0.8 or higher (3.8 percent) is also supportive of this conclusion.

Theory and Hypotheses

Specialization and the division of labor are touted by standard economics texts as fundamental principles of economics because they allow production at the lowest possible cost: by dividing up tasks, less time and hence money is spent in task setup and learning by doing is also enhanced. Becker (1991) extended these principles to the analysis of households and argued that multiperson households have an advantage over single-person households since they are able to take advantage of the benefits offered by specialization. Although Becker focuses his discussion on the specialization of one partner in market and the other in household production, the notion of specialization can be applied more broadly to explain intra-household time allocation as well. Pollak (2007) explicitly extends the literature to consider multiple sectors and to recognize the importance of individual and household technology in the production of household goods. Although Becker theorizes that efficient households will completely specialize, Pollak demonstrates that the time allocation decision will depend on process benefits and the returns to scale associated with household production. With decreasing returns to scale, complete specialization may not be efficient.
In a related model of intra-household specialization, Stratton (2005) posits that the degree of such specialization depends on the expected costs and benefits associated with specialization. The costs in this model are primarily the fixed costs associated with changing activities. The benefits are the increased provision of household goods made possible by specialization. Both the costs and the benefits may differ for households with different characteristics. The benefits of specialization are likely to be greater the greater the differences in the relative ability/skill of the partners. Therefore, more diverse couples may specialize more than less diverse couples, where diversity can be measured in numerous dimensions: diverse educational background and large age differentials constituting two possibilities. Age and education also influence individuals’ market value of time and, hence, may influence the degree of intra-household specialization. Children, and particularly preschool-aged children, increase the value of time spent outside the market and so may increase the optimal degree of intra-household specialization. Further, characteristics of the residence (rural/urban, type of home) may be correlated with household demands, the number of tasks to be performed, and specialization.

Stratton (2005) argues that marital status and the duration of the relationship will be related to the degree of intra-household specialization as well through their influence on the costs associated with specialization. If there are costs associated with changing one’s activities, then the longer the expected period of specialization, the lower will be the present value of the cost of changing tasks when the relationship ends and the greater will be the optimal degree of specialization. More enduring relationships should therefore be more specialized. Relationship type may also matter. In the United States, married couples tend to be together longer than cohabiting couples and thus should be more specialized. In Denmark, the differences between married and cohabiting partnerships are less marked and so the relationship type is less likely to be associated with intra-household specialization.

There is also a substantial sociological literature discussing intra-household time allocation (for a review, see Shelton and John, 1996). In this literature, both relative resource theory and time availability theory posit that housework is a necessary but undesirable task. Relative resource theory says that individuals with the most resources negotiate their way out of housework. This is akin to bargaining theory in economics, which suggests that those household members with the most power will do less housework (Hersch and Stratton, 1994). Power is often linked to earnings and so to relative wages or relative education levels, but while this theory explains who does housework, it does not necessarily explain intra-household specialization.

Alternatively, the time availability approach posits that individuals face time constraints and that housework will be performed by the least time-constrained party. Technically, all individuals share a common time constraint (24 hours), but as suggested by economic theory, individuals with a higher value of market time will logically spend more time in the labor
market and so have less time available for other tasks. It does not seem unreasonable to extend time availability theory to posit that flexibility as well as availability are key determinants of time allocation. Thus, households that have a higher overall opportunity cost of time may allocate tasks less based on gains from specialization and more based on who has the time to do the task that needs to be done at the time it needs to be done. In the long run, these allocations may be driven by efficiency considerations, but in the short run time constraints may lead to less specialization rather than more. Households that are more time constrained (whether because of a higher value of market time, the presence of children, or other increased demands for housework) may thus be observed specializing less.

The sociological literature focusing on the impact of egalitarian values is also relevant. Thus, couples who share more egalitarian views are expected to divide tasks more evenly, particularly if those tasks are undesirable. Hersch and Stratton (1994) and Shelton and John (1996) have used this theory to explain why more educated men contribute a greater share of household time to housework. One might also argue that younger “more liberated” persons have more egalitarian values than older persons, and these hypotheses match the predictions within economics and sociology that cohabiting couples and younger couples will be less specialized. However, where a sociological emphasis on egalitarian values suggests a negative relation between specialization and education, economic theory suggests a positive relation based on time value considerations. It is therefore an empirical question whether education is positively or negatively correlated with specialization. Batalova and Cohen (2002) argue that cohabiting couples on average have more egalitarian values and find that they are more likely to share housework time. Fuwa (2004) finds that married couples who initially cohabited are also more likely to share housework time, and that not only couples with more egalitarian values but also couples living in more egalitarian cultures will allocate time more equally to housework. His empirical work supports this hypothesis, though his measure of housework does not reflect time spent nor allow for specialization by task. Our decision to analyze specialization in both the United States and Denmark is driven in part by evidence (Fuwa, 2004) that the Scandinavian culture is more egalitarian than the U.S. culture, for which reason we expected less specialization in Denmark than in the United States.

