Gender Differences in Job Search Behaviour: A Joint Search Perspective*

Monisankar Bishnu† S Chandrasekhar ‡ Srinivasan Murali§

ISI Delhi IGIDR IIM Bangalore

Abstract

Using data on Indian couples from Periodic Labour Force Survey (2019) and Time Use Survey (2019), we document that women search less in the labour market both on the extensive (labour force participation) and intensive (job search intensity) margin, compared to men. On average, men spend more time on market work while women spend more time on home production. Additionally, unemployed men spend more time on job search compared to unemployed women. In order to disentangle the gender differences in labour force participation between demand and supply effects, we present an equilibrium joint search model of couples with gender-specific wage offers and home productivity. Upon initial calibration, we find that the joint search model broadly captures the gender differences in labour force participation and time disposition in home production, market work, and leisure. Our counterfactual exercise indicates that, gender differences in labour demand in terms of potential wage offers can explain most of the gender gap in search intensity, while the gender difference in labour force participation is primarily driven by supply side factors.

JEL codes: E24, J22, J64.
Keywords: Labour force participation, Search intensity, Gender gap, Time use, Job search.

*This version: September 2022.
†Indian Statistical Institute Delhi, Delhi, India; (mbishnu@isid.ac.in)
‡Indira Gandhi Institute of Development Research, Mumbai, India; (chandra@igidr.ac.in)
§Indian Institute of Management Bangalore, Bengaluru, India; (srinim@iimb.ac.in)

1. Introduction

Gender disparities in various labour market outcomes has been documented and analysed across the world. In the context of India, one of the important questions that the researchers have been interested is the gender gap in labour force participation. The labour force participation rate of women in India is very low and it is around 25%. A number of studies like Afridi et al. (2019), Klasen et al. (2021), and Fletcher et al. (2017) have talked about this and have analysed the reasons behind this. Afridi et al. (2018) also talks about low labour force participation among married women, which is the focus of the current paper.

Our paper makes three broad contributes to this literature. First, we show that, married women on top of participating less in the labour market (extensive margin), also spend less time in searching for a job (intensive margin). Second, we write down an equilibrium household joint search model that can explain the gender differences in both the extensive and intensive margins of job search in a unified framework. Third, using this model we disentangle this gender gap into demand-side and supply-side factors. We find that, differences in search intensity is predominantly driven by gender differences in labour demand, while the gender gap in labour force participation is due to supply side factors.

We use two nationally representative data sources for our empirical analysis. The data on labour market status and wages comes from the Periodic Labour Force Survey of 2019. Restricting our attention to couples, we find that, around 99.6% of men are a part of the labour force while only 25% of the women participate in the labour market. Almost 74% of the households in India have males employed with females out of labour force. In this paper, we make an attempt to uncover the channels behind this huge gender disparity in participation rates. Additionally, we also find that, there is a gender gap in wages earned, with women earning less than men.

We next analyse the gender differences in time disposition patterns using Time Use Survey of 2019. We broadly classify the time spent during a day into market work, home production, and leisure. Following Aguiar et al. (2013), we measure home production by calculating the time spent on three activities, viz. unpaid domestic services, unpaid

care giving services, and unpaid volunteer services. Following Krueger and Mueller (2012), we also calculate search intensity of unemployed workers by measuring the time spent on job search. As anticipated, we find that, women spend disproportionately more time in home production than men. An average woman spends around 54% of her time in taking care of the activities at home, while an average male spends only about 6% of his time. And, an unemployed woman also spends less time in looking for a job compared to an unemployed man. An unemployed man spends around 18% of his time on job search while an unemployed woman allocates only 13% of her time for job search. Thus, we find, even women who are participating in the labour market end up devoting less time for job search compared to men.

In order to understand and explain these gender differences in labour market outcomes and time disposition, we write down a household joint search model along the lines of Guler et al. (2012) and Flabbi and Mabli (2018). In our model, each household is made up of two individuals – a male and a female. Each individual can either be employed, unemployed or out of labour force. Employed individuals earn wages by working either in a part-time or a full-time job and they might get separated from their job next period with certain probability. Unemployed individuals do not have a job currently, but they are actively seeking for one, while those who are out of labour force are not looking for a job. Additionally, these individuals allocate their time between market work, home production, and leisure. Unemployed individuals also spend their time on job search. In our joint search model, the labour market decisions and time allocations of each individual depends on the labour state of their partner or spouse. This model framework helps us to capture the dependencies in labour market transitions and time dispositions within households and also helps us to understand how these measures vary across different households. Since the individuals can be in one of three possible labour market states and each household is made up of two individuals, the model is able to generate nine different households in terms of labour market status, and this helps us capture the interactions we find in the data.

We extend the baseline model of Flabbi and Mabli (2018) in a couple of directions to answer our question. First, as the data suggests that there is a huge gender gap in terms

of time spent in home production, we explicitly model the home production with gender specific home productivities to capture this fact. Home productivity in our framework reflects the differential supply side constraints faced by the two genders, and this helps us to study the impact of supply side channels on various labour market outcomes. Second, since we are interested in understanding the gender gap in intensive margin of participation, we also introduce an endogenous choice of search intensity for unemployed males and females. The choice of search intensity depends on the labour market status of their spouse, the supply side constraints faced by them, and also potential job offers they might land with a successful search. Endogenizing both the extensive and intensive margin of search behaviour helps us uncover the dominant factors determining these outcomes.

This model consists of 22 parameters which are calibrated to match different moments from the data. Simulating the model households, we find that the model is able to broadly explain the stark gender differences found in the data across various dimensions. First, the model is able to generate an almost complete labour market participation from men with a very low (around 21%) participation from women as seen in the data. Second, the model is also able to generate the gender gap in intensive margin, with unemployed women spending less time in job search compared to that of men. Third, the women in our model also spend a large amount of time in home production (around 55%) compared to that of men. Finally, we also do a good job of generating the gender differences in wages and part-time work.

Using our calibrated model, we perform counterfactual experiments to decompose the reasons behind the gender gap in search activity into demand and supply side effects. In our framework, the demand side is modeled using gender specific wage offer distributions that unemployed workers face, while the home productivities reflect the supply side constraints. We carry out two different exercises in order to achieve this decomposition. First, we provide females with male wage distributions in order to analyse the impact of gender differences in labour demand. Second, we give females the home productivities of males in order to equalize the supply side constraints faced by the two genders. At the end of this exercise, we find that, the gender differences

in labour demand almost completely explains the gender gap in search intensity while the low female labour force participation is primarily driven by supply side restrictions.

