Are Women Better than Men at Multitasking Household Activities? New Experimental Evidence

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Becker's standard household production model (Becker 1965, Becker 1985) implies that specialization in household production is driven by differences in household and market productivity. According to this model, if women have a comparative advantage in household production, then women should completely specialize in home production and men should completely specialize in market production. Pollak (2012) calls into question this complete specialization hypothesis, noting that the data show that incomplete specialization is the norm. However, analyses of time-diary data (Kalenkoski, Ribar and Stratton 2005, Kalenkoski, Ribar and Stratton 2007, Kalenkoski and Foster 2008, Kalenkoski, Ribar and Stratton 2009, Gwozdz and Sousa-Poza 2010, Stratton 2012) show that women do perform more household production activities than men, even if specialization by gender is not complete. Furthermore, multitasking of housework activities is found to be more common among women than among men (Offer and Schneider 2011, Zaiceva and Zimmermann 2011).

Are these differences the result of women being inherently more suited than men to household production activities and to the multitasking of these activities? Evidence from neuroscience (Weise et al. 2006) suggests the possibility of innate gender differences in cognitive functioning that may affect task performance. Economists point to differences in preferences, social roles, and cultural constraints (Booth 2009, Croson and Gneezy 2009, de Mel, McKenzie and Woodruff 2009, Gneezy, Leonard and List 2009).

However, direct measures of the home productivity of individuals typically cannot be constructed from existing survey data. Data sets that include household output measures (such as child outcomes) typically do not include the corresponding input measures (such as parental time), and vice versa.

We propose that experimental data can be used to determine whether women are better than men at household production. Buser and Peter (2012) have recently used experimental data to determine that there are no differences in the multitasking ability of women and men when doing word searches and Soduku puzzles. Yet these tasks are quite different from those performed within the household. Therefore, in this paper we present results from a custom-designed experiment that simulates household production tasks. First, however, we propose a theory of multitasking in the household to motivate our analysis.

I. Multitasking Theory

One can imagine a household that produces a child commodity ($C > 0$) and a household commodity ($H > 0$), both of which yield utility for an adult in that household:

$$U = \alpha C + \beta H \tag{1}$$

The child commodity production func-

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tion is represented by

$$C = \gamma_1 ln t_{\text{SC}} + \gamma_2 ln t_{\text{M}}, \tag{2}$$

where t_{SC} is sole-tasked time spent by the individual in production of the child commodity, t_M is multitasked time spent by the individual in production of both commodities, γ_1 is the productivity factor for sole-tasked time in producing the child commodity, and γ_2 is the productivity factor for multitasked time in producing the child commodity.

The household commodity production function is represented by

$$H = z_1 ln t_{\text{SH}} + z_2 ln t_{\text{M}}, \tag{3}$$

where t_{SH} is sole-tasked time spent by the individual in production of the household commodity, z_1 is the productivity factor for sole-tasked time in producing the household commodity, and z_2 is the productivity factor for multitasked time in producing the household commodity.

II. Experimental Data

We use experimental data to measure γ_1, γ_2, z_1, and z_2 and compare these measures across genders.

Our experiment is described in detail in Kalenkoski and Foster (2012).[1] It involved two tasks. The first task was a simulated baby-care task in which the participant viewed a picture of a happy baby and had to click on a pacifier icon that appeared at random positions on the screen in order to keep the baby in that happy mood. If the participant did not click the pacifier button regularly enough, then the baby's mood declined. As the baby's mood declined, pictures of a successively less happy baby appeared and increasingly insistent baby cries were heard through the headphones.

In the other task, the participant was confronted with overlapping icons representing a never-ending pile of laundry that included men's white shirts, men's colored shirts, and women's blouses. There were also icons representing the wash baskets corresponding to each type of shirt: a hot-wash basket, a warm-wash basket, and a hand-wash basket, respectively. The participant's task was to drag and drop the shirts and blouses into the appropriate wash baskets.

