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MISSISSAUGA

Estimating the “Breadwinner Impact” on Household Division of Labour

By MELISSA SIQUEIRA*

This study builds upon previous literature examining the determinants of the household bargaining process. By employing a regression-discontinuity design model, I find that breadwinner status can be used as a bargaining tool to avoid household labour. While this effect generally holds for male breadwinners, it does not for female breadwinners. Limiting the sample to just parents, the breadwinner impact differential between males and females becomes negligible, indicating a different dynamic in households with children.

Keywords: *Regression Discontinuity Design, Household Bargaining, Division of Labour, Family Economics*

I. Introduction

In Canada, the proportion of households with a female breadwinner has been increasing steadily for the last 50 years. Approximately 17.3% of Canadian women earned more than their partners in 2017, compared to just 8% in 1985. Much of this has been attributed to increasing female labour force participation as well as the strong median growth of female wages [Canada (2017)]. Generally, human capital theory states that since time is a limited resource, individuals will choose to divide their time between paid and unpaid work [Becker (1981)]. Moreover, individuals prefer not to do housework and will bargain to avoid engaging in this activity. Given that income is used as a bargaining tool, greater equality in the workplace should be echoed within the home.

Studies have shown that as income increases, housework decreases for male breadwinners. However, this relationship has not held for female breadwinners. All else being equal, women still spend more time than their partners on household labour [Bianchi et al. (2000)]. As such, it is important to determine whether the increasing prevalence of female breadwinners is contributing to the economic advancement of women or if it is putting more burden on these individuals, leading to unsustainable expectations for female-led households. This can have policy implications; if the results support a persistence of unequal division of labour, especially in childcare, it presents a need for a policy that targets this household labour gap.

II. Literature Review

There has been extensive research on division of labour within the household. Becker first modelled division of labour through human capital theory, where individuals divide their finite

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resource of time between paid and unpaid labour [Becker (1981)]. As individuals prefer leisure to housework, they will bargain to avoid engaging in this activity [Becker (1981)].

The existing literature has attempted to formalize the determinants of this bargaining process. Several studies have looked at the impact of income on division of labour. Bianchi et al. ran an OLS regression model estimating the impact of a wife proportional income on time spent on domestic work, controlling for paid work, employment status, income and education [Bianchi et al. (2000)]. Using time-use survey data from Australia in 1992, they found that as a husband proportion of income increased, so did his wife domestic work. However, they found that the inverse did not hold: in situations where women provided 51-100% of the income, they still engaged in a more traditional division of labour [Bianchi et al. (2000)]. Similarly, Bittman et al. found that income is an important bargaining tool in the division of labour [Bittman et al. (2003)]. Applying an OLS regression model, this time to the American National Survey of Families Households, they predicted a statistically significant negative effect of female income on female housework. Nevertheless this impact was not a one-to-one tradeoff. Thbaud hypothesized that this imperfect correlation between income and housework was due to gender expectations [Thbaud (2010)].

Building upon Thbaud, several studies have attempted to further explore the effect of traditional gender roles on the division of labour within the household [Thbaud (2010)]. Most studies do this by making male to female comparisons, more specifically comparing male and female breadwinners. Chesley et al. analyzed how the breadwinner and caretaker models differ when the roles are reversed between males and females [Chesley and Flood (2003)]. They looked at the American Time Use Survey with cross-sectional data on division of labour between couples, limiting the sample to heterosexual married couples with children where one parent was the breadwinner and their partner a stay-at-home parent. This was their attempt at holding constant all conditions except gender, so that any differences in male and female breadwinner labour should be due to gender effects. Applying an OLS-regression model, they found a statistically significant negative impact of being a breadwinning parent on housework, aligning with previous studies. However, similar to Bianchi et al., they found that division of labour was more equal in female-led households than in male-led households [Bianchi et al. (2000)]. Their conclusion was that males and females in similar economic situations experience divergent outcomes.

Greenstein attempted to quantify gender roles by including a measure of “traditionalism” along with his variable of economic dependence [Greenstein (2000)]. He analyzed panel data from the American National Survey of Families and Households which has information on time use as well as qualitative measures of family attitudes. From this, he created the “traditionalism” dummy which he interpreted as being more entrenched in gender norms. He used seemingly-unrelated regression (SUR) techniques to estimate the impact of a wife’s economic dependence (computed as the relative difference in income between an individual and her spouse) and “traditionalism” on household activities. The results show that traditionalism has a positive impact on female hours engaged in housework, and that as economic dependence decreases, household division of labour becomes more equal only until male and female income is approximately equal.

A survey of the literature reveals numerous studies on the effect of income, economic dependence and gender roles on household bargaining via division of labour. However, there have been no recent studies on household division of labour using Canadian data. Moreover, the

majority of the studies have employed standard OLS-regression models. There have been no specific studies on the “breadwinner effect” on the bargaining process and none applying a regression-discontinuity model. Hence this work adds meaningfully to the existing literature by filling several of these gaps.