The rest of the paper is organized as follows. Section 2 provides the empirical evidence for gender gap from both Periodic Labour Force Survey and Time Use Survey. Section 3 develops a household labour search model with gender specific home productivities and wage offers. Section 4 details the calibration strategy while the model mechanism and simulation results are presented in section 5. Section 6 talks about our counterfactual experiments and section 7 concludes.

2. Empirical Evidence

In this section, we document the gender differences in job search behaviour and time allocation among the couples. We make use of Periodic Labour Force Survey (PLFS) to document the gender gap in labour market status while the time allocation data is obtained from Time Use Survey (TUS).

2.1 Periodic Labour Force Survey

Periodic Labour Force Survey is a nationally representative data documenting the labour market status and wages of households. Using the data from year 2019 and restricting our attention to married couples, we have information on 159,590 couples.

2.1.1 Labour Market Status

The individuals can be either Employed (E), Unemployed (U) or out of labour force (N). If an individual is working either as regular or casual labour, we classify them as employed. Those who aren't working at present but actively searching for a job are classified as unemployed. Finally, people who are out of labour force are not employed and are not actively searching for a job. Employed people working less than 40 hours a week are considered to be working part-time while the others are considered to be working full-time.

	E	U	N
Employed (E)	24.34	0.57	73.56
Unemployed (U)	0.20	0.04	0.96
Out of labour force (N)	0.07	0.01	0.26

Table 1: Labour Market Status

Stats	Male	Female	Male	Female
	Part-time		Full-time	
Mean	100.33	53.20	67.62	50.99
Median	83.33	41.67	47.62	30
Std dev	60.62	40.03	52.30	49.76

Table 2: Hourly Wages

Table 1 shows the distribution of households across the labour market status of the couples, where the rows show the status for males while the columns show the corresponding status for females. As can be seen, around 73.5% of the households in India have men working while women being out of labour force. The other major fraction is where both men and women are employed, which constitutes around 25% of the households. Thus, there is a huge gender gap in labour force participation with around 99.66% of the men are in the labour force, only 25% of the women are in the labour force. Even within employed population, there is a gender gap in terms of part-time and full-time jobs. Around 25% of employed women do not work full-time, while this fraction is around 11% for men. Thus, a lot less women participate in labour market compared to men. And, even among those who work, women on average spend less time in their jobs compared to men.

Market work	Employment and related activities (A1)
Job search	Time spent in job search (A116)
Home Production	Unpaid domestic services for household members (A3) + Unpaid caregiving services for household members (A4) + Unpaid volunteer, trainee and other unpaid work (A5)
Leisure	Learning (A6) + Socializing and communication, community participation and religious practice (A7) + Culture, leisure, mass-media and sports practices (A8)

Table 3: Measuring Time Allocation

2.1.2 Wages

We now document the hourly wages of workers from the PLFS. As can be seen from table 2, men earn more per hour compared to women. The median wage of a full-time employed male is around 47.6 INR compared to only 30 INR for a female. This gender difference is starker for part-time workers. Male wages are slightly more dispersed compared to female wages as measured using standard deviation.

2.2 Time Use Survey

We use the first nationally representative time use survey conducted in 2019, to document the time use patterns of couples in India. The time use survey provides us information on time allocation across various activities over the day. Consistent with other time use surveys, data was collected on activity undertaken in slots of 30 minutes each, starting from 4:00 AM on the day before the date of interview to 4:00 AM on the day of the interview. In case multiple activities are undertaken in a slot, each activity is assigned an equal amount of time. Thus, every individual reports activity for 1440 minutes, i.e. 24 hours. The coding of activities by major division (1-digit), division (2-digit) and group (3-digit) is consistent with International Classification of Activities for Time Use Statistics (ICATUS) 2016.

We are interested in measuring gender differences in time allocation across various activities, namely, market work, home production, leisure, and job search. We measure

Activity	Male	Female
Work (part-time)	20.90	19.67
Work (full-time)	42.28	38.98
Home prod.	6.39	54.09
Leisure	34.43	32.96
Job search of unemployed	18.24	13.12

Table 4: Time Disposition

time allocation across these activities following the definition in Aguiar et al. (2013). Table 3 shows our definition of activities and also mentions the corresponding variable names from the time use survey. Any time spent on employment related activities are classified as market work, while the time spent to search for a new job constitutes job search. Time spent on home production is measured by combining the time spent on unpaid domestic and care giving services for household members, and also any other volunteer or unpaid work. Finally, leisure is measured as the time spent on any learning, social activities or leisure. Following the literature, we drop self-care and sleep when measuring leisure.

Table 4 shows the percentage of time allocated across different activities by both men and women. Employed men and women spend similar amounts of time in market work. Part-time workers spend around 20% of their time working, while full-time workers spend around 40%. Similarly, men and women spend almost equal time on leisure, which is around 33% of their time.

Important to our discussion, we find unemployed women spend less time in searching compared to unemployed men. Unemployed men spend around 18% of their time searching for a job, while women spend only around 13%. Thus women, on top of having low labour force participation, also search less intensively in the labour market. Thus, there is a gender gap in search behaviour both on the extensive and on the intensive margin. Another activity where we find a huge gender gap is in home production. Women spend around 54% of their time in home production, while men spend around

6%. Thus, it is safe to say, women take care of most of the activities at home with men contributing minimally on average.

This is consistent with our earlier evidence from Periodic Labour Force Survey. Since almost 75% of married women are out of labour force, they don't spend any time on market work. Most of their time is spent on home production, as seen in the time use survey, with remaining on leisure. Although we have documented the time disposition of an average woman, women who are in the labour force also spend more time in home production compared to men. An out of labour force woman spend 59% of their time in home production while a woman in labour spend around 37% of her time. Both these numbers are orders of magnitude bigger than the 6% of the time an average male spends in home production.