Participants, who were fully briefed about how to perform each task successfully, received experimental dollars based on the quantities of C and H they produced. Experimental dollar payoffs are intended to represent utility payoffs in our theoretical model. The payoff to the baby care task depended on the time the baby spent at each of four different mood levels. For each second that the baby's mood was at the highest level, the participant received two experimental dollars. For each second that the baby's mood was at the next-highest level, the participant received one experimental dollar. For each second that the baby's mood was at the third highest level, the participant received fifty experimental cents. The participant received no experimental dollars for any time during which the baby's mood was at the lowest level.

The payoff for sorting shirts varied. For each shirt correctly sorted, the participant received either two or four experimental dollars. For each shirt incorrectly sorted, the participant lost two or four experimental dollars.

Before performing any tasks, participants answered some questions about their personal characteristics and background. After performing all tasks, participants were asked to evaluate their experiences during the experiment and to answer some additional questions about their background. The task-performing stages set between these surveys were: (1) a sole-tasked baby care stage, lasting for three minutes; (2)

[1] The experiment was run in September 2011 in the ASBLab at the University of New South Wales using software custom-built by Markus Shaffner using the popular software package zTree (Fischbacher 2007) as a template. ORSEE (Greiner 2004) was used to recruit participants from a standing subject pool, consisting mainly of university students enrolled in study programs administered by the Australian School of Business. No participant exclusion criteria were applied during recruitment other than standard exclusions (no children, and no conflicts of interests) required by the UNSW Human Research Ethics Committee.

a sole-tasked clothes-sorting stage, lasting for three minutes; (3) a second sole-tasked clothes-sorting stage, lasting for three minutes; (4) a multitasked stage, lasting for six minutes; and (5) a second multitasked stage, lasting for six minutes. In stages (2) and (4), compensation was based on the \$4 per shirt payoff, and in stages (3) and (5) compensation was based on the \$2 per shirt payoff.

The shirt-sorting payoff was varied in the experiment in order to simulate a relative change in preferences toward the household commodity, H, and away from the child commodity, C: that is, an increase in β relative to α in the theoretical model. In this paper, to keep relative preferences regarding the two commodities fixed, and to minimize the potential for our results to be contaminated by learning effects,[2] we exclude data from task-performing stages (2) and (4).[3] All analysis in this paper is therefore based on the \$2 per shirt payoff scheme.

In order to ensure that participants expended equal effort across stages, a participant's actual take-home payoff in experimental dollars was the sum of his or her payoffs in two randomly-selected sole-tasked stages, plus his or her payoff in one randomly-selected multitasked stage. Experimental dollars were converted to real dollars using a fixed exchange rate chosen to result in the average real-dollar payout being roughly equivalent to the ASBLab's standard payment of \$15 to \$20 per hour of participant time. Earnings calculated in this way are paid in addition to a \$5 show-up fee, which is paid to all participants, regardless of their performance.

We know that t_{SC}, t_{SH}, and t_M are 3 minutes, 3 minutes, and 6 minutes, respectively; that C is the weighted sum of time that the participant's actions kept the baby in the highest, next-highest, and third-highest moods, where the weights are those used in the baby-care payoff function described above:

$$\begin{aligned}&.5 * (\textit{seconds in second-lowest mood})\\ &+ 1 * (\textit{seconds in second-highest mood})\\ &+ 2 * (\textit{seconds in highest mood});\end{aligned}$$

and that H is the number of correctly-sorted shirts minus the number of incorrectly-sorted shirts. We are thus able to calculate γ_1, γ_2, z_1, and z_2 using the following formulas based on our production functions:

$$\begin{aligned}\gamma_1 &= [\textit{C produced in sole-tasking}]/ln(t_{\text{SC}})\\ \gamma_2 &= [\textit{C produced in multitasking}]/ln(t_{\text{M}})\\ z_1 &= [\textit{H produced in sole-tasking}]/ln(t_{\text{SH}})\\ z_2 &= [\textit{H produced in multitasking}]/ln(t_{\text{M}})\end{aligned}$$

Plugging these calculated values into our production functions for C and H allows us to recover a production function for each participant for each task. We also are able to calculate for each person the ratios of γ_2 to γ_1 and z_2 to z_1, which measure how much output is preserved when one moves from sole-tasking to multitasking in production of the child commodity and the household commodity, respectively.