III. Data and Methodology

A. Data

This paper uses an aggregated version of the General Social Survey on Time Use, a private dataset from Statistics Canada. The Time Use module is a branch of the General Social Survey that focuses on how individuals spend their time working, at home and during social activities. It collects data from individuals aged 15 and over in Canada’s 10 provinces via telephone and online questionnaires. Each cycle is a repeated cross-section: individuals are identified by unique codes and do not repeat across periods. All survey questions are linked to actual individual income and household data through tax records. The dataset is an unbalanced pseudo-panel (see Table 1) with the majority of observations coming from the 2015 cycle. For the purpose of this study, the sample was limited to individuals with spouses or common-law partners living in the household, and assumed a dual-earner household in calculation of income ratios. As the goal of this study is to estimate division of labour, it is necessary for an individual to be co-habiting with another individual where their household labour is shared (for example it is not concerned with roommates that live together but lead separate lives). This is in line with the methodology of other division of labour studies.

TABLE 1—NUMBER OF OBSERVATIONS BY YEAR

Year	Number of Observations	Percentage of Total
2005	1,163	6.58%
2010	7,008	39.63%
2015	9,514	53.80%
Total	17,685	100%

Given each cycle has a different questionnaire, the variables were chosen based on the underlying questions that were unchanged across each cycle. This was done to prevent changes in methodology having an impact on the results. It is also important to mention that the data source is a self-reported survey. As such, the reported duration of activities are proxies of actual duration. It is assumed that the error with which these indicators are measured is random and uncorrelated with any breadwinner status. This is reasonable, as there seems to be no obvious motivation for individuals to under- or over-report their levels of household labour. Some may accidentally report incorrect durations, but this measurement error should not result from any unobserved heterogeneity or because of their breadwinner status. Many other studies have adopted this viewpoint. Reliance on self-reported time use surveys is the standard in division of labour studies. The majority of studies preceding this one have utilized the American

Time Use Survey. The Canadian General Social Survey on Time Use mimics its structure and methodology. This suggests the data will provide consistent results.

The data required various transformations for the purpose of this study. Individual and household income, as well as age, came aggregated by groups rather than displaying exact values. To create the income and age variables, the average value for each group was imputed in real amounts. For simplicity, some background and outcome variables were transformed into binary variables: having a long-term partner living in the household, post-secondary education, gender, immigrant and hiring outside help. Other variables such as number of children and household size were unchanged. Duration of the activities of interest (housework, childcare and paid work) were reported in minutes per day. Finally, the income ratios used to calculate breadwinner status were taken as a proportion of individual income over household income standardized. This was done so that earning half of the income results in a ratio of zero. Further information on derivation of the variables can be found in an appendix available on request.

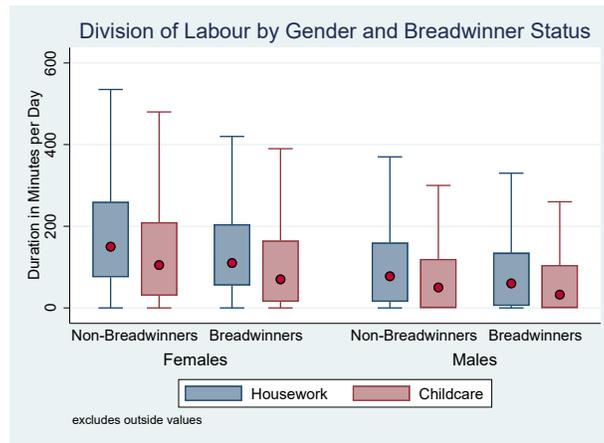


FIGURE 1. MEAN DURATION OF HOUSEHOLD ACTIVITIES BY BREADWINNER STATUS AND GENDER

TABLE 2—TOTAL PAID AND UNPAID LABOUR BY BREADWINNER STATUS, FULL SAMPLE

	Mean	SD	95 % Conf. Int.	N
Non-Breadwinner	357.66	236.52	352.36 - 356.97	7,639
Breadwinner	395.91	256.30	390.92 - 400.89	10,160

As evidenced from a high-level overview of the data, we see that non-breadwinners tend to spend more time on unpaid labour than breadwinners and females more than males (Figure 1). At the same time, breadwinners tend to engage in more total work than non-breadwinners

(Table 2). With this in mind, we might expect to see an inordinately high duration of total labour for female breadwinners.

From the full sample’s summary statistics, we can see that there are inherent differences between breadwinners and non-breadwinners that may contribute to the difference in division of labour other than through the breadwinner impact itself (Table 3). Average individual income and post-secondary education are much higher for breadwinners than non-breadwinners, which may indicate that breadwinners have a higher socio-economic status. This could act as bargaining power. There is also a much larger proportion of male breadwinners than female breadwinners. As the literature has found gender to be important in determining household labour, this could explain the labour difference between breadwinners and non-breadwinners.