3. Model

In the previous section, we documented that women search less in the labour market, both on the extensive and on the intensive margin. We also found that, women spend more time on home production compared to men. We now ask a question, whether these gender gaps in labour market outcomes and time disposition is predominantly driven by demand side or supply side factors. In order to answer this question, we write down a joint household labour search model where the labour market status of one individual will affect the decisions of their partners in the household. From the modeling perspective, the model extends the joint search models of Guler et al. (2012) and Flabbi and Mabli (2018) by incorporating home production and endogenous choice of search intensity.

3.1 Setup

There is a unit measure of households, each consisting of a male and a female. We assume a unitary model of household where the individuals pool their income to decide on their consumption. Each of the individuals can be in one of the three labour market states, namely, employed, unemployed, or out of labour force. Both the individuals

Employed	Market work + home production + leisure
Unemployed	Job search + home production + leisure
Out of labour force	Home production + leisure

Table 5: Time Allocation

choose their labour market states and time allocation in order to maximize a common household utility.

Employed individuals can either be working in a part-time or a full-time job and earn wages associated with the job. At the end of every period, an employed male will lose his job with probability δ_m, while an employed female will lose hers with probability δ_f. The employed individual apart from spending time on market work, also chooses the amount of time to spend on home production and leisure.

Unemployed individuals spend time in searching for jobs. The time spent on job search captures the search intensity and it determines the probability of receiving a wage offer. Higher search intensity, higher the probability of receiving an offer. The job offer received by the individual consists of both wages and work regime – part-time or full-time. Once they receive an offer, the unemployed individual can either accept the offer and become employed or reject the offer and continue to remain unemployed. Unemployed persons, on top of spending time on job search, also choose time to spend on home production and leisure.

Individuals are out of labour force when they do not have a job and also do not spend any time on job search, i.e., their search intensity is zero. When the search intensity is zero, the individuals do not receive any wage offers anymore. Once the individuals exit the labour market, they will not come back in the future. Thus, being out of labour force is an absorbing state in our model. Since these individuals do not spend anytime on job search, they split their entire time between home production and leisure.

Table 5 summarizes the time allocation of individuals in different labour market states. We next define the value functions of the households that will make the depen-

dencies between male and female labour market states more explicit.

3.2 Value Functions

The value functions are defined on the households. Since there are three possible individual labour states and a household has two individuals, the household can be in one of nine possible states. Let EE be the value function of the household where both the man and the woman are employed. And, let EU and EN denote the value functions of the households where men work, but women are either unemployed or out of labour force. Similarly, let UE, UU, UN denote the households where men are unemployed, but women are employed, unemployed, and out of labour force respectively. Finally, NE, NU, and NN denote those households where men are out of labour force, while women occupying the different labour market states.

We now start by defining the problem of an EE household.

$$
\begin{aligned}
rEE(w_m, h_m, w_f, h_f) = \max_{l_m, l_f} \Big\{ & u(w_m h_m + w_f h_f + hp(h_m, h_f, l_m, l_f), l_m, l_f) + \\
& \delta_f \Big(\max \Big\{ EU(w_m, h_m), EN(w_m, h_m), UU, UN, NU, NN \Big\} - EE \Big) + \\
& \delta_m \Big(\max \Big\{ UE(w_f, h_f), NE(w_f, h_f), UU, UN, NU, NN \Big\} - EE \Big) \Big\}
\end{aligned}
$$

An EE household has both the members employed. The male member is working earning a wage w_m per hour and h_m represents the work hours which is either part-time or full-time. Similarly, the female member is employed with wage w_f and hours regime h_f. The total consumption of this household is given by the total labour income of both the members ($w_m h_m + w_f h_f$) and any home production that the members produce, which denoted by $hp(h_m, h_f, l_m, l_f)$. The total home production is determined by the hours supplied by both male and female for this activity. The employed male might lose his job with probability δ_m. Once the male gets hit with a job separation shock, he chooses either to remain unemployed (UE) or completely exit the labour force (NE). Additionally, this shock also affects the labour market state of the female member. The

female might choose the continue working or voluntarily quit her job to be in one of the four possible states – UU, UN, NU, NN. Similarly, the female could lose her job with probability δ_f and could choose to either remain unemployed (EU) or exit the labour force (EN). Again, just like in the previous case, the shock hitting the female will affect the labour state of the male, and he can choose to continue with the job or quit. Thus, the labour market transitions of one household member affects the decisions of the other member and helps us to capture the labour market dependencies within the household. Both male and female member choose their leisure time (in turn determining the time for home production) to maximize the lifetime utility of their household.

A household where the male is employed while the female is unemployed is given by

$$rEU(w_m,h_m) = \max_{l_m,l_f,s_f} \Bigg\{ u(w_m h_m + hp(h_m,h_f,l_m,l_f,s_f),l_m,l_f) + \delta_m \Big(\max\Big\{UU,UN,NU,NN\Big\} - EU(w_m,h_m)\Big) + \alpha_f s_f \Big(\int_w \max\Big\{EU(w_m,h_m), EE(w_m,h_m,w,h), UE(w,h), NE(w,h)\Big\} - EU\Big) dF_f(w,h) \Bigg\}$$

The problem of the employed male is similar to the previous case. He works with hours requirement h_m and earns a wage of w_m. As before, he can lose his job with probability δ_m and this can affect the labour status of the female. On the other hand, the unemployed female endogenously chooses the amount of time to spend for job search (s_f), referred to as the search intensity. The unemployed female draws wage offers from the wage distribution $F_f(.)$ and the probability of receiving a wage offer is given by $\alpha_f s_f$. Thus, higher search intensity leads to higher probability of receiving a wage offer. Even though higher search time leads to more frequent wage offers, the cost of high search intensity is in terms of lower home production hours. This in turn affects today's consumption and utility. Thus the unemployed individual faces trade-off between the job opportunities in the future and home production time today. The gender differences in home productivities and job offers could potentially affect the choice of

search intensity in our model. Similar to the previous case, labour market changes of an unemployed female can also affect the state of the employed male. If the unemployed female receives a wage offer, she can choose to reject the offer, thus remaining in the same state EU or she can accept the offer. Once she accepts the offer, the male member can choose to continue working (EE), or can voluntarily resign the job and become unemployed (UE) or exit the labour force (NE). Thus, once the female starts working, the male might quit his current job to start looking for better opportunities or with female receiving a sufficiently high offer, he might choose to completely exit the labour force. Thus, the model is capable of capturing all these dynamics between the couple. The employed male chooses his leisure time, while the unemployed female chooses her search intensity and leisure time jointly to maximize the lifetime utility.