**Explanatory Variables**

Pursuant to the theory, we model intra-household specialization in housework as a function of variables reflecting relative skills/abilities, market value of time, home value of time, other measures of time constraints, the expected duration of the relationship, and the type of the relationship. Relative skills and abilities are captured by measures of the difference between the man’s and woman’s age and education. The market value of time is captured by the age
and level of education\(^6\) of the man in the household and the difference between the man’s and the woman’s age and level of education. The household’s value of nonmarket time is reflected in nonlinear controls for the number of children in the household and an indicator for the presence of a child younger than school age (six in the United States, seven in Denmark). Residence in a single-family dwelling and in an urban area (SMSA in the United States and Copenhagen in Denmark) are identified to capture different demands on time and availability of market alternatives. Additional controls for region of residence and race are incorporated in the U.S. analysis. The total number of weekly hours reported spent on housework by both partners and the number of different housework tasks performed are incorporated as further measures of time constraints. Although we would like to control for the expected duration of the relationship, we have only information on the completed duration, which we enter in quadratic form. The duration measures are self-reported (but cross-checked against partner reports) in the U.S. data and obtained from annual Danish register data, which go back to 1980. Relationship duration is truncated for Danish couples formed before 1980. Those observations with truncated values are identified with a dummy variable. As the benefits associated with duration are predicted to rise at a decreasing rate, it is unlikely this restriction will substantially bias our results. Finally, we control for the type of relationship by including a dummy variable to identify married (as compared to cohabiting) couples.

Sample means (and standard deviations) for those variables defined comparably across countries are presented in Table 4. Full results are available on request. The first two columns present statistics for the U.S. questionnaire data. The second two columns show statistics for the questionnaire-based Danish sample and the last two columns show statistics for the diary-based Danish sample.

Within the U.S. sample, only about 7 percent of the couples are cohabiting relative to about 25 percent in the Danish samples. Although \textit{YEARS IN RELATIONSHIP} appears larger for the U.S. sample, this is largely the result of truncation at 22 years in the Danish data. When a similar constraint is imposed on the U.S. sample, \textit{YEARS IN RELATIONSHIP} for that sample declines. While about one-third of the Danish sample has been in a relationship for over 21 years, this is true for only about 28 percent of the U.S. sample. Thus, relationships appear to be somewhat more enduring in Denmark as well as less likely to involve formal marriage. Time spent on housework differs markedly cross-country. U.S. couples report spending almost 43 hours a week on the seven housework activities measured here. Danish couples report spending about one-third less time at these chores.\(^7\) This is

\(^6\) Dummy variables are incorporated in the case of the U.S. data to identify observations for which data on education are missing.

\(^7\) It is commonly the case that questionnaire reports overstate time use; however, the results here are notable because the Danish questionnaire data yield approximately the same mean time spent as the Danish diary data.
TABLE 4
Sample Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>U.S. Questionnaire Data</th>
<th>DK Questionnaire Data</th>
<th>DK Diary Data</th>
<th>Differencesa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time-Use</td>
<td>Participatory</td>
<td>Time-Use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Specialization index</td>
<td>0.62</td>
<td>0.24</td>
<td>0.35</td>
<td>0.25</td>
</tr>
<tr>
<td>Man’s education – Woman’s education</td>
<td>0.25</td>
<td>2.44</td>
<td>-0.10</td>
<td>2.85</td>
</tr>
<tr>
<td>Man’s age – Woman’s age</td>
<td>2.19</td>
<td>4.29</td>
<td>2.18</td>
<td>4.25</td>
</tr>
<tr>
<td>Man’s years of education</td>
<td>13.74</td>
<td>2.89</td>
<td>12.58</td>
<td>2.75</td>
</tr>
<tr>
<td>Man’s age</td>
<td>41.51</td>
<td>9.34</td>
<td>42.88</td>
<td>10.07</td>
</tr>
<tr>
<td>Dummy for 1 child in household</td>
<td>0.21</td>
<td>0.41</td>
<td>0.21</td>
<td>0.41</td>
</tr>
<tr>
<td>Dummy for 2+ children in household</td>
<td>0.42</td>
<td>0.49</td>
<td>0.35</td>
<td>0.48</td>
</tr>
<tr>
<td>Dummy for child younger than school age</td>
<td>0.28</td>
<td>0.45</td>
<td>0.30</td>
<td>0.46</td>
</tr>
<tr>
<td>Living in a single-family dwelling</td>
<td>0.74</td>
<td>0.44</td>
<td>0.83</td>
<td>0.38</td>
</tr>
<tr>
<td>Hours per week couple spends on housework</td>
<td>42.52</td>
<td>18.67</td>
<td>27.28</td>
<td>15.34</td>
</tr>
<tr>
<td>diary-based</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of housework activities reported</td>
<td>6.46</td>
<td>0.66</td>
<td>6.31</td>
<td>0.59</td>
</tr>
<tr>
<td>diary-based</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years in relationship</td>
<td>15.03</td>
<td>10.15</td>
<td>13.25</td>
<td>7.79</td>
</tr>
<tr>
<td>Dummy for truncated duration measure</td>
<td></td>
<td></td>
<td>0.32</td>
<td>0.47</td>
</tr>
<tr>
<td>Married</td>
<td>0.93</td>
<td>0.26</td>
<td>0.74</td>
<td>0.44</td>
</tr>
<tr>
<td>Number of observations</td>
<td>3,675</td>
<td>1,318</td>
<td>711</td>
<td></td>
</tr>
</tbody>
</table>