TABLE 3—SUMMARY STATISTICS - FULL SAMPLE

Variable	Breadwinners		Non-Breadwinners		Diff in Means
	Mean (SD)	N	Mean (SD)	N	p-value
Male	0.650 (0.477)	9804	0.269 (0.443)	7649	0.0000
Age	51.2 (14.0)	9582	51.2 (14.9)	7521	0.0148
Post-Secondary Education	0.769 (0.422)	9604	0.661 (0.473)	7981	0.0000
Individual Income	65157 (29162)	9804	24454 (15336)	7639	0.0000
Household Size	2.81 (1.06)	9233	2.82 (1.10)	7089	0.2368
Children	0.55 (0.90)	9804	0.50 (0.88)	7639	0.0001

B. Model

This paper’s regression discontinuity model will build upon a popular model within Education Economics, specifically following Lindo et al. study of academic probation [Lindo et al. (2010)]. Their study focuses on estimating the impact of being placed on academic probation on student achievement. They applied a sharp RD model, with their forcing variable being the GPA cutoff and the resulting treatment being placed on academic probation. They then limited their dataset to observations just around the cutoff. The model in this paper takes a similar approach where the income ratio is analogous to distance from a GPA cutoff and the resulting treatment is breadwinner status.

More formally:

$$Y_i = \alpha + \rho D_i + \beta(X_i) + \epsilon_i$$

given:

$$D_i = \begin{cases} 0 & \text{if } incomeratio_i < 0 \\ 1 & \text{if } incomeratio_i \geq 0 \end{cases}$$

where Y_i is time spent on labour (housework, childcare and total work), D_i is a dummy for breadwinner status and X_i is a matrix of covariates including gender, minutes of paid work, household size, whether the individual hires paid help and number of children.

Lindo et al. included their running variable in the regression [Lindo et al. (2010)]. Due to high collinearity (correlation = 0.9692) between the income ratio and breadwinner treatment, including both variables would result in irrelevant variables high with high standard errors. This high correlation arises for multiple reasons. Being a breadwinner is, by definition, a function of the income ratio. However, this is not necessarily an issue as this is a usual setup for an RDD. Given there was no other consistent predictor of becoming a breadwinner, namely because it depends on both individual and household dynamics, only the breadwinner dummy variable was included in the model.

In previous studies, increases in the income ratio have been shown to decrease household labour. Thus, a concern is that excluding the income ratio could result in overestimation of the breadwinner impact. In spite of this, including only the breadwinner status should provide consistent and informative results. Firstly, the sample will be limited to 0.1 units of the income ratio around the cutoff, which results in little variation in the income ratio (only four different values). Essentially, around the boundary we can think of the arising variation not really coming from changes in the income ratio but coming from the change in breadwinner status. Moreover, the goal is to differentiate the impact of the breadwinner impact by gender, which is still possible with this type of analysis. Breadwinner status is included instead of just the income ratio given that the interpretation is easier. It is more difficult to contextualize a movement of one unit of the income ratio than a movement from non-breadwinner to breadwinner status. Results of the models are available with both the income ratio and breadwinner status and just the income ratio in appendix tables A1 and A2. They did not yield results that alter the general conclusions.

The 0.1 unit band on either side of the breadwinner boundary was chosen as it is the smallest boundary that still contained a significant amount of observations for regression analysis. As the original income variables were grouped and discrete, the income ratio is discrete as well. The 0.1 band allows for four different income ratios, two on either side of the boundary. These accounted for approximately 25% of total observations (Table 4).

TABLE 4—INCOME RATIO VALUES, RESTRICTED SAMPLE

Value	Frequency	Percent
-.0714286	1,152	23.93
-.0454545	1,480	30.74
.0555556	893	18.55
.1	1,290	26.79
Total	4,815	100.00

The expanded model interacts the breadwinner variable with gender. Formally:

$$Y_i = \alpha + \rho_1 \text{female breadwinner} + \rho_2 \text{male breadwinner} + \beta(X_i) + \epsilon_i$$

This generates roughly similar estimates to running the model for males and females separately with a breadwinner dummy.

Before running the model, I test whether there is an actual discontinuity in the data. We might see bunching in the breadwinner boundary if individuals negotiate with their employers so they are just earning more than their partner. In this case, being just to the right of the breadwinner boundary would be endogenous; an individual’s ambition would cause them to become a breadwinner and this may affect their completion of household work, for example. McCrary recommends a density test of the distribution of the running variable [McCrary (2008)]. As shown in Figure 2, there does not appear to be bunching in the observations immediately to the left or to the right of the breadwinner boundary.

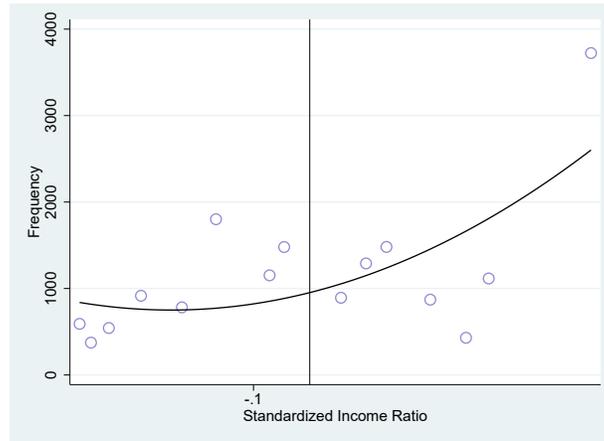


FIGURE 2. DISTRIBUTION OF INCOME RATIO

Another check for validity is to check if there is a discontinuity of pre-existing characteristics

at the breadwinner boundary. If the breadwinner boundary is shown to have a statistically significant impact on a pre-determined characteristic, then that leads to questions of validity of the data. As shown in Table 5, the breadwinner boundary is not predicted to have a statistically significant impact on these characteristics.