We next define the household with working males and out of labour force females. As we saw in our empirical evidence in PLFS, these households constitute the majority (around 74%) in India.

$$rEN(w_m, h_m) = \max_{l_m, l_f} \left\{ u(w_m h_m + hp(h_m, l_m, l_f), l_m, l_f) + \delta_m \Big(\max \Big\{ UN, NN \Big\} - EN \Big) \right\}$$

In our framework, once an individual exits the labour force, they don't re-enter. Thus, the out of labour force females do not face any shocks and continue to stay out of labour force. They divide their time between leisure and home production with no time devoted for job search.

Finally, we will look at the household where both the members are looking for a job.

$$\begin{aligned} rUU = \max_{l_m, l_f, s_m, s_f} \Bigg\{ & u(hp(h_m, h_f, l_m, l_f, s_m, s_f), l_m, l_f) + \\ & \alpha_m s_m \Big(\int_w \max \Big\{ UU, EU(w,h), EN(w,h), \Big\} - UU \Big) dF_m(w,h) + \\ & \alpha_f s_f \Big(\int_w \max \Big\{ UU, UE(w,h), NE(w,h), \Big\} - UU \Big) dF_f(w,h) \Bigg\} \end{aligned}$$

Here, both the members are unemployed and they endogenously choose the time allocated to search for a job. As before, higher search intensity results in a higher probability of landing a job offer from a gender specific wage distribution, but it also reduces the time spent on home production and leisure. The unemployed man and woman choose their respective search intensities and leisure time to maximize the lifetime utility of the household. We can define the value functions of other households in similar fashion.

4. Calibration

In this section, we decide on the functional forms and choose parameter values by matching it with a set of data moments.

4.1 Functional Forms

We start by deciding the functional form of the household utility. Following Flabbi and Mabli (2018), we assume the household maximize the flow utility

$$u(c, l_m, l_f) = (1 - \eta_m - \eta_f)\frac{c^{1-\sigma_c}}{1-\sigma_c} + \eta_m \frac{l_m^{1-\sigma_m}}{1-\sigma_m} + \eta_f \frac{l_f^{1-\sigma_f}}{1-\sigma_f}$$

where σ_c, σ_m, and σ_f are the risk aversion coefficients of consumption and leisure respectively. η_m and η_f capture the relative importance man and woman give to leisure compared to consumption.

Following Albanesi and Olivetti (2009), we capture the home production using a CES functional form

$$hp(.) = \left(A_m hp_m^{\phi} + A_f hp_f^{\phi}\right)^{1/\phi}$$

where hp_m and hp_f are the time spent on home production by male and female, while A_m and A_f denote their respective home productivities. While solving the model, we also assume that there is heterogeneity in home productivity within each gender. Both male and female can have low or high home productivities with the probability of

Job turnover rates	$\delta_m, \delta_f, \alpha_m, \alpha_f$
Utility weights	η_m, η_f
Wage distributions	$\mu_m^{pt}, \sigma_m^{pt}, \mu_m^{ft}, \sigma_m^{ft}, \mu_f^{pt}, \sigma_f^{pt}, \mu_f^{ft}, \sigma_f^{ft}$
Prob. of part-time offer	p_m, p_f
Home productivity	$[A_m^l, A_m^h], [A_f^l, A_f^h]$
Prob. of low home prod.	p_m^{hp}, p_f^{hp}

Table 6: Parameters

drawing a low productivity is given by p_m^{hp} for male and p_f^{hp} for female.

Next, we assume that the wage offers originate from a lognormal distribution, and the distribution is conditional on gender and hours requirement. The lognormal distribution is defined by the mean and the standard deviation. We have 4 different wage distributions in our model – male and female with part-time and full-time offers, and this leaves us with eight parameters to calibrate.

4.2 Parameter Values

We have four different curvature parameters in our specification. They are the utility parameters σ_c, σ_m, σ_f, and the parameter governing the elasticity of substitution in home production, ϕ. For utility curvatures, we use the same values as calibrated in Flabbi and Mabli (2018). We set σ_c to be 0.9744, σ_m as 0.9448 and σ_f as 0.9657. The home production elasticity parameter ϕ is chosen to be 0.5963 as done in Afridi et al. (2019).

We have 22 more parameters that needs to be calibrated, and we do that by matching different moments from the data. Job separation rates δ_m and δ_f are chosen to match the male and female unemployment rates while the base job finding rates α_m and α_f are set to match the respective unemployment durations from the data. Utility weights of leisure η_m and η_f are set to target the proportion of time an average male and female spends on leisure.

We classify those working less than 40 hours per week as part-time employed and

others to be working full-time. The hours requirement for these jobs are obtained from the PLFS data as the average hours spent by part-time and full-time workers. This comes out to be 29.5 hours for part-time and 60.24 hours for full-time. We calibrate the gender-specific probabilities of receiving part-time offers, p_m and p_f to match the proportion of male and female part-time workers in the data. We choose the means and standard deviations of all the wage offer distributions to target the corresponding moments of the accepted wage distribution from the data. We fit a lognormal distribution for the accepted distribution to calculate their means and standard deviations, which are then matched to select our wage offer parameters.

