

Social Norms, Identity, and Married Females' Labor Commitment

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Abstract This paper analyzes how individual identity and social norms together affect a wife's labor commitment, hence influencing aggregate female labor force participation and strengthening the existing social norms. By modeling the interaction between individual as a game constrained by identities and social norms, we conclude that if decisions revolve around the husband's preferences, an increase in the number of career-oriented women does not necessarily increase female labor force participation. Moreover, even if decisions revolve on the wife's labor market preferences, female labor force could be reduced if the husband is a leader in the game.

Keywords Identity • Social norms • Work commitment • Intra-household welfare

JEL Classification D03 • D1 • D31

1 Introduction

Given plunging fertility rates and aging populations in wealthy countries, moving more women into the workforce can be part of an economy's growth strategy.¹ But in developed countries, although women have overtaken men in educational achievement and are more career oriented than earlier generations (Goldin, 2004, 2006; Fortin, 2005) female labor force participation has "plateaued" (Bertrand, et al., 2013; Blau and Kahn, 2006; Goldin et al., 2006). In this paper we explore how individual identity and social norms together affect a wife's labor commitment. We find that household dynamics, reinforced by social norms or an unfair wage structure, might lower a career-oriented wife's labor force participation, even if her husband shares her orientation, thus offering a new explanation for the slowdown of women in the labor force. Moreover, we show that if a husband and wife hold different views of the wife's role the final outcome, including the distribution of intra-household

¹ Japanese Prime Minister has made moving women into the labor force a central part of his plan to stimulate his country's economy (The Economist, May 29, 2014).

welfare, depends on whose preferences dominate, what those preferences are, and how the household comes to a decision about the wife working.

Our model revolves around the wife's "identity" or ideal perception of herself. Using a two-member household model to study decision-making within a household, we address a wife's labor participation from a perspective on how household dynamics respond to her identity, her spouse's view of her identity, and social norms (Stets and Burke, 2003). This enables us to explain how gender bias (at both the societal level and within the household) matters for the wife's labor force participation.

Most early studies of household decision making considered social norms without identity. Becker's (1985) household production model mentions that social norms play an important role in the process but his unitary model implicitly assumes all household members perceive and embrace common norms. Chiappori (1988, 1992) recognized that households can consist of heterogeneous members and expanded on Becker by considering possible dissonance between members of a household. Later studies took into account household heterogeneity by using a sharing rule between household members with bargaining power affected by exogenous social norms (see, for example, Heathcote et al., 2010; Agarwal, 1997). When looking at female labor force participation, social norms were found to be significant factors in women's work effort being more discretionary than men's (Kmec and Gorman, 2010) and for women's family-career conflict (Goldin, 2014).

Akerlof and Kranton (2000, 2008) were the first to add the role of identity, which they defined as "a person's sense of self," to social norms as a way to explain economic outcomes and conflict, arguing that deviations from the expected behavior in one's category has external effects on the others in that category and internal effect on one's self. Bertrand et al. (2013) used this model to examine relative income within households, finding that gender identity affects the wife's labor force participation, the division of responsibilities within a household, marriage satisfaction and the likelihood of divorce. While Fortin's empirical studies (2005, 2013) showed a relationship between female identity and labor market participation, Akerlof and Kranton (2010) go further, suggesting that social norms interact with individuals' identity to affect outcomes. As a result, they argue social norms of traditional gender roles lower women's attachment to the labor market so they are more likely

to move in and out of the labor force. However, none of these papers explain specifically how the process for intra-household decision making affects final outcomes. In this paper, we use a two-person model with individual identities to explore the interaction of social norms and identity for final outcomes.

The rest of paper is organized as follows. In Section 2, we present our model of a two-person household with identity. Our analysis in section 3 analyzes and simulates how market structure and household values affect rational choices even when both spouses hold a common view of the wife’s identity. The case when household members have different perceptions of the wife’s identity is covered in Section 4. Sections 5 and 6 analyze how individuals’ identity and social context create mutual influence. Finally, Section 7 concludes with a discussion of possible extensions and directions of future research.

2 A two-person household model with identity

Our model addresses the case of two-person households. For convenience, we call the two household members “husband” and “wife”. Identity enters our analysis two ways, first in the sense of Akerlof and Kranton (2000), and second in the collective model of Chiappori (1992). The Akerlof and Kranton prototype model brings identity directly into individual utility while the Chiappori model adds identity through individual-specific views of how important (Chiappori calls these “Pareto weights”) the utility of each household member is in aggregate household utility.

2.1 The identity gap function

We define an identity gap function ID_i as a function of the difference between the choice one makes for a role and one’s ideal choice, where $i \in [F, M]$ denotes either the husband (M) or wife (F).² Since we focus on the labor commitment of the wife, the identity gaps in

² This characterization for i as a superscript or subscript persists throughout the paper.

our model depend on how much a wife's actual labor commitment differs from the unique view a wife or husband has of the appropriate level of her labor commitment, denoted by, \bar{L}_F .³ The important characteristic of ID_i is that it is increasing in the distance the wife's actual labor commitment is from the individual's view of her appropriate labor commitment.

Hence, $\frac{dID_i}{d(|L_F - \bar{L}_F|)} > 0$ where L_F is the wife's actual labor force hours and \bar{L}_F is how

much the husband or wife thinks she should work, An example for this function is $ID_i = (L_F - \bar{L}_F)^2$. Note then that we have $ID_F = ID_F(L_F, \bar{L}_F)$ and $ID_M = ID_M(L_F, \bar{L}_F^M)$ where the subscript indicates if the identity gap function belongs to the wife or husband, respectively.

2.2 Individual utility and household welfare

Both the husband and wife face a time constraint, given by T_i , which can be used either in labor market activity, L_i , or for leisure, l_i ⁴, so $l_i = T_i - L_i$. Total household consumption is subject to a budget constraint $W_M(T - l_M) + W_F(T - l_F) = P(C_M + C_F)$ where W_i is the husband's or wife's market wage, C_i denotes their respective consumption, and P is the price of consumption. Utility for each household member is a function of his or her own leisure, consumption, and identity:

$$(1) U_i = U_i(C_i, l_i, ID_i) \text{ for } i \in [F, M]$$

with $\frac{\partial U_i}{\partial C_i} > 0$ and $\frac{\partial^2 U_i}{\partial C_i^2} < 0$, $\frac{\partial U_i}{\partial l_i} > 0$, $\frac{\partial^2 U_i}{\partial l_i^2} < 0$, $\frac{\partial U_i}{\partial ID_i} \leq 0$ and $\frac{\partial^2 U_i}{\partial ID_i^2} \geq 0$. These last

two terms indicate that a gap between reality and identity causes increasing utility costs from

³ For simplicity we assume there is no identity gap for the husband. This means that neither the husband nor wife has a preconceived view of his appropriate labor commitment.

⁴ Leisure is broadly defined here and can include household production activities, for example, raising children. What we really mean is any non-labor market activity that yields utility.

psychological ennui and displacement. Hence, if the wife's actual choice corresponds to her ideal labor hours, her identity gap is zero and has no impact on the individual utility:

$$\frac{\partial U_i}{\partial ID_i} = 0 \quad \text{if } ID_i = 0.$$

We define the *indirect* effect of leisure as marginal identity cost⁵, which is the impact of the wife's actual choice for leisure on each individual utility through the identity gap $\frac{\partial U_i}{\partial ID_i} \frac{\partial ID_i}{\partial l_F}$

while the *direct* effect of leisure, $\frac{\partial U_i}{\partial l_i}$, is the impact of each member's own leisure on each utility.

The household makes a collective decision under the common budget constraint taking into account the weighted joint utility of both members. We define weights⁶ for the proportion of contribution each individual's utility makes to the household welfare. The wife's contribution weight is μ^S while husband's weight is $1 - \mu^S$, where $0 \leq \mu^S \leq 1$. An additional level of identity enters our model through these weights. Let the head of the household be the individual who makes the decision about the distribution of these weights. We define the following attitudes for the head of household: If she or he has "egalitarian perceptions", then $\frac{\mu^S}{1 - \mu^S} = 1$. If the head has the relative weights at less than one

$\frac{\mu^S}{1 - \mu^S} < 1$ we say she or he has a patriarchal perception, while if the relative weights are

such that $\frac{\mu^S}{1 - \mu^S} > 1$ he or she has a matriarchal perception. Household welfare is

⁵ Marginal identity cost $\frac{\partial U_i}{\partial ID_i} \frac{\partial ID_i}{\partial l_F}$ consists of marginal utility cost of identity $\frac{\partial U_i}{\partial ID_i} = \frac{\alpha}{2}$ and marginal identity of leisure $\frac{\partial ID_i}{\partial l_F}$.

⁶ Chiappori (1992) simply interprets the Pareto weights as the implicit weight of the second member's egoistic utility in the collective decision process and explain it as a function of labor and non-labor income.

determined by the weighted utility of the wife and husband:

$$(2) \quad U_H = \mu^S U_F + (1 - \mu^S) U_M,$$

where $S \in \{E, P, M\}$ denote egalitarian, patriarchal and matriarchal weights, respectively.

With this joint utility, we look at the interaction between the household members by considering labor market structure and “matters of perception.” Three main factors concerning perception explain consistency or discordance within a household: the characteristics of society (social norms), who the head (or leader) of the household is, and how the follower’s preferences compare to those of the leader. Societies can vary from patriarchal (the husband’s preferences hold according to the social norm) to matriarchal (the wife’s preferences hold according to social norm). How the leader defines the weights μ^S and how well the follower’s attitudes match both the leader’s weights and social norms are the determining factors in matters of perception.

2.3 The comprehensive and direct effects

Household utility is maximized subject to the choice of C_M , C_F , l_M and l_F . A general specification of the Lagrangian for the household is given by

$$(1 - \mu^S) U_M(C_M, l_M, ID_M) + \mu^S U_F(C_F, l_F, ID_F) + \lambda [W_M(T - l_M) + W_F(T - l_F) - P(C_M + C_F)]$$

and the first order conditions reduce to :

$$(3) \quad (1 - \mu^S) \frac{\partial U_M}{\partial C_M} = \lambda P$$

$$(4) \quad \mu^S \frac{\partial U_F}{\partial C_F} = \lambda P$$

$$(5) \quad (1 - \mu^S) \frac{\partial U_M}{\partial l_M} = \lambda W_M$$

$$(6) \quad (1 - \mu^S) \frac{\partial U_M}{\partial I_M} \frac{\partial I_M}{\partial l_F} + \mu^S \frac{\partial U_F}{\partial I_F} \frac{\partial I_F}{\partial l_F} + \mu^S \frac{\partial U_F}{\partial l_F} = \lambda W_F$$

We call the left-hand side of equation (6) the weighted comprehensive effect of a wife's leisure and use the notation $\mu^S \frac{\Delta U_F}{\Delta l_F}$ to distinguish it from the weighted direct effect of her leisure $\mu^S \frac{\partial U_F}{\partial l_F}$. Under the assumption of no identity gap for husband's leisure $ID_F(l_M) = ID_M(l_M) = 0$ so his weighted comprehensive effect of leisure always equals to his weighted direct effect of leisure:

$$(1 - \mu^S) \frac{\partial U_M}{\partial l_M} = (1 - \mu^S) \frac{\Delta U_M}{\Delta l_M}.$$

Accordingly, the total change in household utility from each member's leisure equals the weighted comprehensive-effects from leisure:

$$(7) \quad \frac{\Delta U_H}{\Delta l_F} = \frac{\mu^S}{W_F} \frac{\Delta U_F}{\Delta l_F} \quad \text{and} \quad \frac{\Delta U_H}{\Delta l_M} = \frac{(1 - \mu^S)}{W_M} \frac{\Delta U_M}{\Delta l_M}.$$

When neither the husband nor the wife have an identity $\frac{\partial U_i}{\partial ID_i} \frac{\partial ID_i}{\partial l_F} \equiv 0$ for $\forall i$.

Then equation (6) reduces to $\mu^S \frac{\partial U_F}{\partial l_F} = \lambda W_F$ and the comprehensive effect is the same as the direct effect for both the wife and husband. Maximizing joint utility requires that household members' leisure and consumption satisfy

$$(8) \quad \frac{\partial U_M / \partial C_M}{\partial U_F / \partial C_F} = \frac{W_F}{W_M} \left(\frac{\Delta U_M / \Delta l_M}{\Delta U_F / \Delta l_F} \right) = \frac{\mu^S}{(1 - \mu^S)} = \frac{W_F}{W_M} \left(\frac{\partial U_M / \partial l_M}{\partial U_F / \partial l_F} \right).$$

When $\mu^S = (1 - \mu^S)$ and agents are homogeneous the model reduces to the unitary model of Becker⁷.

⁷ If $\mu = 1/2$ and they share the same individual utility function (homogeneous), then the equations (5) and (6) can hold only if $W_M = W_F$.