TABLE 5—ESTIMATED DISCONTINUITIES IN SELECTED CHARACTERISTICS

Variable	Age (1)	Children (2)	Post-Sec. Educ (3)	Immigrant (4)
Breadwinner	-0.309 (1.722)	-0.0436 (0.103)	-0.0199 (0.0521)	-0.102 (0.0723)
Income Ratio	22.50* (12.57)	-0.209 (0.705)	-0.366 (0.377)	0.896* (0.519)
Constant	51.30*** (0.739)	0.513*** (0.0443)	0.727*** (0.0222)	0.390*** (0.0310)
Observations	4,712	4,815	4,705	2,840
R-Squared	0.009	0.002	0.006	0.001

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

IV. Results

A. Outcomes for All Individuals

I first chose to investigate the impact of the breadwinner status on time spent on housework. As shown in Table 6, the model produces varied estimates of the breadwinner impact on time spent on housework. For all individuals, there is a small impact of a decrease of 8 minutes per day which is significant at the 10% level. When limiting the sample to just males, the breadwinner impact increases to 13 minutes a day and becomes statistically significant at the 5% level. This may seem small, however this decrease represents an hour and a half per week. For females, the model did not predict any statistically significant effect of being a breadwinner with the standard error being larger than the estimated parameter. In the full sample the gender variable has a large statistically significant effect. Being a male is predicted to decrease housework by half an hour a day at the 5% level. As expected, if an individual hires paid help and engages in paid work, they tend to spend less time on housework. Interestingly, having more children isn't predicted to have any significant impact. However, this could be due to a large proportion of the sample not having any children or simply due to the nature of household work changing rather than intensity (note this does not consider changes in childcare but rather other household tasks).

The next outcome investigated was the breadwinner effect on total work in min per day as the sum of housework, childcare and paid work. Preliminary analysis showed that breadwinners, especially female breadwinners, tend to engage in more total labour than non-breadwinners. This may indicate that breadwinner bargaining power is weak when it comes to total work. The regression results do not contradict this high-level view. For all individuals, there is no statistically significant breadwinner impact (Table 7). Similar to the story shown by the regression

TABLE 6—REGRESSION RESULTS ON HOUSEWORK

Variable	Full Sample (1)	Males (2)	Females (3)	Interaction Effects (4)
Breadwinner	-7.472* (4.338)	-12.68** (6.385)	-3.187 (5.852)	
Male	-30.45*** (4.281)			-25.91*** (5.759)
Paid Work	-0.230*** (0.00726)	-0.203*** (0.0120)	-0.255*** (0.0113)	-0.231*** (0.00820)
Household Size	5.430* (3.208)	0.713 (4.928)	8.755** (4.318)	5.262 (3.250)
Hire	-17.78*** (4.624)	-21.44*** (7.397)	-14.65** (6.292)	-17.75*** (4.796)
Children	-4.945 (3.759)	0.505 (6.176)	-9.419* (5.208)	-4.747 (3.979)
Individual Income	0.000245 (0.000213)	0.000457 (0.000321)	6.31e-05 (0.000283)	0.000246 (0.000212)
Female Breadwinner				-2.928 (5.789)
Male Breadwinner				-13.03** (6.397)
Constant	190.7*** (11.67)	159.4*** (17.39)	194.0*** (14.97)	189.5*** (11.46)
Observations	4,047	1,723	2,324	4,047
R-Squared	0.183	0.153	0.184	0.183

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

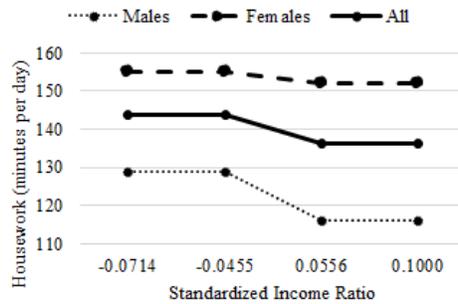


FIGURE 3. DURATION OF HOUSEWORK, ALL

results on housework, there is a strongly significant impact for male breadwinners, but not for female breadwinners. The predicted male breadwinner impact is a decrease of 25 minutes per day, which is sizeable. Aside from the breadwinner impact, gender is not predicted to have a large or significant impact on total work.

Looking at the other covariates, household size and number of children seem to be key for predicting total work. An increase of one person in the household is predicted to increase total

work by around 30 minutes a day while an increase in one child is associated with a 42 minute increase in total work per day. This makes sense as total work includes childcare which would definitely increase with an extra child. Paid work should also increase as individuals' financial obligations increase.

