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Catherine Sofer and Claire Thibout

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Catherine Sofer[†] and Claire Thibout[‡]
[†] **Centre d'Economie de la Sorbonne and Paris School of Economics**
[‡] **Melbourne Institute of Applied Economic and Social Research, The University of Melbourne**

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Melbourne Institute of Applied Economic and Social Research
The University of Melbourne
Victoria 3010 Australia
***Telephone* (03) 8344 2100**
***Fax* (03) 8344 2111**
***Email* melb-inst@unimelb.edu.au**
***WWW Address* http://www.melbourneinstitute.com**

Abstract

The effects of women's strong investments in career on the intra-household division of labor, particularly the share of partners in domestic work, constitute important but unaddressed issues. We use the 2010 French Time Use survey, focusing on two-income couples. We first build indicators of female investment in career, measured in comparison to other similar women or to the woman's partner. We then investigate how the partners allocate time according to the intensity of women's investment. To achieve this objective, we estimate a five-equation model of domestic and labor market work by partners and the use of domestic help. We show that couples where women are invested in career tend to share tasks more equally. These women do less domestic work during weekdays. This diminution is partly compensated on weekends by their partners, but also slightly by women themselves on weekends when they invest more in their careers than their partners do. Also, when they are heavily invested in their careers compared to other women, they tend to use more often domestic help. However, even when women dedicate themselves more than their partners to their careers, women still spend more time on domestic tasks than their partners on average, implying no role reversal in the division of labor.

JEL classification: D13, J16, J22

Keywords: Time use, gender, division of labor, domestic production, household decision-making

1. Introduction

In this paper, we investigate the impact of observable economic variables on the sharing of time within couples. However, we know from the considerable research that exists that looking at education and wages alone is not enough to understand couple's allocation of time. Consequently, we aim at going further by creating some measures of investment in career, in order to identify couples where the woman is invested in her professional life, and further study how both partners adapt their time use to this investment. Today, despite participation of most women in the labor market in most developed countries, time spent between labor market work and household work is still highly differentiated by gender (Goldschmidt-Clermont & Pagnossin-Aligisakis, 1995; Rizavi & Sofer, 2011; Ponthieux & Schreiber, 2006; Anxo, Flood, & Kocoglu, 2002). The difference in time use, despite a long term decreasing trend (see, for France, Champagne, Pailhé, & Solaz, 2015) is very high: as can be seen in Figure 1A, the average difference in OECD countries between time spent by women and men in unpaid work per day is more than two hours (134 minutes), and an hour and a half for France. Women always do more unpaid work than men on average and in particular, women in OECD countries spend 56% of their total working time doing unpaid work and 44% working in the labor market, while men devote 70% of their working time to paid work and thus 30% only in unpaid work. Moreover, total working time (unpaid + paid) is generally higher for women (Figure 1B).

For women, the economic consequences of this division of time are immediate: inequalities in wages, the "glass ceiling" limiting women to access high responsibility jobs, higher risk of poverty especially in case of divorce, impact on negotiation powers within the family. With an objective to reduce the gender wage gap and to achieve a better allocation of resources within the society, it seems fundamental to better understand how time use choices are made. Public policy implications are strong: if these choices mainly come from differences in wages between men and women, the best answer would be to target them through labor market policies. But if the causes come from gender stereotype or social norms, then labor market policies won't be effective, while acting on gender roles and behaviors within the family could create more impact.

Most theoretical models conclude that observed differences between men and women in variables such as wages, might explain why women invest less than their partners in the labor market and more in the family. Namely, the efficiency assumption in the production sphere of the household states that each partner specializes in the activities for which his/her time return