3 Identity agreement and labor market structure

In this section we assume that social norms are the same as the household's agreed identity for the wife, and leisure that differs from the identity value imposes true utility loss.

3.1 Shared equilibrium

If the wife's identity matters in the household decision making process, zero indirect effect for both individual utilities $\frac{\partial U_i}{\partial ID_i} \frac{\partial ID_i}{\partial l_F} = 0$ can hold only if $\frac{\partial ID_M}{\partial l_F} = \frac{\partial ID_F}{\partial l_F} = 0$. This is the

unique case satisfied only when they agree on the wife's identity and the shared identity happens to corresponds to the wife's actual choice $l_F = \bar{l}_F^M = \bar{l}_F^F = \bar{l}^*$. We define such a choice as "shared equilibrium": when all members of the household share the same view of members' roles (in the case of the Akerlof and Kranton approach to identity) and there is no indirect effects by matching their choice based on shared identity to their actual choices based on pecuniary and social structural context. However, life rarely hits targets. The wife's actual choice of leisure does not necessarily coincide with the shared identity \bar{l} ; marginal identity costs are measured against the marginal utilities of consumption and leisure. For example, both the wife and husband might see her as a fulltime worker but she may work less than her ideal amount because of the direct effect from leisure (say for childcare), causes non-zero indirect effects. Similarly, if she sees herself as a "stay at home-mom" with preferred labor market hours of zero, she may need to work for consumption purpose. Therefore, even if the husband and wife agree on the wife's identity, the household cannot always avoid identity gaps from her actual choice; the joint utility maximization may mean $\frac{\partial ID_M}{\partial l_F} = \frac{\partial ID_F}{\partial l_F} \neq 0$.

Hence the indirect effects are same across members since the household agree on their identity and we have

$$(9) \quad \frac{\partial U_M}{\partial I_M} \frac{\partial ID_M}{\partial l_F} = \frac{\partial U_F}{\partial I_F} \frac{\partial ID_F}{\partial l_F}.$$

Given (9) equation (6) reduces to

$$(10) \quad \frac{\partial U_M}{\partial ID_M} \frac{\partial ID_M}{\partial l_F} + \mu^s \frac{\partial U_F}{\partial l_F} = \frac{\partial U_F}{\partial ID_F} \frac{\partial ID_F}{\partial l_F} + \mu^s \frac{\partial U_F}{\partial l_F} = \lambda W_F.$$

Under this assumption the first-order conditions in the model with identity give the household members the following general conditions:

$$(11) \quad \left[\frac{\left(\frac{\partial U_F}{\partial ID_F} \frac{\partial ID_F}{\partial l_F} \right) + \left(\frac{\partial U_F}{\partial l_F} \right)}{\left(\mu^s \frac{\partial U_M}{\partial l_M} \right) + \left(\frac{\partial U_M}{\partial l_M} \right)} \right]_{\text{with identity}} = \frac{(1 - \mu^s) W_F}{\mu^s W_M} = \left[\frac{\left(\frac{\partial U_F}{\partial l_F} \right)}{\left(\frac{\partial U_M}{\partial l_M} \right)} \right]_{\text{without identity}} = \frac{\left(\frac{\Delta U_F}{\Delta l_F} \right)}{\left(\frac{\Delta U_M}{\Delta l_M} \right)}$$

and

$$(12) \quad \left[\frac{\frac{\partial U_F}{\partial ID_F} \frac{\partial ID_F}{\partial l_F} + \frac{\partial U_F}{\partial l_F}}{\frac{\partial U_F}{\partial C_F} + \frac{\partial U_F}{\partial C_F}} \right]_{\text{with identity}} = \frac{W_F}{P} = \left[\frac{\frac{\partial U_F}{\partial l_F}}{\frac{\partial U_F}{\partial C_F}} \right]_{\text{without identity}}$$

Since the denominators of the term for both equation (11) and (12) are positive and $\frac{\partial U_F}{\partial ID_F}$ is

negative, the key term comes down to the sign of $\frac{\partial ID_F}{\partial l_F}$:

$$\text{if } \frac{\partial ID_F}{\partial l_F} \begin{matrix} > \\ = 0 \\ < \end{matrix}, \text{ then } \left[\frac{\left(\frac{\partial U_F}{\partial l_F} \right)}{\left(\frac{\partial U_M}{\partial l_M} \right)} \right]_{\text{with identity}} \begin{matrix} > \\ = \\ < \end{matrix} \left[\frac{\left(\frac{\partial U_F}{\partial l_F} \right)}{\left(\frac{\partial U_M}{\partial l_M} \right)} \right]_{\text{without identity}}$$

$$\text{and } \left[\frac{\frac{\partial U_F}{\partial l_F}}{\frac{\partial U_F}{\partial C_F}} \right]_{\text{with identity}} \begin{matrix} > \\ = \\ < \end{matrix} \left[\frac{\frac{\partial U_F}{\partial l_F}}{\frac{\partial U_F}{\partial C_F}} \right]_{\text{without identity}}$$

Equation (11) indicates that the ratio of comprehensive effects between two members

$\frac{\Delta U_F}{\Delta l_F} / \frac{\Delta U_M}{\Delta l_M}$ is same as the contribution weight ratio multiplied by the wage ratio

$\frac{(1-\mu^S)W_F}{\mu^S W_M}$. If the wife works less than her ideal amount so $\frac{\partial ID_F}{\partial l_F} > 0$ the ratio of direct effects is larger than when identity does not matter, and if she works more than her ideal amount so $\frac{\partial ID_F}{\partial l_F} < 0$ the ratio is smaller than when identity does not matter. Accordingly, a wife's identity has no impact on household utility only if she hits the target, even if the identity is shared by both the husband and the wife

The equation (12) also suggests that wife modifies her leisure for marginal identity cost to keep her consumption-leisure trade-off at the right level. Furthermore, (8) tells us that the wife's and husband's external tradeoff of marginal utility with each other with regard to consumption depends on their contribution weight ratio, which is also one of matters of perception. Therefore, external and internal trade-offs of marginal utility between members with regard to leisure and consumption rely on their perception as well as the wage structure. In particular, when identity matters, optimization in the household has the wife trading some of her marginal utility of leisure for marginal identity costs relative to her husband's marginal utility of leisure.

3. 2 Fair labor market and fair contribution weight under identity agreement

In this subsection, we show how the actual choices when identity matters and they share identity are different from the choices without consideration of identity by simulating with the specific individual utility functions. Suppose

$$U_M = C_M - \frac{1}{2}C_M^2 + l_M - \frac{1}{2}l_M^2 - \frac{\alpha}{4}[l_F - \bar{l}]^2$$

and

$$U_F = C_F - \frac{1}{2}C_F^2 + l_F - \frac{1}{2}l_F^2 - \frac{\alpha}{4}[l_F - \bar{l}]^2.$$

The assumptions on the joint utility function and budget constraint for the simulation are same as the above:

$$U_H = [1 - \mu^S]U_M + \mu^S U_F \text{ and } B.C : W_M(T - l_M) + W_F(T - l_F) - P[C_M + C_F] = 0,$$

where $T - l_i = L_i$. We also assume that the wife and husband have equal labor productivity, earn the same wage (we call this a fair labor market), share the same identity for the wife and have egalitarian perception μ^E . The simulation results show that the cost of the wife's identity will be shared equally between the partners.

[Table 1] The household's decision under egalitarian perception and fair wage structure

lbar=0 (Full time worker)	Husband's Consumption	Wife's Consumption	Husband's Leisure	Wife's Leisure
alpha=0 (No identity)	20.00	20.00	20.00	20.00
alpha=0.5 (Identity matters)	21.82	21.82	21.82	14.55
lbar=40 (Mom staying-at-home)	Husband's Consumption	Wife's Consumption	Husband's Leisure	Wife's Leisure
alpha=0 (No identity)	20.00	20.00	20.00	20.00
alpha=0.5 (Identity matters)	18.18	18.18	18.18	25.45

Table 1 shows that wife's and husband's consumptions are always same across members regardless of marginal utility cost of identity $\frac{\partial U_F}{\partial ID_F} = \frac{\alpha}{2}$. If they have no costs so $\alpha=0$ under the egalitarian view, then $C_M = C_F$ and $l_M = l_F$ regardless of wife's ideal amount of leisure \bar{l} . When α is non zero with the egalitarian view consumption is still equal (although lower) and, most importantly, absolute and relative amounts of leisure differ between household members, and the ratio depends on their shared identity level changes. For example, when wage and price are equal and $\alpha = 2$ if $\bar{l} = 0$ (or $\bar{L} = 40$) the wife's leisure is 8 while the husband's leisure is 24. They each have consumption (measured in terms of hours) of 24. If $\bar{l} = 40$ the wife's leisure is 32 while the husband's leisure is 16 and their equal consumption level is 16. On the other hand, when $\alpha = 0.5$, we find 14.55 of

leisure for the wife, 21.82 of leisure for the husband, and 21.82 of consumption for both at $\bar{l} = 0$. If $\bar{l} = 40$ the wife has 25.45 of leisure and the husband 18.18 of leisure. When the household counts identity cost more seriously they reduce their consumptions and trade off the husband's and wife's leisure to close the wife's identity gap..

The shared equilibrium in Table 1 occurs when $l_F = \bar{l}^* = 20$. At all values of α the wife's leisure hours equal her identity hours. Our simulation shows that the equilibrium leisure goal would increase as the wage level increases, which indicates that a higher relative wage allows people to *want to* work less [See appendix 1]. Moreover, if the shared equilibrium is above the shared identity so $\bar{l} < \bar{l}^*$, the wife's actual choice will be less than her identity level. On the other hand, if $\bar{l} > \bar{l}^*$ the actual choice of the wife's leisure increases as the marginal utility cost of identity $\frac{\partial U_F}{\partial ID_F} = \frac{\alpha}{2}$ increases and the husband's leisure and consumption for parties are reduced. Finally, at any level of α (the marginal utility cost of identity) the wife's actual choice of leisure increases while husband's leisure and couple's consumption decrease as the wife's ideal amount of leisure increases.

4 Cognitive discordance

When couples disagree on identity $\bar{l}_F^F \neq \bar{l}_F^M$ Equation (6) tells us that the weighted comprehensive effect for wife is the weighted direct effect plus the sum of weighted indirect effect such that

$$(13) \quad \mu^S \frac{\Delta U_F}{\Delta l_F} = \mu^S \frac{\partial U_F}{\partial l_F} + (1 - \mu^S) \frac{\partial U_M}{\partial I_M} \frac{\partial I_M}{\partial l_F} + \mu^S \frac{\partial U_F}{\partial I_F} \frac{\partial I_F}{\partial l_F},$$

where $(1 - \mu^S) \frac{\partial U_M}{\partial I_M} \frac{\partial I_M}{\partial l_F} + \mu^S \frac{\partial U_F}{\partial I_F} \frac{\partial I_F}{\partial l_F} \neq 0$. Since the indirect effect from women's leisure

is nonzero for either husband or wife, or for both $\sum_i \frac{\partial U_i}{\partial I_i} \frac{\partial I_i}{\partial l_i} \neq 0$, her direct effect of leisure

is different from her comprehensive effect. However, as we mentioned before, husband's comprehensive effect from his own leisure is the same as his direct effect all the time because

the identity gap function in our model is the function of only wife's leisure.

On the other hand, from the first order conditions, we know that the following equality always holds in all cases regardless of identity issues:

$$(14) \quad \frac{\Delta U_F}{\Delta l_F} / \frac{\Delta U_M}{\Delta l_M} = \frac{(1 - \mu^S) W_F}{\mu^S W_M}$$

because the relative comprehensive effect of leisure between couples is a function of relative contribution weight ratio and wage ratio. Therefore, when identity matters but there exist the cognitive discordances wife's weighted comprehensive effect equals to husband's direct effect multiplied by the relative wage ratio and contribution weight ratio but not to her own weighted direct effect:

$$\frac{\partial U_F}{\partial l_F} \neq \frac{\Delta U_F}{\Delta l_F} = \frac{(1 - \mu^S) W_F}{\mu^S W_M} \frac{\Delta U_M}{\Delta l_M} = \frac{(1 - \mu^S) W_F}{\mu^S W_M} \frac{\partial U_M}{\partial l_M}.$$

Moreover, the relative size between $\frac{\partial U_F}{\partial l_F}$ and $\frac{\Delta U_F}{\Delta l_F}$ depends on the gap between agents' identity and wife's actual labor commitment.

5 Actual labor commitments under the patriarchal society

In this session, we address the patriarchal case first since most countries are in the transition from the society close to the patriarchal system. We assume that market structure is fair $W_M = W_F$ under assumption of same labor productivity and thus wage ratio is one in order for us to focus on the impact of social norms.