III. Estimates by Gender

A. Productivity Parameters

Table 1 shows descriptive statistics for the calculated productivity parameters for women and men separately. Means are shown with standard errors in parentheses underneath. Statistically significant differences across genders at the 10 percent level are indicated in bold typeface. Note that the productivity parameters cannot be directly compared across the two tasks, as C and H are measured in different units.

[2]The sole-tasked baby care stage is extremely easy to master, as all that is involved is clicking on a button repeatedly when it appears. By contrast, the sole-tasked clothes-sorting task does require that participants learn how to drag and drop the icons and that they accurately match clothes to the correct piles. Therefore, we only anticipate (and, in practice, we only see) a sole-tasking learning effect for clothes sorting.

[3]Another group of participants faced a slightly different order: sole-tasked baby care, sole-tasked clothes sorting (low payoff), sole-tasked clothes sorting (high payoff), multitasking (low payoff to clothes sorting), multitasking (high payoff to clothes sorting). For this group, the low-payoff stages were excluded to avoid learning effects and to keep relative payoffs fixed. We do not use data from these participants in the present paper.

The results show that women and men are equally productive in sole-tasking the production of C and H. They are also equally productive in multitasking when it comes to the production of C. However, men, not women, are more productive in multitasking when it comes to the production of H: z_2 and the ratio z_2/z_1 are both greater for men than for women.

Table 1—: Productivity Parameters by Gender

Parameter	Women	Men	P-value of t-test
γ_1	325.98	320.96	0.1582
	(10.95)	(29.48)	
γ_2	293.97	266.43	0.1894
	(136.18)	(149.70)	
z_1	150.28	149.84	0.4625
	(18.51)	(23.91)	
z_2	**91.22**	**111.69**	0.0600
	(50.36)	(67.24)	
γ_2/γ_1	0.90	0.83	0.2400
	(0.41)	(0.48)	
z_2/z_1	**0.61**	**0.73**	0.0829
	(0.34)	(0.41)	
N	39	47	

Samples exclude a handful of records that indicated clear confusion about the task instructions (e.g., those earning zero dollars for any task). P-values shown in the final column are those associated with a one-tailed test of inequality of the parameter means for the two genders. Differences that are significant at the 10 percent level appear in boldface type.

Table 2—: Mean Output Per Minute by Gender and Household Commodity

	Women	Men
Panel A: Child Commodity (C)		
Sole-tasked	119.38	117.54
	(0.64)	(1.57)
Multitasked	87.79	79.56
	(6.51)	(6.52)
Panel B: Household Commodity (H)		
Sole-tasked	55.03	54.87
	(1.09)	(1.28)
Multitasked	**27.24**	**33.35**
	(2.41)	**(2.93)**

Output per minute is calculated for baby care as experimental dollars received per minute, given the payoff scheme for this task; see text for details. Output per minute for sorting clothes is the number of correctly-sorted shirts minus the number of incorrectly-sorted shirts, per minute. Standard errors are in parentheses. Differences that are significant at the 10 percent level appear in boldface type.

B. Output Per Minute

Table 2 shows means and standard errors for estimated output per minute, separately for men and women and for C and H. These results too show that men and women are equally productive in producing C and in producing H while sole-tasking, but that men produce more H per minute when multitasking. This difference is robust to a regression adjustment for self-reported experience playing video games.

IV. Conclusion

The hypothesis that women are better at household work than men, when performing one task alone or two tasks simultaneously, is rejected by our experimental data. Our experimental results, based on participants' performance in simulated household tasks, suggest that men and women are equally productive when sole-tasking production of either the child commodity or the household commodity, and also equally productive with respect to multitasking when it comes to producing the child commodity. However, men have an advantage in multitasking with respect to producing the household commodity. One possible explanation for this difference is that women are more likely than men to be distracted by, or anxious to avoid experiencing, unhappy baby faces and cries when performing the non-child-related task at the same time as the baby-care task.

These results are the first direct measures of multitasking productivity in a household production context. Future research is needed that simulates other household production tasks.

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