Figure 1A: Female less male unpaid working time in minutes per day

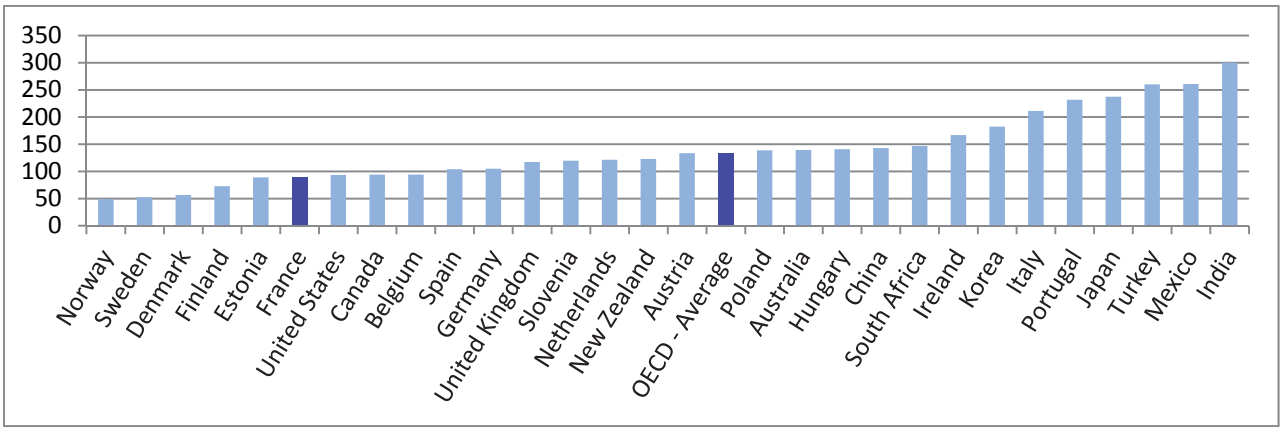
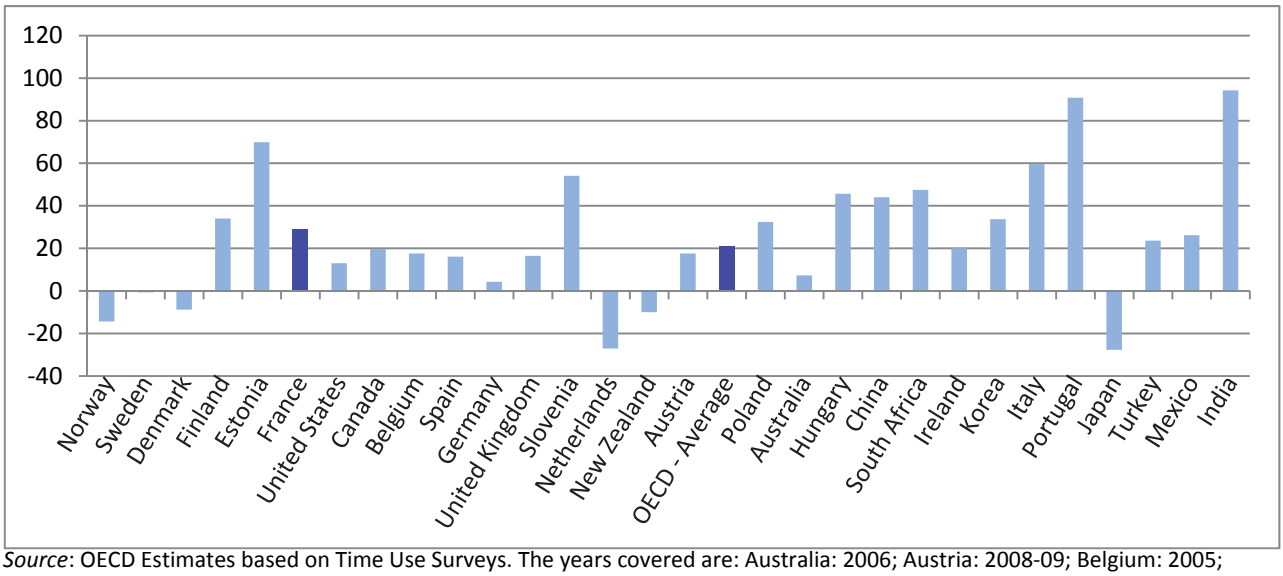


Figure 1B: Female less male total working time in minutes per day (unpaid + paid work)



Source: OECD Estimates based on Time Use Surveys. The years covered are: Australia: 2006; Austria: 2008-09; Belgium: 2005; Canada: 2010; China: 2008; Denmark: 2001; Estonia: 1999-2000; Finland: 2009-10; France: 2009; Germany: 2001-02; Hungary: 1999-2000; India: 1999; Italy: 2008-09; Ireland: 2005; Japan: 2011; Korea: 2009; Mexico: 2009; the Netherlands: 2006; New Zealand: 2009-10; Norway: 2010; Poland: 2003-04; Portugal: 1999; Slovenia: 2000-01; South Africa: 2000; Spain: 2002-03; Sweden: 2010; Turkey: 2006; the United Kingdom: 2005; and the United States: 2010.

is relatively higher. Consequently, the partner earning the higher wage should devote more time to the labor market, and less to household work[1] (Becker, 1981; Gronau, 1977). However, the gender division of labor still remains a mystery: empirically, education, wages, or other measurable variables are found to be far from completely explaining the sharing of household work (Hersch & Stratton, 1994; Anxo, Flood, & Kocoglu, 2002; Aronsson, Daunfeldt, & Wikström, 2001; Rapoport & Sofer, 2005). Note that this result by itself might seriously challenge the often made assumption of efficiency or Pareto-optimality of household

[1] Under the assumption of equal productivities of the partners in household work.

decision making, notably in "collective" models (Chiappori, 1988, 1992, 1997; Apps & Rees, 1997; Rapoport, Sofer, & Solaz, 2011).