5.1 An identity equilibrium

We characterize "identity equilibrium" when the household achieves shared equilibrium and an egalitarian perception on individual utility weight (in the case of the Chiappori model): it

represents $\mu^S = \mu^E$ and $\bar{l}_F^F = \bar{l}_F^M = \bar{l}^* = l_F$. As seen in Section 3, we know that at shared equilibrium the comprehensive effect of leisure equals to direct-effect $\frac{\Delta U_F}{\Delta l_F} = \frac{\partial U_F}{\partial l_F}$ by

$$\frac{\partial U_i}{\partial ID_i} \frac{\partial ID_i}{\partial l_F} = 0 \text{ for } \forall i \text{ and } \frac{\Delta U_M}{\Delta l_M} = \frac{\partial U_M}{\partial l_M} \text{ for husband by assumption. In addition, from}$$

Equation (10), when the head has egalitarian perception such that $\frac{\mu^S}{(1-\mu^S)} = 1$, we know

that $\frac{\Delta U_F}{\Delta l_F} = \frac{\Delta U_M}{\Delta l_M}$ so that their leisure is optimal level across the household. To sum up, the

identity equilibrium is given by

$$\frac{\partial U_F}{\partial l_F^*} = \frac{\Delta U_F}{\Delta l_F^*} = \frac{\Delta U_M}{\Delta l_M^*} = \frac{\partial U_M}{\partial l_M^*}$$

when identity matters in the decision process of the household. Accordingly, we interpret this identity equilibrium as the stable status regardless of the characteristic of social norms because there is no identity cost by zero indirect effects and male's direct effect always coincides with female's direct effect.

5. 2 Characteristic of society (social norms)

In a patriarchal society, the head of household is usually husband. Thus, we assume that the leader of the household is husband and wife is the follower in the patriarchal society. Moreover, we also assume that under any certain social context the follower always chooses some actions to coincide with leader's identity: in the patriarchal society wife chooses actual labor commitment to follow husband's perception even though such a behavior violates her own identity. It makes sense when we consider the following example: a daughter-in-law pretends to prepare for meals when she stays with her parents-in-law because it is perceived as a courtesy for them by patriarchal culture even though she does not want to do so without them. Therefore, in our paper, the patriarchal society indicates the case in which wife's actual commitment equals to husband's ideal amount on wife's labor $L_F = \bar{L}_F^M$ (or $l_F = \bar{l}_F^M$),

which tell us $\frac{\partial U_M}{\partial ID_M} \frac{\partial ID_M}{\partial l_F} = 0$ all the time.

5.3 Characteristic of follower

We categorize the characteristics of follower with four types by comparing to the head's identity: when the follower has the same identity with the head and the shared identity level is shared equilibrium we call her rational type. If the shared identity is not shared equilibrium, then we call her neutral type. If the follower has relatively bigger target than ideal labor commitment of the head, then the follower is classified as career-oriented type. However, we say that she is the housework-oriented type when her ideal amount on labor is relatively smaller than her husband's expectation.

Hence, if wife is either career-oriented or housework-oriented type, the couples would show cognitive discordance because the follower's identity is different from leader's identity: Under the patriarchal social norms, when wife is more career-oriented than husband expects $\bar{L}_F^F > \bar{L}_F^M$ (or $\bar{l}_F^F < \bar{l}_F^M$), the wife is forced to work less than her ideal amount (to follow her husband's dictates). As a result, the identity cost for wife increases as her leisure increases $\frac{\partial ID_F}{\partial l_F} > 0$ and the direct effect of leisure is greater than the comprehensive effect

for the woman $\frac{\partial U_F}{\partial l_F} > \frac{\Delta U_F}{\Delta l_F}$. It is because of the negative indirect effect from leisure

$\frac{\partial U_F}{\partial ID_F} \frac{\partial ID_F}{\partial l_F} < 0$, in which the effects count on as a cost and the marginal utility cost of

identity for both is always negative $\frac{\partial U_i}{\partial ID_i} < 0$. However, when the wife is more housework-

oriented than the husband wants $\bar{L}_F^F < \bar{L}_F^M$ (or $\bar{l}_F^F > \bar{l}_F^M$), the wife then works more than her identity (again to reflect husband's dictates). For such a type of wife, identity cost decreases as leisure goes up $\frac{\partial ID_F}{\partial l_F} < 0$, which tells us there exists marginal benefit from leisure. Hence,

when she is housework-oriented, the direct effect of leisure for wife is smaller than the

comprehensive effect $\frac{\partial U_F}{\partial l_F} < \frac{\Delta U_F}{\Delta l_F}$ due to the positive indirect effect from leisure

$\frac{\partial U_F}{\partial ID_F} \frac{\partial ID_F}{\partial l_F} > 0$, where $\frac{\partial U_i}{\partial ID_i} < 0$ for all i and indirect effects are interpreted as identity

benefit. On the other hand, when the follower's character matches with that of the leader there is identity agreement and thus she is either rational or neutral type. As mentioned earlier, if their identities match to actual choice $\bar{L}_F^F = \bar{L}_F^M = L_F$ indicating shared equilibrium, the

direct effect of wife's leisure is the same with her comprehensive effect $\frac{\partial U_F}{\partial l_F} = \frac{\Delta U_F}{\Delta l_F}$

because indirect effect is zero, i.e., $\frac{\partial U_i}{\partial ID_i} \frac{\partial ID_i}{\partial l_F} = 0$ for all i by actual labor commitment

equaling the identity goal. However, even when the follower agrees to the leader's identity the actual choice can differ from their shared identity, hence meaning she is just neutral type.

5. 4 Characteristic of leader

When husband (the head of the household in a patriarchal society) has an egalitarian perception, shared equilibrium becomes identity equilibrium because their comprehensive

effect of leisure coincide with one another $\frac{\Delta U_F}{\Delta l_F} = \frac{\Delta U_M}{\Delta l_M}$ and thus the levels of leisure

decided by the weight is Pareto-optimal for the household. However, when the husband has patriarchal perception the relative weight is less than one, which means that the weight ratio is less than the wage ratio under the assumption of same labor productivity. Thus, we know

that $\frac{\Delta U_F}{\Delta l_F} < \frac{\Delta U_M}{\Delta l_M}$ from the equation (14). It tells us that since husband's comprehensive

effect is bigger than wife's comprehensive effect the household can improve the joint welfare by decreasing wife's leisure (or increasing wife's labor commitment). On the other hand, when the husband has matriarchal perception, then the equation (14) implicates that the household welfare can be improved by increasing wife's leisure (or decreasing her labor) because the following relation holds between two comprehensive effects such that

$$\frac{\Delta U_F}{\Delta l_F} > \frac{\Delta U_M}{\Delta l_M}.$$

5. 5 Analysis on the actual labor commitment for wife under the fair wage structure

With characteristics of three main factors of perception, we look at the interaction between social norms and identities. If the head has the egalitarian perception under fair wage structure, then only the type of the follower matters concerning the improvement of the household's welfare. Since social norms under the patriarchal society force wife to follow husband's identity $l_F = \bar{l}_F^M$ (or $L_F = \bar{L}_F^M$), the wife with the career-oriented identity has trade-off effect in terms of the indirect effect and direct effect: the indirect effect is the force to decrease her leisure while her direct effect is the incentive to increase leisure. On the other hand, if she is housework-oriented type, her indirect effect and direct effect move in the same direction by strengthening her incentive to increase her leisure (or decrease her labor) from the identity equilibrium level. However, if the head of the household has the matriarchal perception, the household has the incentive to decrease wife's leisure (or increase her labor) with a comparison between comprehensive effects of two members. In addition, if the leader has the patriarchal perception, the household would have the force to increase wife's leisure (or decrease her labor). Therefore, in terms of the household welfare in the patriarchal society, the household has two forces to change wife's leisure (or her labor) depending on the characteristics of the follower and the leader. Table 2 represents all forces to change wife's labor under the patriarchal society.

[Table 2] The household's decision under the patriarchal system $l_F = \bar{l}_F^M$

Leader	Follower			
	Rational (No force)	Career- oriented (If ↓ force)	Neutral (If ↑ force when >rational)	Housework- oriented (If ↑ force)
Egalitarian (No force)	I.E	If ↓	If ↑	If ↑
Patriarchal (If ↑ force)	If ↑	If ↑ or If ↓	If ↑ ↑	If ↑ ↑
Matriarchal (If ↓ force)	If ↓	If ↓ ↓	If ↑ or If ↓	If ↑ ↑ or If ↓ ↓
Indirect Effect $\frac{\partial U_F}{\partial ID_F} \frac{\partial ID_F}{\partial l_F}$	0	<0	~	>0

In particular, if the leader has patriarchal perception and the follower is career-oriented under the fair wage structure, then there are different incentives for the household. However, when changing from the egalitarian perception to the patriarchal perception on the head's side, there exists the unique force to increase wife's leisure and thus their comprehensive effects are the same as their direct effects. On the other hand, when changing from neutral to career-oriented type on the follower's side, there is the other force to crowd out the direct effects and thus the comprehensive effect of wife is less than the direct effect. Consequently, the comprehensive effect from career-oriented type is relatively smaller force than the comprehensive effect from patriarchal perception. Whereas, when wife is house-oriented type and husband has matriarchal perception, then the total effect from two main forces depend on the stronger comprehensive effect from wife's type. It is because the type of wife has strengthened incentives to change her labor by positive indirect effect. Our simulation results show that wife's labor commitment could decrease under the patriarchal perception on contribution weight while matriarchal perception may not lead to increase in labor commitment. We also simulate to examine how the unfair wage structure can affect the household's choices under the egalitarian perception or under unfair perceptions. With the same type of the follower, if wage structure is unfair then the egalitarian perception cannot be the force of maintaining labor [See Appendix 4].

5.5 Impact of the household-level decision on society under the fair wage structure

Suppose that a society consists of the extreme demographics only with married females who are either career-oriented or housework-oriented, and with married males who are either matriarchal or patriarchal. Under the patriarchal social norms, even if the proportion of each type and perception in the demography is even by gender, the outcomes at the social level result in the decrease in the married females' labor. Then the overall married female labor force could be smaller than the level predicted by comparative analyses based on unitary or collective model. Furthermore, if the society consists of more wives with housework-oriented and more husbands with patriarchal perception, then the social environment may be more preferable for housework-oriented females because the community perceives as married women show low labor commitment or low competitiveness at work.

6 Actual labor commitments under the matriarchal society

If the society were matriarchal, the trend of actual labor commitment would be different from the outcomes analyzed under the patriarchal context. Under the matriarchal social norms, we assume that the head of the household is a wife and the follower is a husband. Then, since the follower chooses to follow the leader's identity, reversely, we can say that the wife can decide to choose her actual labor commitment as same as her identity. In addition, one person can have several identities as sociologists point out, and thus we know that the wife can have the career oriented identity, which means the husband is housework-oriented type, and patriarchal perception at the same time. Now that a husband is the follower, the identity gap

function gives him non-zero marginal effect $\frac{\partial U_M}{\partial ID_M} \frac{\partial ID_M}{\partial l_F} \neq 0$ while a wife has no identity

gap $\frac{\partial U_F}{\partial ID_F} \frac{\partial ID_F}{\partial l_F} = 0$. From Equation (6) and Equation (11), wife's comprehensive effect

now turns into her direct effect and indirect effect, which later effect is the result from her taking care of spouse's identity mismatch:

$$\mu^S \frac{\Delta U_F}{\Delta l_F} = \mu^S \frac{\partial U_F}{\partial l_F} + (1 - \mu^S) \frac{\partial U_M}{\partial ID_M} \frac{\partial ID_M}{\partial l_F} = \lambda W_F$$

Note that, from Equation (13), the husband's identity cost or benefit is taken an account into the wife's utility. Therefore, if the follower is housework-oriented type, then a wife is more career-oriented type than her husband. However, since the final decision is always to follow wife's identity in the matriarchal society $L_F = \bar{L}_F^F$ (or $l_F = \bar{l}_F^F$), when the husband is housework-oriented the reduced labor commitment of a wife (or increase in her leisure) can reduce the husband's identity gap $\frac{\partial ID_M}{\partial l_F} < 0$. Accordingly, if he has more housework-oriented ideal amount than wife's identity $\bar{L}_F^M < \bar{L}_F^F$ (or $\bar{l}_F^M > \bar{l}_F^F$), then the indirect effect from the wife's leisure is positive $\frac{\partial U_M}{\partial ID_M} \frac{\partial ID_M}{\partial l_F} > 0$ and thus wife's comprehensive effect is smaller than direct effect of her leisure while being affecting by that effect. Hence, when he is more housework-oriented, there is the incentive for the household to increase wife's leisure (or decrease her labor commitment). However, when a wife (the head of the household) has patriarchal perception there is the incentive in the same direction and thus the actual choice decided by a wife would be smaller one than the identity equilibrium level to improve the household welfare. Whereas, if the head has the patriarchal perception with the career-oriented type of husband, which means housework-oriented wife, then the negative indirect effect from the follower's type $\frac{\partial U_M}{\partial ID_M} \frac{\partial ID_M}{\partial l_F} < 0$ crowds out the direct effect because increase in wife's leisure incurs husband's identity cost $\frac{\partial ID_M}{\partial l_F} > 0$. Therefore, even when the husband is housework-oriented (or the wife is career-oriented) in the matriarchal society, the identity gap from the husband can make the wife's actual labor commitment reduced because she considers her spouse's identity cost (see the case in which the husband is housework-oriented or career-oriented and the wife has economic perception). Table 3 represents all forces to change wife's labor under the matriarchal society.