TABLE 7—REGRESSION RESULTS ON TOTAL WORK

Variable	Full Sample (1)	Males (2)	Females (3)	Interaction Effects (4)
Breadwinner	-12.75 (7.776)	-24.09** (12.16)	-3.974 (10.01)	
Male	-19.58** (7.721)			-9.244 (10.31)
Household Size	28.77*** (6.039)	22.70** (9.357)	32.36*** (7.355)	28.37*** (5.805)
Hire	-13.07 (8.492)	-20.40 (14.09)	-7.046 (10.76)	-12.98 (8.599)
Children	42.38*** (7.358)	55.14*** (11.76)	34.23*** (8.897)	42.83*** (7.134)
Individual Income	0.00176*** (0.000382)	0.00271*** (0.000610)	0.00104*** (0.000483)	0.00176*** (0.000380)
Female Breadwinner				-2.394 (10.38)
Male Breadwinner				-25.41** (11.47)
Constant	240.1*** (21.07)	201.1*** (33.12)	259.1*** (25.57)	237.4*** (20.55)
Observations	4,047	1,723	2,324	4,047
R-Squared	0.080	0.087	0.073	0.081

Robust standard errors in parentheses
 *** p< 0.01, ** p<0.05, * p<0.1

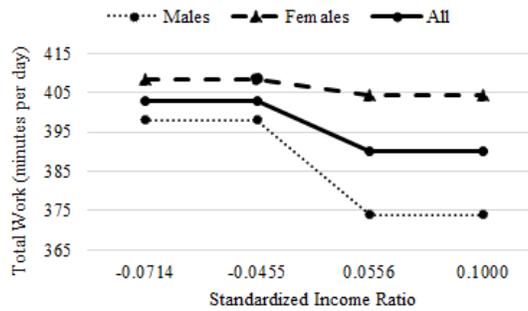


FIGURE 4. DURATION OF TOTAL WORK, ALL

B. Outcomes for Parents

After looking at the entire sample around the cutoff, the dataset was then limited to individuals with children (i.e. parents). Three outcome variables were chosen for analysis: housework, childcare and total work. In the previous section, it was decided not to analyze childcare given a large proportion of the sample did not have children; clearly this concern has been addressed by the use of parental data.

Looking at the regression results in Table 8, division of labour seems to be more equal among males and females. There is a similar estimate at the 10% level of the breadwinner impact for both mothers and fathers, a decrease of 20 minutes per day of housework. Note that this impact was stronger than the predicted effect for the general sample. The predicted gender effects are still strongly significant at the 5% level but they are smaller in magnitude with being male resulting in a decrease of housework of only 20 minutes per day compared to over 30 minutes for the full sample. As before, paid work and hiring paid help have important and significant impacts. Household size and number of children remain inconsistently important across the different groups. The R-squared measure also increases in this regression in comparison to the housework regression for all individuals, albeit slightly.

TABLE 8—REGRESSION RESULTS ON HOUSEWORK, PARENTS

Variable	Full Sample (1)	Males (2)	Females (3)	Interaction Effects (4)
Breadwinner	-18.13*** (6.998)	-19.05* (10.39)	-17.82* (9.497)	
Male	-23.03*** (7.185)			-21.97** (9.354)
Paid Work	-0.219*** (0.0135)	-0.203*** (0.0193)	-0.233*** (0.0185)	-0.219*** (0.0134)
Household Size	16.42** (6.813)	12.25 (8.636)	20.71** (8.611)	16.37*** (6.102)
Hire	-20.15*** (6.634)	-14.84 (10.87)	-22.43** (9.036)	-20.10*** (6.912)
Children	-15.61* (7.969)	-16.39 (10.89)	-16.79 (10.37)	-15.57** (7.490)
Individual Income	7.34e-05 (0.000353)	0.000300 (0.000533)	-9.76e-05 (0.000455)	7.26e-05 (0.000346)
Female Breadwinner				-17.08* (9.308)
Male Breadwinner				-19.47* (10.50)
Constant	172.2*** (27.16)	150.7*** (35.32)	168.5*** (31.47)	172.0*** (23.39)
Observations	1,236	501	735	1,236
R-Squared	0.225	0.198	0.208	0.225

Robust standard errors in parentheses

*** p< 0.01, ** p<0.05, * p<0.1

When it comes to childcare (Table 9), the model produces no statistically significant results for the breadwinner effect, which supports the previous literature’s claims that childcare is

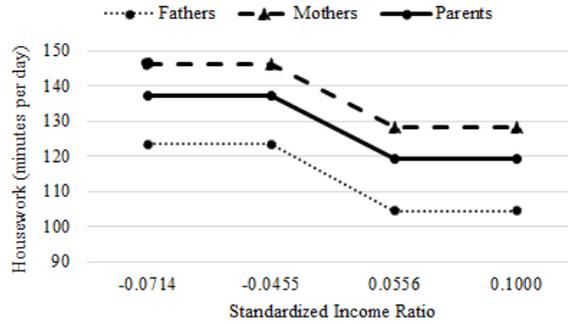


FIGURE 5. DURATION OF HOUSEWORK, PARENTS

unaffected by the household bargaining process. The main determinants of the amount of time spent on childcare are gender, duration of paid work, household size, hiring paid help and number of children. Here, we see the largest gender difference in division of labour with males predicted to spend on average 35 minutes less a day on childcare. It also is not surprising that a one-person increase in household size is predicted to decrease time spent on childcare as extra individuals within a household may be able to contribute to child-rearing activities such as babysitting.