aIndication of statistical significance at the 5 percent level between: x = U.S. questionnaire data and DK questionnaire data; y = U.S. questionnaire data and DK diary data; z = DK questionnaire data and DK diary data.
true even when comparing the 2003 ATUS diary data to the 2001 DTUS and is rather surprising as the greater tax burden imposed on market purchases in Denmark would suggest that Danes should spend more not less time on housework than Americans. Higher tax rates increase the cost of purchasing substitutes relative to performing the task in house. Furthermore, Danes are more likely to live in a single-family dwelling and less likely to have more than two children—though not less likely to have children who are not yet in school. U.S. men are somewhat younger and have more years of schooling than their Danish counterparts. In both Denmark and the United States, women are about two years younger than their partners, and in the United States women are a little less well educated than their partners while in Denmark they are a bit better educated than their partners.

**Multivariate Analyses**

We proceed now to a multivariate analysis of intra-household specialization in housework in order to determine the degree to which economic and/or sociological theories can explain differences in specialization. As the specialization index is designed to run from 0 to 1 and clearly has some massing at the extreme values, we employ a two-limit Tobit specification in our analysis. Results are presented in Table 5, with the U.S. results presented first, followed by the Danish questionnaire- and time-diary-based results.

The first two variables are intended to capture differences in relative abilities, where greater differences should increase the advantages to specialization. Indeed, we see that for two of the three specifications, greater differences in education are associated with significantly greater specialization. Age differences have little impact in any specification.

Age and education levels, by contrast, may have different results depending on whether their association with time value or with egalitarian values has the greater impact. Older individuals are expected to have a higher market value of time and to have more “traditional” as compared to egalitarian values. As such, they are unambiguously expected to specialize more. This is indeed the case and the positive relation is significant in two of the three specifications. Although more education generally increases one’s market value of time, it is also generally associated with more egalitarian values. The coefficient estimates here indicate a uniformly significant negative relation between education level and specialization. This result, as well as the finding that Danish households are more specialized than U.S. households, suggests (albeit indirectly) that social norms and egalitarian views are in some cases more important than time valuation in time-allocation decisions.

One finding that differs significantly cross-country is the impact of children on household specialization. Children do not have a significant impact on specialization in Denmark (a joint $F$ test of the three variables yields a $p$
value of 0.62), but do in the United States (p value 0.00). The presence of children, particularly young children, is associated with a large increase in intra-household specialization in the United States. Results using the U.S. participatory measure, using the U.S. data as reported by men, or restricting the U.S. sample to dual earner couples are substantially the same (available on request).

We also observe this result using not entirely comparable data from the 1985 AUT time diary survey.