However, even if the wife considers spouse's the identity cost or benefit, the overall result from the aggregation at the society level reflects exactly the proportion of demographic. Likewise to the patriarchal society case, suppose the extreme case in which population consists of 50 percentage of housework-oriented and 50 percentage of career-oriented husband, and wives have either matriarchal or patriarchal perception evenly. Then, the social

outcome shows unchanged females' labor forces with such a characteristic of population.

[Table 3] The household's decision under the matriarchal system $l_F = \bar{l}_F^F$

Leader	Follower		
	Rational (No force)	Housework- oriented (If ↑ force)	Career- oriented (If ↓ force)
Egalitarian (No force)	I.E	If ↑	If ↓
Patriarchal (If ↑ force)	If ↑	If ↑ ↑	If ↑ or If ↓
Matriarchal (If ↓ force)	If ↓	If ↑ ↑ or If ↓ ↓	If ↓ ↓
Indirect Effect $\frac{\partial U_F}{\partial ID_F} \frac{\partial ID_F}{\partial l_F}$	0	>0	<0

7 Conclusion

In our paper, we raise the two research questions: what are the main factors to explain why females' labor force participation has plateaued even when the society seems to give more opportunity to the current generation than the previous generation. In addition, we ask how those factors affect females' labor commitment. From our analysis, we answer the main factors are individual identities and social norms as well as labor market structure. Those factors interact with each other, and thus the final result could be disruptive at the household level: we find even when they share identity on wife's leisure, they can have some identity cost, which ends up spreading between the couple. In addition, if labor market structure is unfair, then when their perception fits to such structure they can be better off. More importantly, we find that the characteristics of society and each individual identity play the important role concerning the decision on the married female's labor commitment within the household. Our main contribution is to show how the joint decision involves each agent's identity, the joint decision interacts with social norm, and that identity and social norms mutually influence each other rather than identity being affected by social norms in only one direction. In addition, we consider the individual weight in the household utility as an

endogenous variable instead of taking it as given.

In particular, we show with the case of patriarchal social norms that heterogeneous agents have mutual impacts on the final decision with their own identities to improve the joint utility welfare. We conclude that even if a wife is career-oriented in a patriarchal society, when the husband has a patriarchal perception, then the female's labor commitment does not necessarily increase. Especially, when the society has the extreme population, in which the proportion of wives is either career-oriented or housework-oriented evenly and the proportion of husband is either patriarchal or matriarchal type evenly, the overall labor force of married females would be reduced by interacting between individual identities and social norms. Furthermore, we also show that an agent can have several identities or perception with the matriarchal society case. Even in the matriarchal society, we find that the career-oriented wife does not necessarily increase her labor commitment because she takes care of spouse's identity cost from her choice when the two agents jointly make a certain decision.

Our paper has some limitation since our application only focuses on the females' labor choice, and thus we do not consider how the inclusion of males' labor forces in the identity gap function can have different impact on the household decision making process. However, for more realistic analysis the inclusion of such effects is necessary even though we simplify the cases for the purpose of this paper. Furthermore, we interpret identity only limited to oneself agents perceive consciously excluding their unconscious mind. Moreover, we analyze that a wife and a husband both work before marriage and thus we do not explain the corner solution in which the wife cannot have any wage. Finally, we suggest that the further study demands the macro-level impact of the identities in detail by aggregating each case and proving the results numerically.

Appendix 1 Economic/egalitarian perception

Economic Perception: $W=0.75$ ($W_m=W_f$); $\mu=0.5$; $P=1$ (weight ratio = wage ratio)												
Cm	lbar=0	lbar=5	lbar=10		lbar=14.56	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	19.08	19.08	19.08	↓	19.08	19.08	19.08	19.08	19.08	19.08	19.08	↑
alpha=0.5	20.32	19.89	19.47		19.08	19.04	18.62	18.19	17.77	17.34	16.91	
alpha=1	21.00	20.34	19.68		19.08	19.02	18.36	17.70	17.04	16.38	15.73	
alpha=15	21.43	20.62	19.82		19.08	19.01	18.20	17.39	16.59	15.78	14.97	
alpha=2	21.73	20.82	19.91		19.08	19.00	18.09	17.18	16.27	15.36	14.45	
Cf	lbar=0	lbar=5	lbar=10		lbar=14.56	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	19.08	19.08	19.08	↓	19.08	19.08	19.08	19.08	19.08	19.08	19.08	↑
alpha=0.5	20.32	19.89	19.47		19.08	19.04	18.62	18.19	17.77	17.34	16.91	
alpha=1	21.00	20.34	19.68		19.08	19.02	18.36	17.70	17.04	16.38	15.73	
alpha=15	21.43	20.62	19.82		19.08	19.01	18.20	17.39	16.59	15.78	14.97	
alpha=2	21.73	20.82	19.91		19.08	19.00	18.09	17.18	16.27	15.36	14.45	
Im	lbar=0	lbar=5	lbar=10		lbar=14.56	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	14.56	14.56	14.56	↓	14.56	14.56	14.56	14.56	14.56	14.56	14.56	↑
alpha=0.5	15.49	15.17	14.85		14.56	14.53	14.21	13.89	13.57	13.26	12.94	
alpha=1	16.00	15.51	15.01		14.56	14.52	14.02	13.53	13.03	12.54	12.04	
alpha=15	16.32	15.72	15.11		14.56	14.51	13.90	13.30	12.69	12.09	11.48	
alpha=2	16.55	15.86	15.18		14.56	14.50	13.82	13.14	12.45	11.77	11.09	
If	lbar=0	lbar=5	lbar=10		lbar=14.56	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	14.56	14.56	14.56	↑	14.56	14.56	14.56	14.56	14.56	14.56	14.56	↓
alpha=0.5	10.33	11.78	13.23		14.56	14.69	16.14	17.60	19.05	20.50	21.96	
alpha=1	8.00	10.25	12.51		14.56	14.76	17.01	19.26	21.52	23.77	26.02	
alpha=15	6.53	9.29	12.04		14.56	14.80	17.56	20.32	23.08	25.83	28.59	
alpha=2	5.52	8.62	11.73		14.56	14.83	17.94	21.05	24.15	27.26	30.36	

Economic Perception: $W=1$ ($W_m=W_f$); $\mu=0.5$; $P=1$ (weight ratio = wage ratio)												
Cm	lbar=0	lbar=5	lbar=10	lbar=15		lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		
alpha=0	20.00	20.00	20.00	20.00	↓	20.00	20.00	20.00	20.00	20.00	↑	
alpha=0.5	21.82	21.36	20.91	20.45		20.00	19.55	19.09	18.64	18.18		
alpha=1	22.86	22.14	21.43	20.71		20.00	19.29	18.57	17.86	17.14		
alpha=15	23.53	22.65	21.76	20.88		20.00	19.12	18.24	17.35	16.47		
alpha=2	24.00	23.00	22.00	21.00		20.00	19.00	18.00	17.00	16.00		
Cf	lbar=0	lbar=5	lbar=10	lbar=15		lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		
alpha=0	20.00	20.00	20.00	20.00	↓	20.00	20.00	20.00	20.00	20.00	↑	
alpha=0.5	21.82	21.36	20.91	20.45		20.00	19.55	19.09	18.64	18.18		
alpha=1	22.86	22.14	21.43	20.71		20.00	19.29	18.57	17.86	17.14		
alpha=15	23.53	22.65	21.76	20.88		20.00	19.12	18.24	17.35	16.47		
alpha=2	24.00	23.00	22.00	21.00		20.00	19.00	18.00	17.00	16.00		
Im	lbar=0	lbar=5	lbar=10	lbar=15		lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		
alpha=0	20.00	20.00	20.00	20.00	↓	20.00	20.00	20.00	20.00	20.00	↑	
alpha=0.5	21.82	21.36	20.91	20.45		20.00	19.55	19.09	18.64	18.18		
alpha=1	22.86	22.14	21.43	20.71		20.00	19.29	18.57	17.86	17.14		
alpha=15	23.53	22.65	21.76	20.88		20.00	19.12	18.24	17.35	16.47		
alpha=2	24.00	23.00	22.00	21.00		20.00	19.00	18.00	17.00	16.00		
If	lbar=0	lbar=5	lbar=10	lbar=15		lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		
alpha=0	20.00	20.00	20.00	20.00	↑	20.00	20.00	20.00	20.00	20.00	↓	
alpha=0.5	14.55	15.91	17.27	18.64		20.00	21.36	22.73	24.09	25.45		
alpha=1	11.43	13.57	15.71	17.86		20.00	22.14	24.29	26.43	28.57		
alpha=15	9.41	12.06	14.71	17.35		20.00	22.65	25.29	27.94	30.59		
alpha=2	8.00	11.00	14.00	17.00		20.00	23.00	26.00	29.00	32.00		

Economic Perception: $W=1.5$ ($W_m=W_f$); $\mu=0.5$; $P=1$ (weight ratio = wage ratio)												
Cm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$		$\bar{l}=27.54$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	18.69	18.69	18.69	18.69	18.69	18.69	↓	18.69	18.69	18.69	18.69	↑
alpha=0.5	21.09	20.65	20.22	19.78	19.35	18.91		18.69	18.48	18.04	17.61	
alpha=1	22.53	21.84	21.14	20.44	19.74	19.05		18.69	18.35	17.65	16.95	
alpha=15	13.97	14.83	15.69	16.54	17.40	18.26		18.69	19.11	19.97	20.83	
alpha=2	0.33	3.67	7.00	10.33	13.67	17.00		18.69	20.33	23.67	27.00	
←←←←←←←←←←←←												
Cf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$		$\bar{l}=27.54$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	18.69	18.69	18.69	18.69	18.69	18.69	↓	18.69	18.69	18.69	18.69	↑
alpha=0.5	21.09	20.65	20.22	19.78	19.35	18.91		18.69	18.48	18.04	17.61	
alpha=1	22.53	21.84	21.14	20.44	19.74	19.05		18.69	18.35	17.65	16.95	
alpha=15	13.97	14.83	15.69	16.54	17.40	18.26		18.69	19.11	19.97	20.83	
alpha=2	0.33	3.67	7.00	10.33	13.67	17.00		18.69	20.33	23.67	27.00	
←←←←←←←←←←←←												
lm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$		$\bar{l}=27.54$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	27.54	27.54	27.54	27.54	27.54	27.54	↓	27.54	27.54	27.54	27.54	↑
alpha=0.5	31.13	30.48	29.83	29.17	28.52	27.87		27.54	27.22	26.57	25.91	
alpha=1	33.30	32.26	31.21	30.16	29.12	28.07		27.54	27.02	25.98	24.93	
alpha=15	34.76	33.45	32.14	30.83	29.51	28.20		27.54	26.89	25.58	24.27	
alpha=2	35.80	34.30	32.80	31.30	29.80	28.30		27.54	26.80	25.30	23.80	
←←←←←←←←←←←←												
lf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$		$\bar{l}=27.54$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	27.54	27.54	27.54	27.54	27.54	27.54	↑	27.54	27.54	27.54	27.54	↓
alpha=0.5	20.75	21.99	23.22	24.45	25.68	26.91		27.54	28.14	29.38	30.61	
alpha=1	16.65	18.63	20.60	22.58	24.56	26.53		27.54	28.51	30.49	32.47	
alpha=15	13.90	16.38	18.85	21.33	23.81	26.28		27.54	28.76	31.23	33.71	
alpha=2	11.93	14.77	17.60	20.43	23.27	26.10		27.54	28.93	31.77	34.60	
→→→→→→→→→→→→												