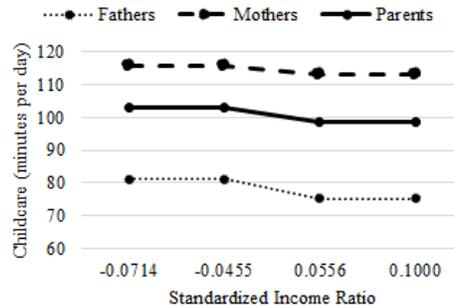


FIGURE 6. DURATION OF CHILDCARE, PARENTS

Finally, the model turns to an analysis of total work for parents. In Table 10, there are hardly any noteworthy results for any determinants in the bargaining process except for a few significant coefficients for household size and children. From the previous regressions, it appears that division of labour is more equal within parenting households so that individuals who engage in more paid labour may have a more proportional decrease in unpaid labour in comparison to non-parenting households. The fact that there are few significant explanatory variables in this regression leads to the R-squared being very low in each of the regression - sometimes less than 1%. Clearly, for parents there are other more important variables that explain total hours worked. Some of these variables could be financial obligations, where they live or future

TABLE 9—REGRESSION RESULTS ON CHILDCARE, PARENTS

Variable	Full Sample (1)	Males (2)	Females (3)	Interaction Effects (4)
Breadwinner	-4.387 (7.056)	-5.829 (8.693)	-2.769 (10.47)	
Male	-35.11*** (6.694)			-31.84*** (9.466)
Paid Work	-0.105*** (0.0134)	-0.0670*** (0.0162)	-0.136*** (0.0204)	-0.105*** (0.0135)
Household Size	-25.55*** (5.133)	-21.14*** (7.225)	-29.13*** (9.493)	-25.68*** (6.176)
Hire	14.43** (6.884)	24.35*** (9.090)	10.92 (9.962)	14.57** (6.995)
Children	44.28*** (6.292)	31.31*** (9.110)	53.24*** (11.43)	44.40*** (7.581)
Individual income	-0.000289 (0.000355)	0.000381 (0.000446)	-0.000798 (0.000502)	-0.000291 (0.000350)
Female Breadwinner				-1.130 (9.420)
Male Breadwinner				-8.546 (10.63)
Constant	176.1*** (24.36)	102.2*** (29.55)	204.4*** (34.70)	175.5*** (23.67)
Observations	1,236	501	735	1,236
R-Squared	0.111	0.081	0.089	0.112

Robust standard errors in parentheses

*** p< 0.01, ** p<0.05, * p<0.1

aspirations that could force them to work more or less.

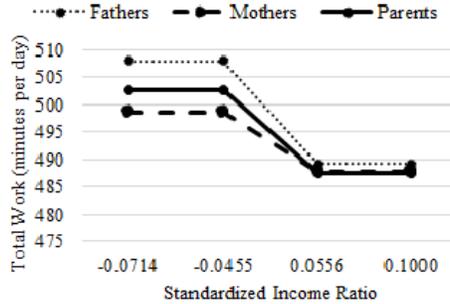


FIGURE 7. DURATION OF TOTAL WORK, PARENTS

V. Conclusions

Overall, my results support the existing literature in that income ratio matters - being a breadwinner (having a higher income ratio) is associated in most cases with a decrease in house-

TABLE 10—REGRESSION RESULTS ON TOTAL WORK, PARENTS

Variable	Full Sample (1)	Males (2)	Females (3)	Interaction Effects (4)
Breadwinner	-15.25 (13.95)	-18.82 (21.83)	-10.86 (17.57)	
Male	6.321 (13.75)			13.28 (18.10)
Household Size	-21.78* (12.23)	-33.05* (18.10)	-14.30 (15.93)	-22.07* (11.92)
Hire	14.63 (13.33)	-9.249 (22.81)	29.73* (16.57)	14.91 (13.49)
Children	36.73** (14.85)	36.67 (22.85)	37.09* (19.19)	36.99** (14.64)
Individual Income	0.000416 (0.000689)	0.00207* (0.00112)	-0.000669 (0.000842)	0.000411 (0.000676)
Female Breadwinner				-8.298 (18.19)
Male Breadwinner				-24.13 (20.54)
Constant	499.4*** (46.85)	493.3*** (72.99)	506.4*** (57.79)	498.0*** (45.35)
Observations	1,236	501	735	1,236
R-Squared	0.009	0.016	0.014	0.009

Robust standard errors in parentheses

*** p< 0.01, ** p<0.05, * p<0.1

hold labour. If household labour was simply determined by the amount of time an individual has in a day, then we would see a one-to-one tradeoff between paid work and household labour. As an individual spends more time on one, then logically they have less time to spend on the other. However, in the majority of the models I ran, this was not the case. Paid work was a statistically significant variable but after controlling for it, there was still a significant impact of the breadwinner impact. This is in line with Becker's human capital theory, which states that individuals use bargaining tools to avoid engaging in unpaid labour (which is an inferior good) [Becker (1981)].