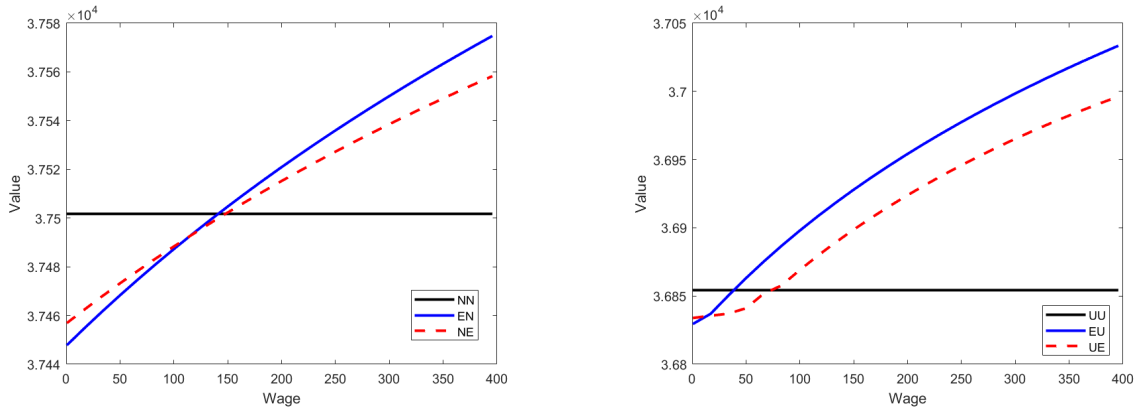
Finally, we assume there are two types of home productivities for men (A_m^l, A_m^h) and for women (A_f^l, A_f^h). We need this heterogeneity in order to match the household distribution we find in the PLFS data. This gives rise to four parameters that needs to be calibrated. We choose these four parameters to match the mean and standard deviation of hours spent on home production by men and women respectively. And, the probability of receiving low home productivity for men and women p_m^{hp} and p_f^{hp} are calibrated to match the corresponding labour force participation rates. On top of these moments, we also include the household distribution and time disposition in terms of leisure and search intensity in our model calibration. In sum, we use 33 data moments to calibrate 22 model parameters.

5. Results

We now discuss the optimal decisions of the households both on the extensive and intensive margin. We will also examine the fit of the model as determined by our model simulations.

5.1 Extensive Margin

The extensive margin decision between being employed and being out of labour force is seen in figure 1a. Here, we plot the lifetime value as a function of wages for NN household along with households where one of the members is employed and other is



(a) Out of Labour Force vs. Employed

(b) Unemployed vs. Employed

Figure 1: Extensive Margin

out of labour force (EN and NE). Further, both the members have high home productivities in this household. As can be seen, NN is a constant as the household doesn't earn any wage. But, both EN and NE are increasing with wage earned, as higher wages increases their consumption. Importantly, we can observe that, for low enough wages, these households prefer to be completely out of labour force than have one of the members do market work. Since both the members have high home productivity, market wage has to be sufficiently high enough to compensate them for their loss of time in home production. Interestingly, at least for these highly productive households, we don't find any gender gap in terms of cutoff wages between employment and out of labour force.

Similarly, figure 1b shows reservation wage that determines the employment - unemployment decisions for males and females. These decisions correspond to those households where man has low home productivity while woman having high home productivity. As before, the value of fully unemployed household (UU) is constant. But, the value of a single employed household (EU and UE) is increasing with wage earned. We find that there is a non-zero reservation wage for both male and female below which they prefer to remain unemployed. Additionally, we find that the reservation wage of a woman is higher than that of a man. A woman needs a sufficiently higher wage offer to accept a job offer, and this might reflect the higher supply-side

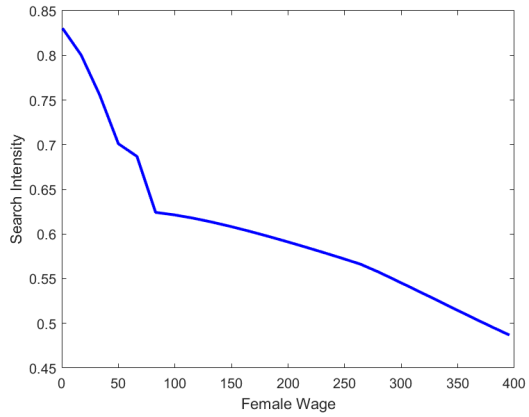
constraints a woman faces compared to a man.

5.2 Intensive Margin

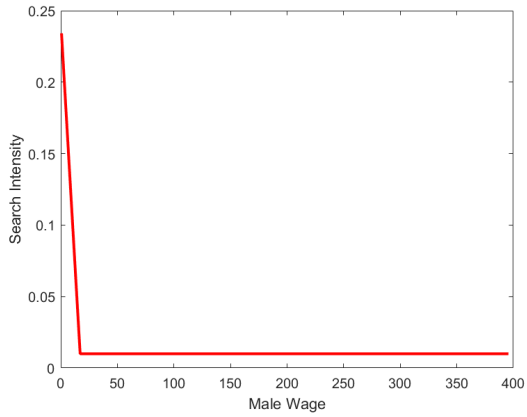
All households optimally split their time between home production and leisure. Unemployed members additionally choose their search intensity while the employed members spend time on market work depending on the hours requirement. We now consider how these optimal decisions vary across different households.

5.2.1 Search Intensity

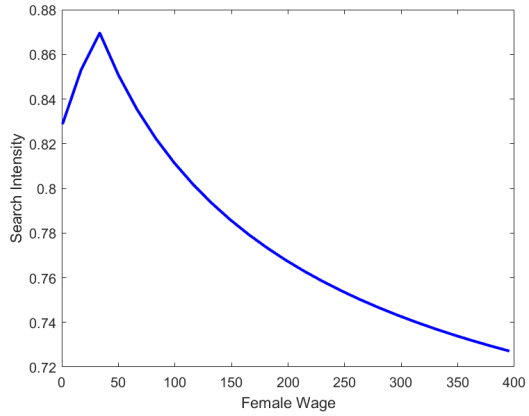
Figure 2 shows the choice of search intensity in a household with one unemployed and another employed member. We start with the top row that shows the result for the household where male has low home productivity and female has high home productivity. We plot the search intensity as a function of spouse's wage. We find that both male and female search intensity are a decreasing function of partner's wage. This makes sense, as higher the wage of the earning member, there is less need for an unemployed member to find a job, hence they search less intensively. Comparing between male and female intensity, we find that men devote lot more time in job search and they continue searching irrespective of wife's wage. On the other hand, female in this household look for job only when the husband's wage is very low. With a moderately high wages for the male, the female stops looking for a job and exits the labour force. Since female has high home productivity in this household, they find it more profitable to spend time on home production than searching for a job. In contrast, when we look at a household where both male and female have low home productivity, female search more now and they continue searching even when the husband is earning high wages. Since female has low home productivity, it is more beneficial for the household to devote more time for job search than in home production. Even though a low productive female search more compared to a high productive household, still the search intensity of a female is lower than that of a male. Additionally, since our calibration points that the majority of households have low home productive males and high home productive females, the model generates average female search intensity to be lower than that