Economic Perception: $W=2$ ($W_m=W_f$); $\mu=0.5$; $P=1$ (weight ratio = wage ratio)												
Cm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$		$\bar{l}=31.8$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	16.40	16.40	16.40	16.40	16.40	16.40	16.40	↓	16.40	16.40	16.40	↑
alpha=0.5	18.85	18.46	18.08	17.69	17.31	16.92	16.54		16.40	16.15	15.77	
alpha=1	20.38	19.75	19.13	18.50	17.88	17.25	16.63		16.40	16.00	15.38	
alpha=15	21.42	20.63	19.84	19.05	18.26	17.47	16.68		16.40	15.89	15.11	
alpha=2	22.18	21.27	20.36	19.45	18.55	17.64	16.73		16.40	15.82	14.91	
←←←←←←←←←←←←												
Cf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$		$\bar{l}=31.8$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	16.40	16.40	16.40	16.40	16.40	16.40	16.40	↓	16.40	16.40	16.40	↑
alpha=0.5	18.85	18.46	18.08	17.69	17.31	16.92	16.54		16.40	16.15	15.77	
alpha=1	20.38	19.75	19.13	18.50	17.88	17.25	16.63		16.40	16.00	15.38	
alpha=15	21.42	20.63	19.84	19.05	18.26	17.47	16.68		16.40	15.89	15.11	
alpha=2	22.18	21.27	20.36	19.45	18.55	17.64	16.73		16.40	15.82	14.91	
←←←←←←←←←←←←												
lm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$		$\bar{l}=31.8$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	31.80	31.80	31.80	31.80	31.80	31.80	31.80	↓	31.80	31.80	31.80	↑
alpha=0.5	36.69	35.92	35.15	34.38	33.62	32.85	32.08		31.80	31.31	30.54	
alpha=1	39.75	38.50	37.25	36.00	34.75	33.50	32.25		31.80	31.00	29.75	
alpha=15	41.84	40.26	38.68	37.11	35.53	33.95	32.37		31.80	30.79	29.21	
alpha=2	43.36	41.55	39.73	37.91	36.09	34.27	32.45		31.80	30.64	28.82	
←←←←←←←←←←←←												
lf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$		$\bar{l}=31.8$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	31.80	31.80	31.80	31.80	31.80	31.80	31.80	↑	31.80	31.80	31.80	↓
alpha=0.5	24.46	25.62	26.77	27.92	29.08	30.23	31.38		31.80	32.54	33.69	
alpha=1	19.88	21.75	23.63	25.50	27.38	29.25	31.13		31.80	33.00	34.88	
alpha=15	16.74	19.11	21.47	23.84	26.21	28.58	30.95		31.80	33.32	35.68	
alpha=2	14.45	17.18	19.91	22.64	25.36	28.09	30.82		31.80	33.55	36.27	
→→→→→→→→→→→→												

Appendix 2 Fair labor market and unfair contribution weight under identity agreement

Under fair wage market structure, our simulation either with matriarchal or with patriarchal perception show that higher wage compared to consumption price leads to higher shared equilibrium level \bar{l}^* while indicating income substitution. In addition, l_M and l_F also increase as wage to price raises at the same level of \bar{l} , μ^S and α [See appendix 2 and 3]. Furthermore, as shared identity \bar{l} is higher, wife's actual leisure gets larger while consumptions for both and husband's leisure get smaller

However, the results show that in the patriarchal case compared to matriarchal perception case shared equilibrium level is higher given wage level and marginal utility cost of identity $\frac{\alpha}{2}$. In addition, in the patriarchal perception case wife's leisure is bigger than that in matriarchal case at the same level of shared identity. These results indicate that even though labor market is fair in terms of wage, the perception can affect the household decision making process.

In addition, we find that wife's leisure is always larger than husband's leisure under patriarchal perception given wage to price level and marginal utility of identity. It indicates that when they have patriarchal perception wife participates in labor market for less hours than does husband. On the other hand, even when household has matriarchal perception wife's leisure could be larger than husband's leisure if they consider marginal utility cost of identity $\frac{\alpha}{2}$ is very small. However, at most matriarchal cases in our simulation, it turns out

$$l_M > l_F.$$

Another interesting thing in our simulation is the change in husband's consumption as marginal utility cost of identity increases. If wage to price ratio equals to or less than one, then husband's consumption amounts are greater under patriarchal perception than those under matriarchal view at any level of marginal utility cost (α) and shared identity (\bar{l}). If wage to price is above one, however, when α is small husband's consumptions in patriarchal case are smaller than those under matriarchal perception and when α is big they are reversed.

2.1 [Patriarchal perception with fair market structure]

Patriarchal Perception: $W=0.75$ ($W_m=W_f$); $\mu=0.4$; $P=1$ (weight ratio < wage ratio)												
Cm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=21.81	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	19.49	19.49	19.49	19.49	19.49	↓	19.49	19.49	19.49	19.49	19.49	↑
alpha=0.5	21.78	21.26	20.73	20.21	19.68		19.49	19.16	18.64	18.11	17.59	
alpha=1	22.98	22.18	21.38	20.58	19.78		19.49	18.98	18.18	17.38	16.58	
alpha=15	23.72	22.75	21.78	20.81	19.85		19.49	18.88	17.91	16.94	15.97	
alpha=2	24.22	23.14	22.06	20.97	19.89		19.49	18.80	17.72	16.63	15.55	
Cf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=21.81	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	28.74	28.74	28.74	28.74	28.74	↓	28.74	28.74	28.74	28.74	28.74	↑
alpha=0.5	32.18	31.39	30.60	29.81	29.03		28.74	28.24	27.45	26.67	25.88	
alpha=1	33.98	32.78	31.58	30.38	29.18		28.74	27.98	26.78	25.58	24.38	
alpha=15	35.08	33.63	32.18	30.72	29.27		28.74	27.81	26.36	24.91	23.45	
alpha=2	35.84	34.21	32.58	30.96	29.33		28.74	27.70	26.08	24.45	22.82	
lm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=21.81	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	14.87	14.87	14.87	14.87	14.87	↓	14.87	14.87	14.87	14.87	14.87	↑
alpha=0.5	16.59	16.19	15.80	15.41	15.01		14.87	14.62	14.23	13.83	13.44	
alpha=1	17.49	16.89	16.29	15.69	15.09		14.87	14.49	13.89	13.29	12.69	
alpha=15	18.04	17.32	16.59	15.86	15.13		14.87	14.41	13.68	12.95	12.23	
alpha=2	18.42	17.60	16.79	15.98	15.17		14.87	14.35	13.54	12.73	11.91	
lf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=21.81	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	21.81	21.81	21.81	21.81	21.81	↑	21.81	21.81	21.81	21.81	21.81	↓
alpha=0.5	15.00	16.56	18.12	19.68	21.24		21.81	22.80	24.36	25.92	27.48	
alpha=1	11.44	13.81	16.19	18.57	20.95		21.81	23.33	25.70	28.08	30.46	
alpha=15	9.24	12.12	15.00	17.88	20.77		21.81	23.65	26.53	29.41	32.29	
alpha=2	7.75	10.97	14.20	17.42	20.64		21.81	23.87	27.09	30.31	33.53	

Patriarchal Perception: $W=1$ ($W_m=W_f$); $\mu=0.4$; $P=1$ (weight ratio < wage ratio)												
Cm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=25	lbar=28.48	lbar=30	lbar=35	lbar=40	
alpha=0	19.32	19.32	19.32	19.32	19.32	↓	19.32	19.32	19.32	19.32	19.32	↑
alpha=0.5	22.37	21.84	21.30	20.76	20.23		19.69	19.32	19.16	18.62	18.09	
alpha=1	24.07	23.23	22.40	21.57	20.73		19.90	19.32	19.07	18.23	17.40	
alpha=15	25.15	24.12	23.10	22.08	21.05		20.03	19.32	19.01	17.99	16.96	
alpha=2	25.89	24.74	23.58	22.43	21.28		20.12	19.32	18.97	17.82	16.66	
Cf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=25	lbar=28.48	lbar=30	lbar=35	lbar=40	
alpha=0	28.48	28.48	28.48	28.48	28.48	↓	28.48	28.48	28.48	28.48	28.48	↑
alpha=0.5	33.06	32.25	31.45	30.65	29.84		29.04	28.48	28.24	27.43	26.63	
alpha=1	35.60	34.35	33.10	31.85	30.60		29.35	28.48	28.10	26.85	25.60	
alpha=15	37.22	35.68	34.15	32.62	31.08		29.55	28.48	28.01	26.48	24.95	
alpha=2	38.34	36.61	34.88	33.15	31.42		29.68	28.48	27.95	26.22	24.49	
lm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=25	lbar=28.48	lbar=30	lbar=35	lbar=40	
alpha=0	19.32	19.32	19.32	19.32	19.32	↓	19.32	19.32	19.32	19.32	19.32	↑
alpha=0.5	22.37	21.84	21.30	20.76	20.23		19.69	19.32	19.16	18.62	18.09	
alpha=1	24.07	23.23	22.40	21.57	20.73		19.90	19.32	19.07	18.23	17.40	
alpha=15	25.15	24.12	23.10	22.08	21.05		20.03	19.32	19.01	17.99	16.96	
alpha=2	25.89	24.74	23.58	22.43	21.28		20.12	19.32	18.97	17.82	16.66	
lf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=25	lbar=28.48	lbar=30	lbar=35	lbar=40	
alpha=0	28.48	28.48	28.48	28.48	28.48	↑	28.48	28.48	28.48	28.48	28.48	↓
alpha=0.5	20.34	21.77	23.20	24.63	26.06		27.49	28.48	28.91	30.34	31.77	
alpha=1	15.82	18.04	20.27	22.49	24.71		26.93	28.48	29.16	31.38	33.60	
alpha=15	12.95	15.67	18.40	21.13	23.85		26.58	28.48	29.31	32.04	34.76	
alpha=2	10.95	14.03	17.11	20.18	23.26		26.34	28.48	29.42	32.49	35.57	

Patriarchal Perception: W=1.5 (Wm=Wf); mu=0.4; P=1 (weight ratio < wage ratio)												
Cm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35		lbar=36.59	lbar=40	
alpha=0	16.82	16.82	16.82	16.82	16.82	16.82	16.82	16.82	↓	16.82	16.82	↑
alpha=0.5	20.34	19.86	19.38	18.90	18.41	17.93	17.45	16.97		16.82	16.49	
alpha=1	22.45	21.68	20.91	20.14	19.37	18.60	17.83	17.06		16.82	16.29	
alpha=15	23.85	22.89	21.93	20.97	20.01	19.04	18.08	17.12		16.82	16.16	
alpha=2	24.85	23.75	22.65	21.56	20.46	19.36	18.26	17.17		16.82	16.07	
Cf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35		lbar=36.59	lbar=40	
alpha=0	24.73	24.73	24.73	24.73	24.73	24.73	24.73	24.73	↓	24.73	24.73	↑
alpha=0.5	30.01	29.29	28.56	27.84	27.12	26.40	25.68	24.96		24.73	24.23	
alpha=1	33.17	32.02	30.86	29.71	28.55	27.40	26.25	25.09		24.73	23.94	
alpha=15	35.27	33.83	32.39	30.95	29.51	28.07	26.62	25.18		24.73	23.74	
alpha=2	36.77	35.13	33.48	31.83	30.19	28.54	26.90	25.25		24.73	23.60	
lm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35		lbar=36.59	lbar=40	
alpha=0	24.73	24.73	24.73	24.73	24.73	24.73	24.73	24.73	↓	24.73	24.73	↑
alpha=0.5	30.01	29.29	28.56	27.84	27.12	26.40	25.68	24.96		24.73	24.23	
alpha=1	33.17	32.02	30.86	29.71	28.55	27.40	26.25	25.09		24.73	23.94	
alpha=15	35.27	33.83	32.39	30.95	29.51	28.07	26.62	25.18		24.73	23.74	
alpha=2	36.77	35.13	33.48	31.83	30.19	28.54	26.90	25.25		24.73	23.60	
lf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35		lbar=36.59	lbar=40	
alpha=0	36.59	36.59	36.59	36.59	36.59	36.59	36.59	36.59	↑	36.59	36.59	↓
alpha=0.5	27.39	28.65	29.91	31.16	32.42	33.68	34.93	36.19		36.59	37.45	
alpha=1	21.89	23.90	25.91	27.92	29.92	31.93	33.94	35.95		36.59	37.96	
alpha=15	18.23	20.74	23.25	25.76	28.26	30.77	33.28	35.79		36.59	38.30	
alpha=2	15.62	18.48	21.35	24.21	27.08	29.95	32.81	35.68		36.59	38.54	