### TABLE 5
Specialization Index, Two-Limit Tobit Results

<table>
<thead>
<tr>
<th></th>
<th>U.S. Questionnaire Data&lt;sup&gt;a&lt;/sup&gt; Time-Use</th>
<th>DK Questionnaire Data&lt;sup&gt;b&lt;/sup&gt; Participatory</th>
<th>DK Diary Data&lt;sup&gt;b&lt;/sup&gt; Time-Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man’s education – Woman’s education</td>
<td>0.0163***</td>
<td>0.0151***</td>
<td>0.0041</td>
</tr>
<tr>
<td>Man’s age – Woman’s age</td>
<td>-0.0016</td>
<td>0.0016</td>
<td>-0.0008</td>
</tr>
<tr>
<td>Man’s years of education</td>
<td>-0.0210***</td>
<td>-0.0238***</td>
<td>-0.0099***</td>
</tr>
<tr>
<td>Man’s age</td>
<td>0.0021***</td>
<td>0.0029**</td>
<td>0.0017</td>
</tr>
<tr>
<td>1 child in household</td>
<td>0.0653***</td>
<td>-0.0083</td>
<td>0.0090</td>
</tr>
<tr>
<td>2+ children in household</td>
<td>0.0703***</td>
<td>-0.0175</td>
<td>0.0262</td>
</tr>
<tr>
<td>Child younger than school age</td>
<td>0.0451***</td>
<td>0.0308</td>
<td>0.0135</td>
</tr>
<tr>
<td>Single-family dwelling</td>
<td>0.0137</td>
<td>0.0054</td>
<td>0.0275</td>
</tr>
<tr>
<td>Hours/week spent on housework diary based</td>
<td>-0.0013***</td>
<td>-0.0015***</td>
<td>-0.0034***</td>
</tr>
<tr>
<td># of housework activities diary based</td>
<td>-0.0131*</td>
<td>-0.0521***</td>
<td>0.0239**</td>
</tr>
<tr>
<td>Years in relationship</td>
<td>0.0057***</td>
<td>0.0158**</td>
<td>-0.0065</td>
</tr>
<tr>
<td>Years in relationship squared/100</td>
<td>-0.0080*</td>
<td>-0.0560*</td>
<td>0.0440</td>
</tr>
<tr>
<td>Truncated duration measure</td>
<td></td>
<td>0.0426</td>
<td>-0.0382</td>
</tr>
<tr>
<td>Married</td>
<td>0.0073</td>
<td>0.0016</td>
<td>-0.0524**</td>
</tr>
<tr>
<td>Number of observations</td>
<td>3,675</td>
<td>1,318</td>
<td>711</td>
</tr>
<tr>
<td># left censored</td>
<td>14</td>
<td>96</td>
<td>0</td>
</tr>
<tr>
<td># right censored</td>
<td>266</td>
<td>50</td>
<td>44</td>
</tr>
</tbody>
</table>

<sup>a</sup>Includes dummy variables identifying blacks; nonblack/nonwhites; those residing in an SMSA; those residing in a rural area; those residing in the West, South, and Midwest (Eastern residence is the base case); and those missing education data.

<sup>b</sup>These specifications also include dummy variables to identify those residing in Copenhagen and in rural areas.

<sup>Note</sup>: Asterisks indicate statistical significance: ***1 percent level; **5 percent level; and *10 percent level.
The finding that in two of three specifications households that perform more household tasks and in all specifications households that spend more time on housework are less specialized suggests that more time-constrained households are less concerned with the gains to be had from specialization than with the short-run time constraints. Couples with more housework to complete in a given period of time may be more concerned with flexibility and hence be less specialized when allocating housework tasks. As these measures of time and tasks are used in the construction of the specialization measure and could be viewed as endogenous, we also estimate all our models excluding these variables and find strikingly similar results. The only notable difference is that the coefficients to the three child-related variables decline. Although children continue to have a significant positive association with specialization in the United States, without the time and task measures they have a significant negative association (p value 0.08) in Denmark, a finding that only acts to further accentuate the observed cross-country difference in the effect of children.

Finally, longer relationships are associated with greater intra-household specialization, albeit with diminishing returns in the two specifications estimated using questionnaire-based data. This result is as predicted by economic theory, assuming that current duration is a reasonable proxy for expected duration. The magnitude of the duration measure is similar across countries in a linear specification, but appears to have greater diminishing returns in Denmark. The coefficient to the dummy variable identifying households for whom the duration of the relationship is over 22 years does have a positive sign for the Danish sample, but is not statistically significant. In these same two specifications, married couples are found to specialize more, but not significantly so. To explore the possibility that, as suggested by Batalova and Cohen (2002), there may be differences between married couples who initially cohabited and married couples who did not, we estimated a model incorporating this distinction (results not shown) for the United States. We find that married couples who initially cohabited behave like currently cohabiting couples, while married couples who did not initially cohabit are marginally (p value 0.14) more likely to specialize. This finding is akin to Batalova and Cohen’s and lends further support to the hypothesis that relationship type/egalitarian values are an important determinant of intra-household specialization.