Previous literature has maintained that there are gender inequalities in household division of labour, and the results seem to support this. Behind paid labour, being male had the second-largest statistically significant impact on household labour. These impacts were economically large, ranging from a decrease of 20 to 40 minutes a day. On a weekly basis, this would accumulate to over two hours a week in just gender differences. The impact widened further when interacting the breadwinner impact with gender. Statistically significant impacts of the breadwinner impact on household labour for the full sample became insignificant when accounting for only female breadwinners. The model predicted weak effects on bargaining power for being a female breadwinner.

Another striking feature of the results is how much the results changed when constricting the sample to parents. For housework, the breadwinner impact was statistically significant and of a larger magnitude than for the full sample. Nevertheless, the gender breadwinner differential shrunk as both male and female impacts were equally large and significant. A

possible explanation, hinted at earlier, is that parenting households may tend to be more equal. Preliminary analysis showed that average duration of housework, childcare and paid work tended to be higher for parents. If on average, parents are busier than non-parents, this may leave less room for bargaining power.

A noteworthy result is that paid work had the weakest effect (although still statistically significant) on childcare. In other words, one minute of paid work was worth less in terms of minutes of childcare than in minutes of housework. For childcare, there was essentially no breadwinner impact and unlike the other regressions, household size was calculated to be statistically significant. One of the main facets of Becker’s human capital theory is that unpaid labour is undesirable and that individuals will bargain to avoid engaging in this work [Becker (1981)]. However, childcare is of a different nature than housework. It does not necessarily have to be a disagreeable experience, and individuals will often bargain to spend more time with their children. Something else to consider is that childcare cannot necessarily be postponed or delegated like housework. This is why we see household size having such a large impact as additional family members may be trusted to care for children. The lack of significant breadwinner impacts suggest that the bargaining process for childcare differs from that for standard unpaid labour activities.

Although these results are promising there are evidently improvements that could be made to the study. If data were available at the more granular level (i.e. with individual and household incomes instead of income groups), this would allow for a truer RD model with income ratio included in the regression as the running variable. Due to data constraints, the income ratio was discrete and thus had a high correlation with breadwinner status, not allowing the model to separate the two impacts. As well, due to the discrete nature of the data and the lack of availability right at the boundary of the income ratio, it was not possible to completely eliminate omitted variable bias by dropping observations further away from the cutoff. This is evident in how much results changed when including covariates such as paid work and gender.

Another improvement would be to gain access to data with division of labour rather than levels of labour. This survey did not interview individuals within the same household so we do not directly observe division of labour. Some households may naturally have higher levels of labour regardless of their income and education levels and household size. Unfortunately, I was not able to control for this heterogeneity within the regression. Ideally, this study would have been conducted comparing bargaining power between individuals in the same household, as household pairs. This would allow for a more direct study on division of labour.

VI. Implications

Although female breadwinners are on the rise, inequality still persists within households, specifically in division of household labour. In an ideal scenario, individuals would experience a one-to-one tradeoff between their time engaged in paid and unpaid labour. This would allow for a fairer allocation of time - individuals considering working more to increase their income would have to worry less about being overworked as time spent at work would balance out with time spent at home.

Yet, this is not the case. Since breadwinner status has been shown to be a determinant in the bargaining process, an individual may be more inclined to alter their labour force participation

if their income reaches a certain threshold - an amount higher than their partner's. This has implications in game theory for firms offering promotions to managerial roles that offer better pay but require more hours. Not every individual will respond to the same pay raise; it is also dependent on household income and household dynamics.

Another key takeaway is that females tend to take the brunt of unpaid labour, even as breadwinners. As mentioned in the introduction, female breadwinners have been on the rise and there have been many policies aimed at targeting the earnings gap between males and females. Nonetheless, if increasing working hours and household income leads to females increasing their total hours of work, this could lead to female breadwinners being overworked. This has implications for the economy: it may deinceivize females from pursuing breadwinner status hereby hindering female labour force participation.

At a policy level, encouraging individuals to enter the workforce is not simply a question of reducing the wage gap but also attacking the household labour gap. Unpaid labour activities tended to be more inelastic with respect to income for females, especially for childcare. This raises the issue of parents staying out of the workforce due to inability to find or cost of childcare arrangements. Implementing childcare policies or encouraging flex work arrangements within companies could be a way to counteract bargaining differentials within the household.