Patriarchal Perception: W=2 (Wm=Wf); mu=0.4; P=1 (weight ratio < wage ratio)												
Cm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		lbar=40.69	
alpha=0	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	↓	14.23	↑
alpha=0.5	17.57	17.16	16.75	16.34	15.93	15.52	15.11	14.70	14.28		14.23	
alpha=1	19.65	18.99	18.32	17.65	16.99	16.32	15.65	14.99	14.32		14.23	
alpha=15	21.07	20.23	19.39	18.55	17.71	16.87	16.03	15.19	14.34		14.23	
alpha=2	22.10	21.14	20.17	19.20	18.23	17.26	16.30	15.33	14.36		14.23	
Cf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		lbar=40.69	
alpha=0	20.84	20.84	20.84	20.84	20.84	20.84	20.84	20.84	20.84	↓	20.84	↑
alpha=0.5	25.86	25.24	24.63	24.01	23.39	22.78	22.16	21.54	20.93		20.84	
alpha=1	28.98	27.98	26.98	25.98	24.98	23.98	22.98	21.98	20.98		20.84	
alpha=15	31.11	29.85	28.59	27.32	26.06	24.80	23.54	22.28	21.02		20.84	
alpha=2	32.65	31.20	29.75	28.30	26.85	25.40	23.95	22.49	21.04		20.84	
lm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		lbar=40.69	
alpha=0	27.46	27.46	27.46	27.46	27.46	27.46	27.46	27.46	27.46	↓	27.46	↑
alpha=0.5	34.15	33.32	32.50	31.68	30.86	30.04	29.21	28.39	27.57		27.46	
alpha=1	38.31	36.97	35.64	34.31	32.97	31.64	30.31	28.97	27.64		27.46	
alpha=15	41.15	39.46	37.78	36.10	34.42	32.73	31.05	29.37	27.69		27.46	
alpha=2	43.21	41.27	39.34	37.40	35.46	33.53	31.59	29.66	27.72		27.46	
lf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		lbar=40.69	
alpha=0	40.69	40.69	40.69	40.69	40.69	40.69	40.69	40.69	40.69	↑	40.69	↓
alpha=0.5	31.21	32.38	33.54	34.70	35.87	37.03	38.20	39.36	40.53		40.69	
alpha=1	25.32	27.20	29.09	30.98	32.87	34.76	36.65	38.54	40.43		40.69	
alpha=15	21.29	23.68	26.06	28.44	30.83	33.21	35.59	37.98	40.36		40.69	
alpha=2	18.37	21.12	23.86	26.60	29.34	32.08	34.83	37.57	40.31		40.69	

2.2 [Matriarchal perception with fair market structure]

Matriarchal Perception: $W=0.75$ ($W_m=W_f$); $\mu=0.6$; $P=1$ (weight ratio > wage ratio)													
Cm	$\bar{l}=0$	$\bar{l}=5$	↓	$\bar{l}=9.15$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	↑	
alpha=0	17.29	17.29		17.29	17.29	17.29	17.29	17.29	17.29	17.29	17.29		17.29
alpha=0.5	17.90	17.57		17.29	17.23	16.90	16.57	16.24	15.91	15.58	15.25		
alpha=1	18.25	17.72		17.29	17.20	16.68	16.16	15.64	15.11	14.59	14.07		
alpha=15	18.47	17.83		17.29	17.18	16.54	15.89	15.25	14.60	13.95	13.31		
alpha=2	18.63	17.90		17.29	17.17	16.43	15.70	14.97	14.24	13.51	12.78		
Cf	$\bar{l}=0$	$\bar{l}=5$	↓	$\bar{l}=9.15$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	↑	
alpha=0	11.86	11.86		11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86		
alpha=0.5	12.26	12.04		11.86	11.82	11.60	11.38	11.16	10.94	10.72	10.50		
alpha=1	12.50	12.15		11.86	11.80	11.45	11.11	10.76	10.41	10.06	9.71		
alpha=15	12.65	12.22		11.86	11.79	11.36	10.93	10.50	10.07	9.64	9.21		
alpha=2	12.75	12.27		11.86	11.78	11.29	10.80	10.31	9.83	9.34	8.85		
Im	$\bar{l}=0$	$\bar{l}=5$	↓	$\bar{l}=9.15$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	↑	
alpha=0	13.22	13.22		13.22	13.22	13.22	13.22	13.22	13.22	13.22	13.22		
alpha=0.5	13.67	13.42		13.22	13.18	12.93	12.68	12.43	12.18	11.93	11.68		
alpha=1	13.93	13.54		13.22	13.15	12.76	12.37	11.98	11.59	11.19	10.80		
alpha=15	14.10	13.62		13.22	13.14	12.65	12.17	11.68	11.20	10.72	10.23		
alpha=2	14.22	13.67		13.22	13.12	12.58	12.03	11.48	10.93	10.38	9.83		
If	$\bar{l}=0$	$\bar{l}=5$	↑	$\bar{l}=9.15$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	↓	
alpha=0	9.15	9.15		9.15	9.15	9.15	9.15	9.15	9.15	9.15	9.15		
alpha=0.5	6.67	8.02		9.15	9.38	10.73	12.08	13.44	14.79	16.14	17.50		
alpha=1	5.25	7.38		9.15	9.51	11.64	13.77	15.90	18.03	20.16	22.29		
alpha=15	4.33	6.96		9.15	9.60	12.23	14.86	17.50	20.13	22.77	25.40		
alpha=2	3.68	6.67		9.15	9.66	12.64	15.63	18.62	21.61	24.60	27.58		

Matriarchal Perception: $W=1$ ($W_m=W_f$); $\mu=0.6$; $P=1$ (weight ratio > wage ratio)												
Cm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	↓	$\bar{l}=13.08$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	↑
alpha=0	19.12	19.12	19.12		19.12	19.12	19.12	19.12	19.12	19.12	19.12	
alpha=0.5	20.09	19.72	19.35		19.12	18.98	18.61	18.24	17.87	17.50	17.13	
alpha=1	20.66	20.07	19.48		19.12	18.89	18.31	17.72	17.13	16.54	15.95	
alpha=15	21.03	20.30	19.57		19.12	18.84	18.11	17.38	16.64	15.91	15.18	
alpha=2	21.30	20.47	19.63		19.12	18.80	17.97	17.13	16.30	15.47	14.63	
Cf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	↓	$\bar{l}=13.08$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	↑
alpha=0	13.08	13.08	13.08		13.08	13.08	13.08	13.08	13.08	13.08	13.08	
alpha=0.5	13.73	13.48	13.23		13.08	12.99	12.74	12.49	12.24	12.00	11.75	
alpha=1	14.11	13.71	13.32		13.08	12.93	12.54	12.15	11.75	11.36	10.97	
alpha=15	14.36	13.87	13.38		13.08	12.89	12.40	11.92	11.43	10.94	10.45	
alpha=2	14.53	13.98	13.42		13.08	12.87	12.31	11.76	11.20	10.64	10.09	
Im	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	↓	$\bar{l}=13.08$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	↑
alpha=0	19.12	19.12	19.12		19.12	19.12	19.12	19.12	19.12	19.12	19.12	
alpha=0.5	20.09	19.72	19.35		19.12	18.98	18.61	18.24	17.87	17.50	17.13	
alpha=1	20.66	20.07	19.48		19.12	18.89	18.31	17.72	17.13	16.54	15.95	
alpha=15	21.03	20.30	19.57		19.12	18.84	18.11	17.38	16.64	15.91	15.18	
alpha=2	21.30	20.47	19.63		19.12	18.80	17.97	17.13	16.30	15.47	14.63	
If	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	↑	$\bar{l}=13.08$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	↓
alpha=0	13.08	13.08	13.08		13.08	13.08	13.08	13.08	13.08	13.08	13.08	
alpha=0.5	9.69	10.99	12.28		13.08	13.58	14.87	16.17	17.47	18.76	20.06	
alpha=1	7.69	9.75	11.81		13.08	13.87	15.93	17.99	20.05	22.11	24.16	
alpha=15	6.38	8.94	11.50		13.08	14.06	16.62	19.19	21.75	24.31	26.87	
alpha=2	5.45	8.37	11.28		13.08	14.20	17.12	20.03	22.95	25.87	28.78	

Matriarchal Perception: W=1.5 (Wm=Wf); mu=0.6; P=1 (weight ratio > wage ratio)												
Cm	lbar=0	lbar=5	lbar=10	lbar=15		lbar=19.32	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	19.32	19.32	19.32	19.32	↓	19.32	19.32	19.32	19.32	19.32	19.32	↑
alpha=0.5	20.79	20.41	20.03	19.65		19.32	19.27	18.89	18.51	18.13	17.75	
alpha=1	21.69	21.07	20.46	19.85		19.32	19.24	18.62	18.01	17.40	16.79	
alpha=15	22.29	21.52	20.75	19.98		19.32	19.22	18.45	17.68	16.91	16.14	
alpha=2	22.73	21.85	20.96	20.08		19.32	19.20	18.32	17.44	16.55	15.67	
Cf	lbar=0	lbar=5	lbar=10	lbar=15		lbar=19.32	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	13.21	13.21	13.21	13.21	↓	13.21	13.21	13.21	13.21	13.21	13.21	↑
alpha=0.5	14.19	13.94	13.69	13.43		13.21	13.18	12.93	12.67	12.42	12.17	
alpha=1	14.79	14.38	13.97	13.57		13.21	13.16	12.75	12.34	11.93	11.53	
alpha=15	15.19	14.68	14.17	13.66		13.21	13.14	12.63	12.12	11.61	11.09	
alpha=2	15.49	14.90	14.31	13.72		13.21	13.13	12.55	11.96	11.37	10.78	
lm	lbar=0	lbar=5	lbar=10	lbar=15		lbar=19.32	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	28.48	28.48	28.48	28.48	↓	28.48	28.48	28.48	28.48	28.48	28.48	↑
alpha=0.5	30.68	30.11	29.54	28.97		28.48	28.40	27.83	27.26	26.69	26.12	
alpha=1	32.03	31.11	30.19	29.27		28.48	28.36	27.44	26.52	25.60	24.68	
alpha=15	32.94	31.78	30.63	29.48		28.48	28.32	27.17	26.02	24.86	23.71	
alpha=2	33.59	32.27	30.95	29.62		28.48	28.30	26.98	25.65	24.33	23.01	
lf	lbar=0	lbar=5	lbar=10	lbar=15		lbar=19.32	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	19.32	19.32	19.32	19.32	↑	19.32	19.32	19.32	19.32	19.32	19.32	↓
alpha=0.5	14.67	15.88	17.08	18.28		19.32	19.48	20.69	21.89	23.09	24.29	
alpha=1	11.83	13.77	15.71	17.64		19.32	19.58	21.52	23.46	25.40	27.34	
alpha=15	9.91	12.34	14.78	17.22		19.32	19.65	22.09	24.52	26.96	29.39	
alpha=2	8.52	11.32	14.11	16.91		19.32	19.70	22.49	25.29	28.08	30.88	

Matriarchal Perception: W=2 (Wm=Wf); mu=0.6; P=1 (weight ratio > wage ratio)												
Cm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=23.33	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	17.75	17.75	17.75	17.75	17.75	↓	17.75	17.75	17.75	17.75	17.75	↑
alpha=0.5	19.38	19.03	18.68	18.33	17.98		17.75	17.63	17.28	16.93	16.58	
alpha=1	20.41	19.84	19.27	18.70	18.13		17.75	17.55	16.98	16.41	15.84	
alpha=15	21.12	20.40	19.67	18.95	18.23		17.75	17.50	16.78	16.06	15.33	
alpha=2	21.63	20.80	19.97	19.13	18.30		17.75	17.47	16.63	15.80	14.97	
Cf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=23.327	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	12.16	12.16	12.16	12.16	12.16	↓	12.16	12.16	12.16	12.16	12.16	↑
alpha=0.5	13.26	13.02	12.79	12.55	12.32		12.16	12.09	11.85	11.62	11.38	
alpha=1	13.94	13.56	13.18	12.80	12.42		12.16	12.04	11.66	11.27	10.89	
alpha=15	14.41	13.93	13.45	12.97	12.48		12.16	12.00	11.52	11.04	10.56	
alpha=2	14.76	14.20	13.64	13.09	12.53		12.16	11.98	11.42	10.87	10.31	
lm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=23.327	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	34.49	34.49	34.49	34.49	34.49	↓	34.49	34.49	34.49	34.49	34.49	↑
alpha=0.5	37.76	37.06	36.36	35.66	34.96		34.49	34.26	33.55	32.85	32.15	
alpha=1	39.82	38.68	37.54	36.39	35.25		34.49	34.11	32.97	31.82	30.68	
alpha=15	41.24	39.79	38.34	36.90	35.45		34.49	34.01	32.56	31.12	29.67	
alpha=2	42.27	40.60	38.93	37.27	35.60		34.49	33.93	32.27	30.60	28.93	
lf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20		lbar=23.327	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	23.33	23.33	23.33	23.33	23.33	↑	23.33	23.33	23.33	23.33	23.33	↓
alpha=0.5	18.01	19.15	20.29	21.43	22.57		23.33	23.71	24.85	25.99	27.13	
alpha=1	14.66	16.52	18.38	20.23	22.09		23.33	23.95	25.81	27.66	29.52	
alpha=15	12.37	14.72	17.07	19.41	21.76		23.33	24.11	26.46	28.81	31.16	
alpha=2	10.69	13.40	16.11	18.82	21.53		23.33	24.23	26.94	29.65	32.36	

Appendix 3 Unfair labor market and unfair contribution weight under identity agreement

The most interesting thing in our simulation is when the labor market is structurally unfair. If wages are different even though they are equally productive, then household try to be better off by adapting to the structure.

The results show that if husband's wage is higher, the patriarchal household has higher utility in all terms of consumption and leisure than matriarchal household does. The identity equilibrium is also larger under the patriarchal perception ($\mu = 0.4$ given the wage ratio) than under the matriarchal perception ($\mu = 0.6$ given the wage ratio). It indicates that wife in household with patriarchal perception tends to choose larger leisure than their shared equilibrium level more often under the labor market structure. On the other hand, if wife's wage is higher, then matriarchal household are better in all aspects. The shared equilibrium for wife's leisure is larger under the matriarchal perception than under the patriarchal perception but both of them show lower level of shared equilibrium than the cases of higher wage for man.