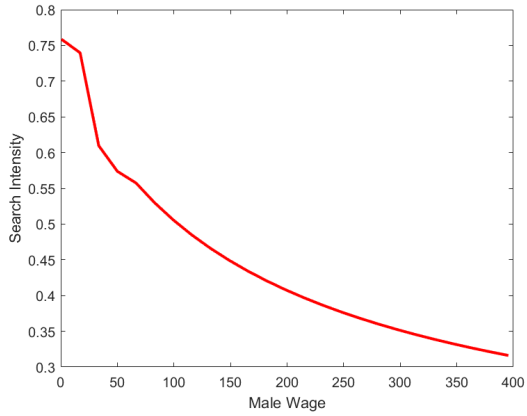
(a) Male/LH



(b) Female/LH



(c) Male/LL



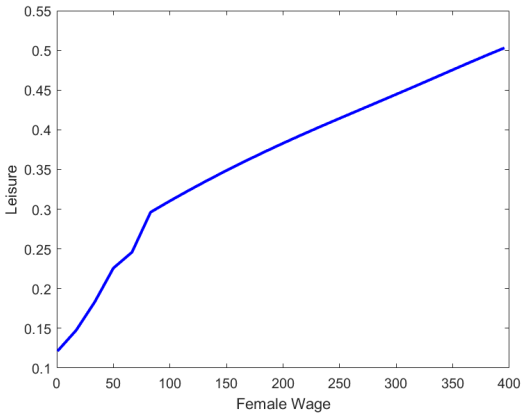
(d) Female/LL

Figure 2: Search Intensity

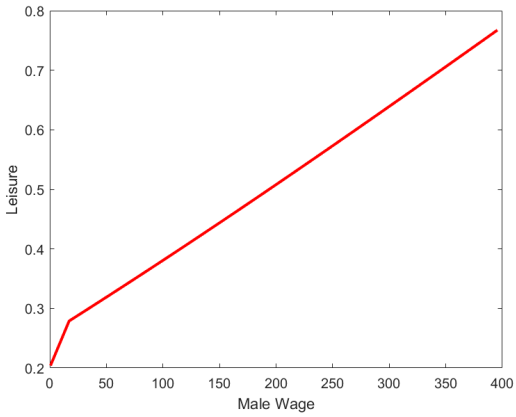
of males, which is consistent with the data.

5.2.2 Leisure

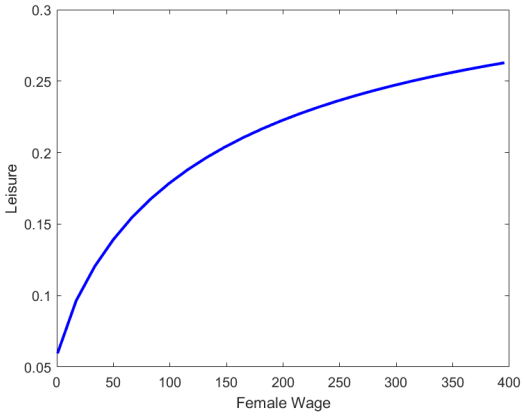
Similar to the case of search intensity, figure 3 shows the choice of leisure among male and female across two different home productivity configurations. To be consistent



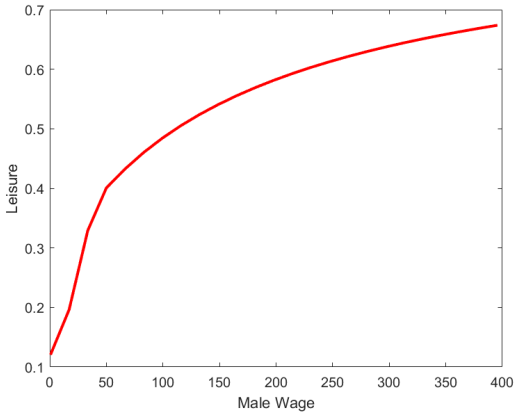
(a) Male/LH



(b) Female/LH



(c) Male/LL



(d) Female/LL

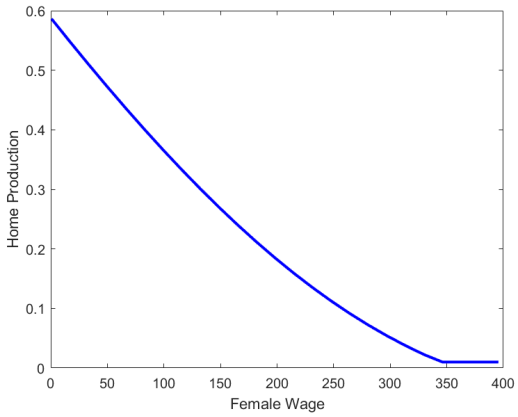
Figure 3: Leisure

with our previous discussion, we continue to look at a household with one member employed and the other unemployed. The leisure choice shown in the figure correspond to the unemployed member of the household. As can be seen, the leisure time of an unemployed increases with the partner's wage. This is consistent, as with a high-earning spouse, there is less need to devote time to either job search or home pro-

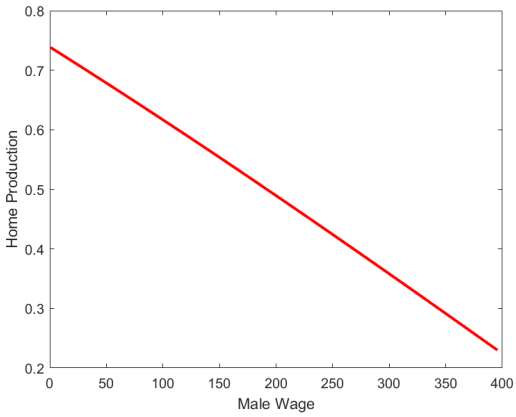
duction. Thus, the unemployed member can enjoy more leisure. Our model predicts unemployed women enjoy more leisure compared to unemployed men. This might be because, unemployed men devote time to job search irrespective of the wages earned by their wife, while unemployed women do not spend much time on job search unless the husband's wage is very low. We also find that the home productivity configurations does not affect the leisure margins by much as both low and high home productivity individuals choose similar amounts of leisure.