Interestingly, the results of relationship duration and type are quite different using diary-based time-use data as compared to questionnaire-based measures. For example, using time diary data, marital status has a significant negative relation to specialization while relationship duration has no significant effect. Moreover, households engaging in more tasks reported less specialization using questionnaire data and more using time diary data. These significant changes may indicate a difference in the reporting of diary- and questionnaire-based data. They are not attributable to differences in the sample alone, as results using the questionnaire-based measure of
intra-household specialization for the 711 household diary sample are substantially the same as those reported here for the full questionnaire sample. Nor do these differences appear attributable to sample selection bias. Testing for sample selection bias by instrumenting for survey completion using measures of household income and stress, we find similar results to those reported by Abraham, Maitland, and Bianchi (2006) for the 2003 ATUS and Bonke (2002) for this sample. Higher-income households are more likely to complete the diaries, but our estimates of the specialization index model are unchanged.9

Discussion and Conclusion

We used data on a comprehensive set of seven household tasks gathered from couples in the United States and Denmark to construct measures of intra-household specialization in housework. The U.S. data come from the 1992–1994 wave of the National Survey of Families and Households and provide relatively detailed questionnaire data on time use, while the Danish data come from the 2001 Danish Time Use Survey and provide both bare-bones questionnaire data on participation as well as detailed 48-hour time diary information. We show that the precise level of specialization differs systematically based on the type of time-use data used. Specifically, questionnaire data on participation yielded lower estimates of specialization than more detailed questionnaire data, probably because only very specialized households report nonparticipation. By contrast, time-diary-based data provided the highest estimates of specialization, perhaps because they capture not only specialization by task but also by day. Despite the differences in our data, we found substantial evidence that there is more intra-household specialization in the United States than in Denmark.

We then conducted a multivariate analysis of intra-household specialization using a variety of variables suggested by either economic or sociological theory. Economic theory suggests that the degree of intra-household specialization in housework will be a function of the costs and benefits associated with such specialization. The benefits are likely to be greater the more time constrained the household and the greater the intra-household division of skills (the greater the potential comparative advantages). The costs are likely to be lower the more enduring the relationship. Countering this economic perspective is the evidence from sociology that individuals in more time-constrained households and in more egalitarian-oriented households may favor more flexible or more equal divisions of chores and so exhibit less intra-household specialization.

Our results using the questionnaire-based data from both countries show remarkable similarity. Older couples, those in more enduring relationships,

9All these results are available on request.
and those with more disparate education levels were found to specialize more, supporting economic theory. However, households that reported more housework tasks and more household time devoted to those tasks specialized less. This finding suggests that such households value the flexibility offered when both partners have the skills to perform the tasks more than the advantages inherent in specialization. Finally, there was evidence from both countries that younger and more educated couples specialize less. These results provide substantial, albeit indirect, evidence that egalitarian values are an important factor in intra-household time allocation and reduce specialization. Substantial differences in social norms regarding egalitarianism may also explain the cross-country differences in specialization. The more egalitarian-minded Danes (as evidenced by their social welfare policies and in sociological research (Fuwa, 2004)) may specialize less for cultural reasons.

A comparison of the multivariate model of intra-household specialization using questionnaire- versus time-diary-based data from the same sample of Danish households revealed tantalizing differences. A number of factors had an effect that differed significantly depending on the type of data used to calculate intra-household specialization. Specifically, while years in relationship was positively related to specialization using the questionnaire-based data, it was marital status that was significant but negatively related to specialization using diary-based data. This result suggests that married and cohabiting couples may respond differently when asked about household tasks than when asked to report on their own time use. In addition, the questionnaire-based analysis revealed that households performing more tasks specialized less, whereas the diary-based analysis reveals just the opposite. This finding lends some support to our proposition that busier households may find specialization by tasks too confining—but may still specialize by day as indicated in the time diary analysis.

One key distinction between Denmark and the United States was in the impact of children on intra-household specialization: children have a negative but generally statistically insignificant impact on specialization in Denmark, whereas children (particularly young children) were associated with increased specialization in U.S. households. We believe these cross-country differences are attributable to the substantial cross-country differences in the availability of affordable, high-quality daycare. The Danish social welfare system provides subsidized child-care services that are only available at high cost in the private sector in the United States. Thus, the higher degree of specialization in the United States may also be partly attributable to the positive impact children have on specialization in the United States, an impact that may be moderated in Denmark by the generous social welfare system there. As this welfare system is often associated with the more egalitarian preferences observed in Scandinavia, these egalitarian preferences may have a two-fold impact on relative intra-household specialization.
REFERENCES