3.1 [Patriarchal perception with unfair market structure]

Patriarchal Perception: $W_m=1; W_f=0.75; \mu=0.4; P=1$ (weight ratio < wage ratio)												
Cm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$		$\bar{l}=22.34$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	19.97	19.97	19.97	19.97	19.97	↓	19.97	19.97	19.97	19.97	19.97	↑
alpha=0.5	21.99	21.54	21.08	20.63	20.18		19.97	19.73	19.27	18.82	18.37	
alpha=1	23.03	22.34	21.66	20.97	20.29		19.97	19.60	18.92	18.23	17.55	
alpha=15	23.66	22.83	22.01	21.18	20.35		19.97	19.53	18.70	17.88	17.05	
alpha=2	24.08	23.16	22.24	21.32	20.40		19.97	19.48	18.56	17.63	16.71	
Cf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$		$\bar{l}=22.34$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	29.45	29.45	29.45	29.45	29.45	↓	29.45	29.45	29.45	29.45	29.45	↑
alpha=0.5	32.48	31.81	31.13	30.45	29.77		29.45	29.09	28.41	27.73	27.05	
alpha=1	34.04	33.01	31.99	30.96	29.93		29.45	28.90	27.88	26.85	25.82	
alpha=15	34.99	33.75	32.51	31.27	30.03		29.45	28.79	27.55	26.31	25.07	
alpha=2	35.62	34.24	32.86	31.48	30.10		29.45	28.72	27.33	25.95	24.57	
lm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$		$\bar{l}=22.34$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	19.97	19.97	19.97	19.97	19.97	↓	19.97	19.97	19.97	19.97	19.97	↑
alpha=0.5	21.99	21.54	21.08	20.63	20.18		19.97	19.73	19.27	18.82	18.37	
alpha=1	23.03	22.34	21.66	20.97	20.29		19.97	19.60	18.92	18.23	17.55	
alpha=15	23.66	22.83	22.01	21.18	20.35		19.97	19.53	18.70	17.88	17.05	
alpha=2	24.08	23.16	22.24	21.32	20.40		19.97	19.48	18.56	17.63	16.71	
lf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$		$\bar{l}=22.34$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	22.34	22.34	22.34	22.34	22.34	↑	22.34	22.34	22.34	22.34	22.34	↓
alpha=0.5	15.15	16.76	18.37	19.98	21.59		22.34	23.20	24.80	26.41	28.02	
alpha=1	11.46	13.89	16.33	18.76	21.20		22.34	23.63	26.07	28.51	30.94	
alpha=15	9.21	12.15	15.09	18.03	20.96		22.34	23.90	26.84	29.78	32.71	
alpha=2	7.71	10.98	14.26	17.53	20.81		22.34	24.08	27.36	30.63	33.91	

Patriarchal Perception: $W_m=2; W_f=1.5; \mu=0.4; P=1$ (weight ratio < wage ratio)												
Cm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$		$\bar{l}=34.55$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	15.91	15.91	15.91	15.91	15.91	15.91	15.91	↓	15.91	15.91	15.91	↑
alpha=0.5	18.49	18.11	17.74	17.37	17.00	16.62	16.25		15.91	15.88	15.51	
alpha=1	19.93	19.35	18.77	18.19	17.60	17.02	16.44		15.91	15.86	15.28	
alpha=15	20.85	20.14	19.42	18.71	17.99	17.28	16.56		15.91	15.85	15.13	
alpha=2	21.50	20.69	19.88	19.07	18.26	17.46	16.65		15.91	15.84	15.03	
Cf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$		$\bar{l}=34.55$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	23.37	23.37	23.37	23.37	23.37	23.37	23.37	↓	23.37	23.37	23.37	↑
alpha=0.5	27.23	26.67	26.11	25.55	25.00	24.44	23.88		23.37	23.32	22.76	
alpha=1	29.40	28.52	27.65	26.78	25.91	25.03	24.16		23.37	23.29	22.42	
alpha=15	30.78	29.71	28.64	27.56	26.49	25.42	24.35		23.37	23.27	22.20	
alpha=2	31.74	30.53	29.32	28.11	26.90	25.68	24.47		23.37	23.26	22.05	
lm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$		$\bar{l}=34.55$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	30.82	30.82	30.82	30.82	30.82	30.82	30.82	↓	30.82	30.82	30.82	↑
alpha=0.5	35.97	35.23	34.48	33.74	32.99	32.25	31.50		30.82	30.76	30.01	
alpha=1	38.86	37.70	36.53	35.37	34.21	33.05	31.88		30.82	30.72	29.56	
alpha=15	40.71	39.28	37.85	36.42	34.99	33.56	32.13		30.82	30.70	29.27	
alpha=2	41.99	40.38	38.76	37.14	35.53	33.91	32.30		30.82	30.68	29.06	
lf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$		$\bar{l}=34.55$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	34.55	34.55	34.55	34.55	34.55	34.55	34.55	↑	34.55	34.55	34.55	↓
alpha=0.5	24.83	26.24	27.64	29.05	30.46	31.86	33.27		34.55	34.68	36.09	
alpha=1	19.37	21.57	23.77	25.96	28.16	30.36	32.55		34.55	34.75	36.95	
alpha=15	15.89	18.59	21.29	23.99	26.69	29.39	32.09		34.55	34.79	37.50	
alpha=2	13.46	16.51	19.57	22.62	25.67	28.72	31.77		34.55	34.83	37.88	

Patriarchal Perception: Wm=0.75; Wf=1; mu=0.4; P=1 (weight ratio < wage ratio)												
Cm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25		lbar=27.78	lbar=30	lbar=35	lbar=40	
alpha=0	18.85	18.85	18.85	18.85	18.85	18.85		18.85	18.85	18.85	18.85	
alpha=0.5	22.24	21.63	21.02	20.41	19.80	19.19	↓	18.85	18.58	17.97	17.36	↑
alpha=1	24.18	23.23	22.27	21.31	20.35	19.39		18.85	18.43	17.47	16.51	
alpha=15	25.44	24.26	23.07	21.89	20.70	19.51		18.85	18.33	17.14	15.96	
alpha=2	26.32	24.98	23.63	22.29	20.95	19.60		18.85	18.26	16.91	15.57	
	←	←	←	←	←	←		←	←	←	←	
Cf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25		lbar=27.78	lbar=30	lbar=35	lbar=40	
alpha=0	27.78	27.78	27.78	27.78	27.78	27.78		27.78	27.78	27.78	27.78	
alpha=0.5	32.87	31.95	31.04	30.12	29.21	28.29	↓	27.78	27.38	26.46	25.55	↑
alpha=1	35.78	34.34	32.90	31.46	30.02	28.58		27.78	27.14	25.71	24.27	
alpha=15	37.66	35.88	34.11	32.33	30.55	28.77		27.78	26.99	25.22	23.44	
alpha=2	38.98	36.97	34.95	32.94	30.92	28.90		27.78	26.89	24.87	22.86	
	←	←	←	←	←	←		←	←	←	←	
lm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25		lbar=27.78	lbar=30	lbar=35	lbar=40	
alpha=0	14.39	14.39	14.39	14.39	14.39	14.39		14.39	14.39	14.39	14.39	
alpha=0.5	16.93	16.48	16.02	15.56	15.10	14.65	↓	14.39	14.19	13.73	13.27	↑
alpha=1	18.39	17.67	16.95	16.23	15.51	14.79		14.39	14.07	13.35	12.63	
alpha=15	19.33	18.44	17.55	16.66	15.77	14.89		14.39	14.00	13.11	12.22	
alpha=2	19.99	18.98	17.98	16.97	15.96	14.95		14.39	13.94	12.94	11.93	
	←	←	←	←	←	←		←	←	←	←	
lf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25		lbar=27.78	lbar=30	lbar=35	lbar=40	
alpha=0	27.78	27.78	27.78	27.78	27.78	27.78		27.78	27.78	27.78	27.78	
alpha=0.5	20.23	21.59	22.95	24.31	25.67	27.03	↑	27.78	28.39	29.75	31.11	↓
alpha=1	15.90	18.04	20.18	22.32	24.45	26.59		27.78	28.73	30.87	33.01	
alpha=15	13.10	15.74	18.38	21.03	23.67	26.31		27.78	28.95	31.60	34.24	
alpha=2	11.14	14.13	17.13	20.12	23.12	26.12		27.78	29.11	32.11	35.10	
	→	→	→	→	→	→		→	→	→	→	

Patriarchal Perception: Wm=1.5; Wf=2; mu=0.4; P=1 (weight ratio < wage ratio)											
Cm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		lbar=41.79
alpha=0	14.60	14.60	14.60	14.60	14.60	14.60	14.60	14.60	14.60		14.60
alpha=0.5	18.82	18.32	17.81	17.31	16.80	16.29	15.79	15.28	14.78	↓	14.60
alpha=1	21.65	20.81	19.96	19.12	18.27	17.43	16.59	15.74	14.90		14.60
alpha=15	23.68	22.59	21.50	20.42	19.33	18.24	17.16	16.07	14.99		14.60
alpha=2	25.20	23.93	22.66	21.39	20.12	18.86	17.59	16.32	15.05		14.60
	←	←	←	←	←	←	←	←	←		←
Cf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		lbar=41.79
alpha=0	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40		21.40
alpha=0.5	27.73	26.97	26.22	25.46	24.70	23.94	23.18	22.42	21.67	↓	21.40
alpha=1	31.97	30.71	29.44	28.18	26.91	25.65	24.38	23.11	21.85		21.40
alpha=15	35.01	33.38	31.76	30.13	28.50	26.87	25.24	23.61	21.98		21.40
alpha=2	37.30	35.40	33.49	31.59	29.69	27.78	25.88	23.98	22.08		21.40
	←	←	←	←	←	←	←	←	←		←
lm	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		lbar=41.79
alpha=0	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40		21.40
alpha=0.5	27.73	26.97	26.22	25.46	24.70	23.94	23.18	22.42	21.67	↓	21.40
alpha=1	31.97	30.71	29.44	28.18	26.91	25.65	24.38	23.11	21.85		21.40
alpha=15	35.01	33.38	31.76	30.13	28.50	26.87	25.24	23.61	21.98		21.40
alpha=2	37.30	35.40	33.49	31.59	29.69	27.78	25.88	23.98	22.08		21.40
	←	←	←	←	←	←	←	←	←		←
lf	lbar=0	lbar=5	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40		lbar=41.79
alpha=0	41.79	41.79	41.79	41.79	41.79	41.79	41.79	41.79	41.79		41.79
alpha=0.5	33.52	34.51	35.50	36.49	37.48	38.47	39.46	40.45	41.44	↑	41.79
alpha=1	27.98	29.63	31.28	32.94	34.59	36.24	37.89	39.55	41.20		41.79
alpha=15	24.01	26.14	28.26	30.39	32.52	34.65	36.77	38.90	41.03		41.79
alpha=2	21.03	23.51	26.00	28.48	30.96	33.45	35.93	38.42	40.90		41.79
	→	→	→	→	→	→	→	→	→		→

3.2 [Matriarchal perception with unfair market structure]

Matriarchal Perception: $W_m=1; W_f=0.75; \mu=0.6; P=1$ (weight ratio > wage ratio)												
Cm	lbar=0	lbar=5		lbar=9.48	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	17.97	17.97	↓	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	↑
alpha=0.5	18.52	18.23		17.97	17.94	17.64	17.35	17.06	16.77	16.47	16.18	
alpha=1	18.84	18.38		17.97	17.92	17.46	17.00	16.54	16.08	15.62	15.16	
alpha=15	19.05	18.48		17.97	17.91	17.34	16.77	16.20	15.64	15.07	14.50	
alpha=2	19.19	18.55		17.97	17.90	17.26	16.61	15.97	15.33	14.68	14.04	
Cf	lbar=0	lbar=5		lbar=9.48	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	12.31	12.31	↓	12.31	12.31	12.31	12.31	12.31	12.31	12.31	12.31	↑
alpha=0.5	12.68	12.49		12.31	12.29	12.10	11.90	11.71	11.51	11.32	11.12	
alpha=1	12.89	12.59		12.31	12.28	11.97	11.67	11.36	11.05	10.75	10.44	
alpha=15	13.03	12.65		12.31	12.27	11.89	11.52	11.14	10.76	10.38	10.00	
alpha=2	13.13	12.70		12.31	12.27	11.84	11.41	10.98	10.55	10.12	9.69	
lm	lbar=0	lbar=5		lbar=9.48	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	17.97	17.97	↓	17.97	17.97	17.97	17.97	17.97	17.97	17.97	17.97	↑
alpha=0.5	18.52	18.23		17.97	17.94	17.64	17.35	17.06	16.77	16.47	16.18	
alpha=1	18.84	18.38		17.97	17.92	17.46	17.00	16.54	16.08	15.62	15.16	
alpha=15	19.05	18.48		17.97	17.91	17.34	16.77	16.20	15.64	15.07	14.50	
alpha=2	19.19	18.55		17.97	17.90	17.26	16.61	15.97	15.33	14.68	14.04	
lf	lbar=0	lbar=5		lbar=9.48	lbar=10	lbar=15	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	9.48	9.48	↑	9.48	9.48	9.48	9.48	9.48	9.48	9.48	9.48	↓
alpha=0.5	6.89	8.26		9.48	9.63	10.99	12.36	13.73	15.09	16.46	17.83	
alpha=1	5.41	7.56		9.48	9.71	11.85	14.00	16.15	18.29	20.44	22.59	
alpha=15	4.45	7.11		9.48	9.76	12.41	15.06	17.71	20.36	23.02	25.67	
alpha=2	3.79	6.79		9.48	9.79	12.80	15.80	18.81	21.81	24.82	27.82	