5.2.3 Home Production

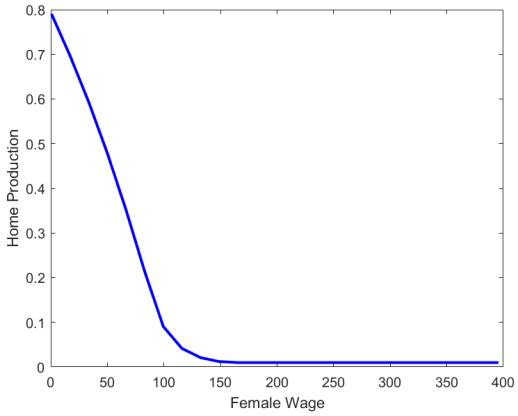
We now talk about the choice of time allocated for home production by both male and female members across different types of households. Here, we concentrate on the households with one member employed and another out of labour force. The choice of home production hours shown in figure 4 refers to the choice of the member who is out of labour force. We find that, with higher spousal wage, the out of labour force member spends less time in home production. This is consistent with previous discussion, as with higher wages earned by the partner, there is less need for home production in order to support consumption. Specifically looking at the households with low home productivity for male and high home productivity for female, we can see that females spend a lot more home production time on average compared to men. Even though both men and women spend similar amount of time on home production when the spouse's wage is low, men decrease their home production time more rapidly as the partner's wage increase. Men stop home producing when their wives earn high wages. On the other hand, women continue to spend time on home production even when their partners earn high enough wages. Looking at the households where both male and female have low home productivities, we find there is not much gender difference in terms of time allocated towards home production. We can see that, both male and female spend time on home production only when their spousal wage is very low. With higher wages, both men and women choose to spend no time on home production.



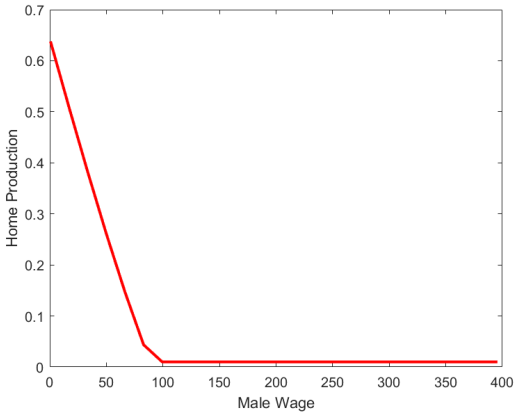
(a) Male/LH



(b) Female/LH



(c) Male/LL



(d) Female/LL

Figure 4: Home Production

5.3 Model Simulations

We simulate our model to calculate the various model moments and compare them with the corresponding data moments. This will help us in analyzing the performance of the model in matching the data moments. We generate a panel of 10,000 households over 2001 periods. We drop the first 2000 periods and take the last period as signifying

	Data			Model		
	E	U	N	E	U	N
Employed (E)	24.34	0.57	73.56	9.99	5.21	50.29
Unemployed (U)	0.20	0.04	0.96	4.08	1.93	28.35
Out of labour force (N)	0.07	0.01	0.26	0.01	0	0.14

Table 7: Household Distribution

the steady state cross-section of households, comparable to our data. We start all the households as unemployed (UU) and then they are hit with different shocks as per the probabilities determined by our calibration exercise.

5.3.1 Household Distribution

We start by looking at the household distribution generated by our model simulation and compare it with the data counterpart. Table 7 shows the model generated distribution along with the data distribution. The model is able to qualitatively capture the household labour status found in the PLFS data. In the data, we find around 73.5% of the households have an employed male and out of labour force female. The model generates this proportion to be around 50%. Similarly, the next big fraction of the households are those where both male and female are employed. In data, around 24% of the households fall under this classification, while the model generates around 10% as the EE households. The model is also able to generate comparable number of NN households where both the members are out of labour force. The model also does a good job of matching the labour force participation rate for both male and female. According to PLFS, around 99.66% of married men are in labour force, while in the model 99.85% of the men are in the labour force. On the other hand, in the data, 25.22% of women are in labour force and the model counterpart is 21.22%. Thus the model is able to capture the stark gender difference in labour force participation rates. When it comes to share of part-time work, the model is able to generate around 6% for men and 11% for women. This is lower than what we find in the data, which is 11% and 25% respec-

Stats	Data - Accepted		Model - Accepted		Model - Offer	
	Male	Female	Male	Female	Male	Female
Part-time						
Mean	4.33	3.76	4.4	3.95	2.33	2.26
Std dev	0.72	0.78	0.53	0.60	1.22	1.05
Full-time						
Mean	3.87	3.46	4.16	3.49	1.87	1.96
Std dev	0.75	0.84	0.56	0.72	1.28	1.14

Table 8: Wage Distribution

tively. Another dimension where the model falls short is matching the unemployment rate. We can see that, there are a lot more households with an unemployed male or female than what the data suggests.

5.3.2 Wages

Using the wages accepted by the unemployed workers in our model, we estimate a lognormal distribution to obtain the means and standard deviations implied by the model. Table 8 compares the accepted wage distribution from the data with the one generated by our model. We are able to match the empirical distribution of accepted wages quite closely for both male and female. The model generates the gender gap in accepted wages, with male workers earning more than female workers in both part-time and full-time work. Additionally, we can use our model to back out the wage offer distributions that led to these accepted distributions in the data. We find that, the offer distributions have smaller means and larger standard deviations. This happens because, accepted wages form a truncated distribution of the underlying offer distributions. Unemployed workers reject wages near the left tail of the offer distributions, and thus the accepted distributions end up having larger means and lower dispersion. Interestingly, we find that, even though there is a large gender gap in accepted wages,

Activity	Data		Model	
	Male	Female	Male	Female
Work (part-time)	20.90	19.67	20.49	
Work (full-time)	42.28	38.98	41.83	
Home prod.	6.39	54.09	15.64	55.26
Leisure	34.43	32.96	38.25	35.88
Job search	18.24	13.12	56.90	46.14

Table 9: Time Disposition

there is hardly any gender gap in terms of wage offers. Thus, the supply side constraints in terms of home production responsibilities might play a role in introducing gender gap in accepted wages.