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APPENDIX

A1. Data Characteristics

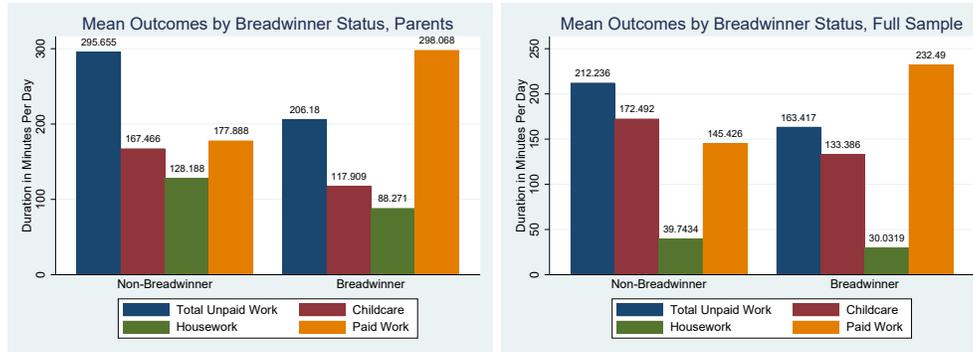


FIGURE A1. MEAN DURATION OF LABOUR BY BREADWINNER STATUS

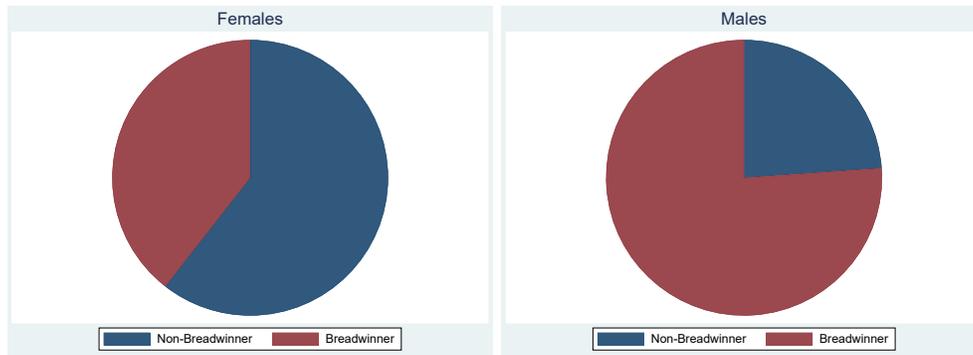


FIGURE A2. SHARES OF BREADWINNER STATUS BY GENDER

A2. Additional Regressions

The base model, without any interaction effects is:

$$(A1) \quad Y_i = \alpha + \rho D_i + \beta(X_i) + \gamma \text{incomeratio}_i + \epsilon_i$$

I then expanded the model to capture gender effects:

$$(A2) \quad Y_i = \alpha + \rho D_i + \beta(X_i) + \gamma \text{incomeratio}_i + \delta \text{incomeratio} * \text{gender} + \epsilon_i$$

Results can be found in Table A1. As explained before, the breadwinner variable is directly derived from income ratio, leading to high linear dependence. As such, identification is a problem in this model and this relationship leads to high standard errors and small test statistics. The model did not predict any statistically significant impacts for either variable.

TABLE A1—REGRESSION RESULTS ON HOUSEWORK INCLUDING BREADWINNER TREATMENT AND INCOME RATIO

Variable	Full Sample (1)	Males (2)	Females (3)	Interaction Effects (4)
Breadwinner	13.08 (16.62)	8.065 (23.60)	15.40 (23.23)	
Income Ratio	-155.1 (119.7)	-159.6 (169.7)	-137.8 (167.9)	-153.8 (119.1)
Male	-30.46*** (4.282)			-25.98*** (5.759)
Paid Work	-0.230*** (0.00723)	-0.202*** (0.0106)	-0.255*** (0.00994)	-0.230*** (0.00818)
Household Size	6.060* (3.208)	1.573 (4.592)	9.113** (4.383)	5.894* (3.235)
Hire	-17.26*** (4.589)	-20.68*** (6.723)	-14.48** (6.208)	-17.22*** (4.764)
Children	-5.407 (3.763)	-0.0724 (5.450)	-9.692* (5.129)	-5.211 (3.973)
Female Breadwinner				17.40 (17.19)
Male Breadwinner				7.422 (17.47)
Constant	190.4*** (10.84)	166.7*** (16.09)	187.9*** (14.58)	189.3*** (11.03)
Observations	4,047	1,723	2,324	4,047
R-Squared	0.183	0.152	0.184	0.183

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

When the model was run with just the income ratio, excluding the breadwinner impact, it was still possible to find significant results, albeit at the 10% level for the income ratio (recall that there is little variation in the income ratio due to restricted sample size so that standard errors will increase). As shown in Table A2, the most statistically significant and economically large impactful independent variables were gender, duration of paid work and hiring of paid help, as expected. There was no significant impact of the income ratio and gender interaction effect.

TABLE A2—REGRESSION RESULTS ON HOUSEWORK USING INCOME RATIO

Variable	Full Sample (1)	Males (2)	Females (3)	Interaction Effects (4)
Income Ratio	-65.29** (31.00)	-104.6** (45.73)	-104.6** (45.73)	-32.43 (41.07)
Male	-30.31*** (4.275)			-29.95*** (4.280)
Paid Work	-0.230*** (0.00724)	-0.202*** (0.0106)	-0.202*** (0.0106)	-0.230*** (0.00818)
Household Size	5.880* (3.206)	1.463 (4.572)	1.463 (4.572)	5.701* (3.227)
Hire	-17.24*** (4.587)	-20.61*** (6.719)	-20.61*** (6.719)	-17.23*** (4.764)
Children	-5.257 (3.762)	0.0288 (5.432)	0.0288 (5.432)	-5.052 (3.968)
Income Ratio × Gender				-72.53 (60.94)
Constant	196.1*** (8.256)	170.3*** (11.95)	170.3*** (11.95)	196.9*** (8.194)
Observations	4,047	1,723	1,723	4,047
R-Squared	0.182	0.152	0.152	0.183

Robust standard errors in parentheses

*** p< 0.01, ** p<0.05, * p<0.1