Matriarchal Perception: $W_m=2; W_f=1.5; \mu=0.6; P=1$ (weight ratio > wage ratio)												
Cm	lbar=0	lbar=5	lbar=10	lbar=15		lbar=17.75	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	17.75	17.75	17.75	17.75	↓	17.75	17.75	17.75	17.75	17.75	17.75	↑
alpha=0.5	18.79	18.49	18.20	17.91		17.75	17.62	17.33	17.04	16.74	16.45	
alpha=1	19.40	18.94	18.47	18.01		17.75	17.54	17.07	16.61	16.14	15.68	
alpha=15	19.81	19.23	18.65	18.07		17.75	17.49	16.91	16.33	15.74	15.16	
alpha=2	20.11	19.44	18.78	18.12		17.75	17.45	16.79	16.12	15.46	14.80	
Cf	lbar=0	lbar=5	lbar=10	lbar=15		lbar=17.75	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	12.17	12.17	12.17	12.17	↓	12.17	12.17	12.17	12.17	12.17	12.17	↑
alpha=0.5	12.86	12.66	12.47	12.27		12.17	12.08	11.88	11.69	11.50	11.30	
alpha=1	13.27	12.96	12.65	12.34		12.17	12.03	11.72	11.41	11.10	10.78	
alpha=15	13.54	13.16	12.77	12.38		12.17	11.99	11.60	11.22	10.83	10.44	
alpha=2	13.74	13.30	12.85	12.41		12.17	11.97	11.53	11.08	10.64	10.20	
lm	lbar=0	lbar=5	lbar=10	lbar=15		lbar=17.75	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	34.50	34.50	34.50	34.50	↓	34.50	34.50	34.50	34.50	34.50	34.50	↑
alpha=0.5	36.57	35.99	35.40	34.82		34.50	34.24	33.65	33.07	32.49	31.90	
alpha=1	37.81	36.88	35.94	35.01		34.50	34.08	33.15	32.22	31.29	30.35	
alpha=15	38.63	37.47	36.30	35.14		34.50	33.98	32.81	31.65	30.49	29.33	
alpha=2	39.21	37.89	36.56	35.23		34.50	33.90	32.58	31.25	29.92	28.59	
lf	lbar=0	lbar=5	lbar=10	lbar=15		lbar=17.75	lbar=20	lbar=25	lbar=30	lbar=35	lbar=40	
alpha=0	17.75	17.75	17.75	17.75	↑	17.75	17.75	17.75	17.75	17.75	17.75	↓
alpha=0.5	13.26	14.53	15.79	17.05		17.75	18.32	19.58	20.85	22.11	23.38	
alpha=1	10.58	12.60	14.62	16.64		17.75	18.66	20.68	22.70	24.71	26.73	
alpha=15	8.81	11.33	13.85	16.36		17.75	18.88	21.40	23.92	26.44	28.96	
alpha=2	7.54	10.42	13.29	16.17		17.75	19.04	21.92	24.80	27.67	30.55	

Matriarchal Perception: $W_m=0.75$; $W_f=1$; $\mu=0.6$; $P=1$ (weight ratio > wage ratio)												
Cm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$		$\bar{l}=12.75$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	18.63	18.63	18.63	↓	18.63	18.63	18.63	18.63	18.63	18.63	18.63	↑
alpha=0.5	19.69	19.28	18.86		18.63	18.44	18.03	17.61	17.20	16.78	16.36	
alpha=1	20.32	19.66	19.00		18.63	18.33	17.67	17.01	16.34	15.68	15.02	
alpha=15	20.74	19.91	19.09		18.63	18.26	17.43	16.61	15.78	14.95	14.12	
alpha=2	21.04	20.09	19.15		18.63	18.21	17.26	16.32	15.38	14.43	13.49	
	←	←	←		←	←	←	←	←	←		
Cf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$		$\bar{l}=12.75$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	12.75	12.75	12.75	↓	12.75	12.75	12.75	12.75	12.75	12.75	12.75	↑
alpha=0.5	13.46	13.18	12.91		12.75	12.63	12.35	12.07	11.80	11.52	11.24	
alpha=1	13.88	13.44	13.00		12.75	12.56	12.11	11.67	11.23	10.79	10.34	
alpha=15	14.16	13.61	13.06		12.75	12.51	11.96	11.40	10.85	10.30	9.75	
alpha=2	14.36	13.73	13.10		12.75	12.47	11.84	11.21	10.58	9.96	9.33	
	←	←	←		←	←	←	←	←	←		
Im	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$		$\bar{l}=12.75$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	14.22	14.22	14.22	↓	14.22	14.22	14.22	14.22	14.22	14.22	14.22	↑
alpha=0.5	15.02	14.71	14.40		14.22	14.08	13.77	13.46	13.15	12.83	12.52	
alpha=1	15.49	15.00	14.50		14.22	14.00	13.50	13.01	12.51	12.01	11.51	
alpha=15	15.81	15.19	14.57		14.22	13.94	13.32	12.70	12.08	11.46	10.84	
alpha=2	16.03	15.32	14.61		14.22	13.91	13.20	12.49	11.78	11.08	10.37	
	←	←	←		←	←	←	←	←	←		
If	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$		$\bar{l}=12.75$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	12.75	12.75	12.75	↑	12.75	12.75	12.75	12.75	12.75	12.75	12.75	↓
alpha=0.5	9.50	10.78	12.05		12.75	13.33	14.60	15.88	17.15	18.43	19.70	
alpha=1	7.57	9.60	11.64		12.75	13.67	15.70	17.73	19.76	21.79	23.82	
alpha=15	6.29	8.83	11.36		12.75	13.89	16.42	18.96	21.49	24.02	26.56	
alpha=2	5.38	8.27	11.16		12.75	14.05	16.94	19.83	22.72	25.61	28.50	
	→	→	→		→	→	→	→	→	→		

Matriarchal Perception: $W_m=1.5$; $W_f=2$; $\mu=0.6$; $P=1$ (weight ratio > wage ratio)												
Cm	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$		$\bar{l}=25.09$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	19.07	19.07	19.07	19.07	19.07	19.07	↓	19.07	19.07	19.07	19.07	↑
alpha=0.5	21.29	20.85	20.41	19.96	19.52	19.08		19.07	18.63	18.19	17.75	
alpha=1	22.74	22.01	21.28	20.55	19.81	19.08		19.07	18.35	17.62	16.88	
alpha=15	23.76	22.83	21.89	20.96	20.02	19.08		19.07	18.15	17.21	16.28	
alpha=2	24.52	23.43	22.35	21.26	20.17	19.09		19.07	18.00	16.91	15.83	
	←	←	←	←	←	←		←	←	←		
Cf	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$		$\bar{l}=25.09$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	13.04	13.04	13.04	13.04	13.04	13.04	↓	13.04	13.04	13.04	13.04	↑
alpha=0.5	14.53	14.23	13.94	13.64	13.35	13.05		13.04	12.75	12.46	12.16	
alpha=1	15.50	15.01	14.52	14.03	13.54	13.05		13.04	12.57	12.08	11.59	
alpha=15	16.18	15.55	14.93	14.30	13.68	13.06		13.04	12.43	11.81	11.18	
alpha=2	16.68	15.96	15.23	14.51	13.78	13.06		13.04	12.33	11.61	10.88	
	←	←	←	←	←	←		←	←	←		
Im	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$		$\bar{l}=25.09$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	28.10	28.10	28.10	28.10	28.10	28.10	↓	28.10	28.10	28.10	28.10	↑
alpha=0.5	31.44	30.77	30.11	29.44	28.78	28.11		28.10	27.45	26.78	26.12	
alpha=1	33.62	32.52	31.42	30.32	29.22	28.12		28.10	27.02	25.92	24.82	
alpha=15	35.15	33.74	32.34	30.93	29.53	28.13		28.10	26.72	25.32	23.91	
alpha=2	36.28	34.65	33.02	31.39	29.76	28.13		28.10	26.50	24.87	23.24	
	←	←	←	←	←	←		←	←	←		
If	$\bar{l}=0$	$\bar{l}=5$	$\bar{l}=10$	$\bar{l}=15$	$\bar{l}=20$	$\bar{l}=25$		$\bar{l}=25.09$	$\bar{l}=30$	$\bar{l}=35$	$\bar{l}=40$	
alpha=0	25.09	25.09	25.09	25.09	25.09	25.09	↑	25.09	25.09	25.09	25.09	↓
alpha=0.5	19.80	20.86	21.91	22.96	24.02	25.07		25.09	26.12	27.18	28.23	
alpha=1	16.36	18.10	19.84	21.58	23.32	25.06		25.09	26.80	28.54	30.28	
alpha=15	13.93	16.16	18.38	20.60	22.83	25.05		25.09	27.27	29.50	31.72	
alpha=2	12.14	14.72	17.30	19.88	22.46	25.04		25.09	27.63	30.21	32.79	
	→	→	→	→	→	→		→	→	→		

Appendix 4 The impact of unfair wage structure with the leader's egalitarian perception

4.1 [The impact of the patriarchal system $l_F = \bar{l}_F^M$]

alpha=2	Society= Patriarchal				
Wm=Wf=1 ; P=1	Perception	Rational: Shared Equilibrium	Career- oriented (lf ↓ force)	Neutral (lf ↑ force when >rational)	Housework- oriented (lf ↑ force)
		lbarm=20 lbarf=20	lbarm=30 lbarf=0	lbarm=30 lbarf=30	lbarm=30 lbarf=40
mu=0.5	Egalitarian	Identity Equilibrium =20.00	17.00 (lf ↓)	26.00 (lf ↑)	29.00 (lf ↑)
mu=0.4	Patriarchal	23.26 (lf ↑)	20.11 (lf ↑)	27.75 (lf ↑ ↑)	30.29 (lf ↑ ↑)
mu=0.6	Matriarchal	17.12 (lf ↓)	13.80 (lf ↓ ↓)	24.09 (lf ↑)	27.51 (lf ↑ ↑)

4.2 [The impact of unfair wage structure under the egalitarian perception of the head]

alpha=2	Society= Patriarchal				
P=1	Wage Structure	Rational: Shared Equilibrium	Career- oriented (lf ↓ force)	Neutral (lf ↑ force when >rational)	Housework- oriented (lf ↑ force)
		lbarm=20 lbarf=20	lbarm=30 lbarf=0	lbarm=30 lbarf=30	lbarm=30 lbarf=40
Wm=1;Wf=1	Fair	Identity Equilibrium =20.00	17.00 (lf ↓)	26.00	29.00 (lf ↑)
Wm=1; Wf=0.75	Patriarchal	18.12 (lf ↓ ↓)	14.98 (lf ↓ ↓)	24.39	27.53 (lf ↑)
Wm=0.75; Wf=1	Matriarchal	19.83 (lf ↓)	16.88 (lf ↓)	25.73	28.68 (lf ↑ ↑)

4.3 [The combined impact of unfair wage structure and perceptions of the head]

		Society= Patriarchal			
alpha=2	Perception+ Wage	Rational: Shared Equilibrium	Career- oriented (If ↓ force)	Neutral (If ↑ force when >rational)	Housework- oriented (If ↑ force)
P=1		lbarm=20 lbarf=20	lbarm=30 lbarf=0	lbarm=30 lbarf=30	lbarm=30 lbarf=40
mu=0.5; Wm=1;Wf=1	Egalitarian view and fair wage	Identity Equilibrium =20.00	17.00 (If ↓)	26.00	29.00 (If ↑)
mu=0.4 ; Wm=1; Wf=0.75	Patriarchal view and wage toward male	20.80 (If ↑)	18.05 (If ↓)	26.07	28.74 (If ↑ ↑)
mu=0.6 ; Wm=0.75; Wf=1	Matriarchal view and wage toward female	16.94 (If ↓)	13.86 (If ↓ ↓)	23.98	27.35 (If ↑)

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