5.3.3 Time Disposition

Finally, we look at the performance of the model in terms of time allocated across different activities. In terms of market work, we fix the grid for part-time and full-time hours, and it is the same for both male and female. We are able to match the time spent on market work by the choice of the grid points. The model is able to successfully generate the huge gender gap in home production time that we find in the data. An average man in the model spends around 15.6% of their time in home production compared to around 6% in the data. On the other hand, an average woman in the model spends around 55% of her time on home production which is very close to 54% as seen in the data. Thus even though the model overstates the home production time of males, we are able to almost exactly match the home production time of the females. The model also roughly matches the time spent by males and females on leisure. There is not much gender gap in leisure time with males having slightly more leisure time compared to females, which the model also replicates. We also know that unemployed men search more compared to unemployed female, and the model is able to capture this fact qualitatively. But, the search intensity of both male and female in the model is

Activity	Baseline		Counterfactual	
	Male	Female	Male	Female
Work (part-time)	20.49		20.49	
Work (full-time)	41.83		41.83	
Home prod.	15.64	55.26	15.41	54.75
Leisure	38.25	35.88	38.60	35.48
Job search	56.90	46.14	56.64	55.50

Table 10: Counterfactual 1: Time Disposition

higher than what we find in the data.

6. Counterfactual Experiments

In the previous section, we saw that the model does a fair job of capturing the various facets of the data. Importantly, the model is able to generate the gender gap in job search behaviour both on the extensive and on the intensive margin. We now attempt to answer the question, whether this gender gap is driven predominantly by demand-side or supply-side factors. We model the demand-side factor using the wage offer distributions while the supply-side factors are captured by home productivities. In order to disentangle these demand and supply effects, we perform two experiments. First, we provide females with male wage distributions. Second, we provide females with male home productivities.

6.1 Females with Male Wage Offers

In our first experiment, we provide females with wage offer distributions of males and also the probability of part-time offer. Since the offer distributions characterize the demand side channel, this exercise removes the gender gap on the demand side. This exercise will help answer the question, suppose if females also receive equally paid

	Baseline			Counterfactual		
	E	U	N	E	U	N
Employed (E)	9.99	5.21	50.29	10.22	5.27	50.12
Unemployed (U)	4.08	1.93	28.35	3.63	2.1	28.52
Out of labour force (N)	0.01	0	0.14	0.02	0	0.12

Table 11: Counterfactual 1: Household Distribution

offers and equal proportion of full-time jobs, how would females respond in terms of their job search.

Table 10 shows the time disposition of the households when both male and female receive offers from the same distribution. As can be seen, providing females with male wage distributions doesn't affect the time spent on home production or leisure. But, we find, equalizing the demand side across male and female almost completely removes the gender gap in search intensity. In the baseline case, we find that an unemployed man spent around 57% of his time in job search while an unemployed female devoted only 46% of her time. But, when females also face the male wage distributions, their search intensity jumps to 55.5% which is almost equal to that of an unemployed man. Thus most of the gender gap in search intensity can be explained by the differences in the job offers received by men and women. In order to analyse the impact on the extensive margin, we look into the household distribution as shown in table 11. Removing the gender disparity on the demand side does little to affect the extensive margin of job search. The labour force participation rate of females increases slightly from 21.22% to 21.24% with no major changes in other aspects. Thus the demand-side channels doesn't seem to play a big role in explaining the low female labour force participation in India.

6.2 Females with Male Home Productivities

In the previous experiment, we equalized the gender gap on the demand side to analyse the response of female job search both on the extensive and on the intensive mar-

Activity	Baseline		Counterfactual	
	Male	Female	Male	Female
Work (part-time)	20.49		20.49	
Work (full-time)	41.83		41.83	
Home prod.	15.64	55.26	7.55	5.37
Leisure	38.25	35.88	42.69	51.59
Job search	56.90	46.14	79.51	54.32

Table 12: Counterfactual 2: Time Disposition

gin. In this experiment, we equalize the supply side across genders. We do this by providing females with male home productivities and also the probability of drawing the low home productivity. In our framework, gender specific home productivities on top of capturing the supply-side constraints faced by the individuals, also reflect the individual preferences for home production, and gender specific social norms towards home production activities. Thus by providing females with male home productivities, we assume that the females now face similar amount of constraints at home as a male. Thus relaxing the constraints faced by females might induce them to search more in the labour market.

	Baseline			Counterfactual		
	E	U	N	E	U	N
Employed (E)	9.99	5.21	50.29	50.25	24.28	0.83
Unemployed (U)	4.08	1.93	28.35	19.57	4.04	0.53
Out of labour force (N)	0.01	0	0.14	0.06	0	0.44

Table 13: Counterfactual 2: Household Distribution

In order to quantify this effect, we will start by looking at the changes in time disposition provided in table 12. The moment we relax the supply side constraints faced by women, we see that both men and women spend almost equal amount of time in home

production and they also end up enjoying more leisure compared to the baseline. Thus equating the gender disparities in home productivity removes the gap in home production time between men and women. Interestingly, even though both men and women search more in the counterfactual case compared to the baseline, we find that, removing supply side disparities exacerbates the gender gap in search intensity. The gender difference in search intensity of around 10.75 percentage points in the baseline jumps to around 25 percentage points in the counterfactual case. Thus, this exercise reiterates our previous finding that, gender gap in search intensity is primarily driven by demand-side and not supply-side factors. Table 13 shows the changes in household distribution when women face the same supply side constraints as men. We see that, equating the home productivities has led to a large number of women entering the labour market. Around 50% of the households have both men and women working compared to just 10% in the baseline case. Similarly, only around 0.8% of the households have men working and women out of labour force, in contrast to the baseline scenario where these households contributed around 50% of the population. Removing the gender disparities in the supply side has removed the gender gap in extensive margin, with women's labour force participation rate jumping to 98.2% compared to just 21.2% in the baseline case. Thus, we find that, the gender differences in labour force participation is almost completely explained by supply-side constraints. And, in order to bring more women into the labour market, the policy actions should target and ease the supply-side constraints faced by women.

7. Conclusion

Using the nationally representative data from Periodic Labour Force Survey and Time Use Survey, we document that, women search less in the labour market both on the extensive and on the intensive margin. In order to explain this gender gap in search behaviour, we write down a household labour search model with gender specific wage offers and home productivities. Calibrating the model, we find that the model is able to broadly explain the gender disparities in labour market participation and in time

disposition. In order to tease out the source for these gender disparities, we conduct counterfactual exercises by providing females with male wage offers and home productivities. As a result of these exercises, we find that, the gender gap in job search intensity is predominantly driven by demand-side factors while the gender difference in labor market participation can be almost completely explained by supply-side constraints faced by women.

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