Another area of the literature, mainly sociological, insists on gender norms: Conelly and Kimmel (2009), using U.S. data show, for example, that when the wife's relative wage with respect to her partner's increases, he tends to do less domestic work on the weekend. Bittman, England, Sayer, Folbre, and Matheson (2003) get similar results: when women's share of household income increases in the U.S. and in Australia, their share of household work tends to increase too. This phenomenon has been explained by the authors as an attempt made by these couples to neutralize the social "deviance" generated by economic dependence of men, and the term "doing gender" coined. Brines (1994) for the U.S, and Sevilla-Sanz, Gimenez-Nadal, and Fernandez (2010) for Spain, find some evidence of the "doing gender" phenomenon. Conversely, data from U.K., Kalenkoski, Ribar, and Stratton (2009) do not show evidence of such a phenomenon, as do previous results for France (Anxo & Carlin, 2004; Ponthieux & Schreiber, 2006; Bloemen & Stancanelli, 2014; Stancanelli & Stratton, 2014; Rizavi & Sofer, 2010; Sofer & Thibout, 2015). All show that women's higher wages tend to have a negative impact on household work and parental time.

In this paper, we look at the impact of wages and income, but we want to go further by looking at women who invest heavily in their professional lives. We identify these career-focussed women using several criteria: earning a higher wage rate than the average woman with the same level of education or the same occupational status, or achieving a higher occupational status compared to other women with the same level of education. We also compare women with their partners to identify women with higher hourly wages, higher educational levels, or better occupational status than their partners. We extend the studies by Rizavi and Sofer (2010) and Sofer and Thibout (2015), by using several combinations of these variables to build some indexes of a strong professional investment. Then, in a second step, we study, conditional on wives' strong investment in professional life, how partners spend their time, especially their time working at home and in the workplace. We might particularly expect that men whose wives invest heavily in their careers, devote more time to household work than the other men. In the specific situation where the partners' economic roles are reversed as compared to the traditional "male breadwinner" norm, we might also expect a role reversal in the domestic sphere, with men devoting more time than their wives to domestic

production[2]. Consequently, we aim to investigate these questions. Do households in which the wife strongly invests in her career, show evidence of a more egalitarian division of domestic labor, in the sense that they share time spent in household work more equally? When women earn more than their partners, do they compensate towards the norm by "doing gender"? Or can we observe a more equal sharing of household work, or even a role reversal, with their partners taking charge of the largest share of domestic work as Pareto-optimality would predict[3]? Or do these couples use paid domestic help? As the decision-making process implies all choices related to market and household work made simultaneously by both partners, as well as the decision to use paid domestic help, these choices become endogenous, and estimations have to take this into account. With this objective, we use the latest available French Time Use survey (2009-2010), to estimate a model of household division of labor, where all the decisions are allowed to depend on the intensity of woman's investment in career. Our results show that men do react to their wives' investment in the labor market by increasing their domestic work on weekends. Hence, we see no "doing gender" effect for France. But, conversely, though households in which the wives strongly invest in career do tend to be more egalitarian, the increase in men's domestic work is not strong enough to result in a role reversal.

The structure of the paper is as follows. In Section 2, we describe the data used in the estimations, and some descriptive statistics. In Section 3, we suggest different indexes of women's strong investment in professional life, built from several indicators. In Section 4, we present and estimate a model of simultaneous equations of market and domestic work considering both partners, adding an equation for the choice of external help for household work. The last section concludes.

2. Data

The French Time Use survey (*Enquête Emploi du Temps*) was carried out by the National Statistical Office (INSEE) in 2009-2010. Its aim is to measure daily activities as precisely as possible. It was conducted in successive stages throughout the year, so as to avoid seasonal effects. The survey includes a base of 12,069 households, in which one of the household members above 11 years old was selected at random, and he/she and his/her possible partner

[2] Under the assumptions of equal productivities in household work, and of separability between the production and consumption spheres within the household, meaning that the inputs to domestic goods, including domestic times, are not driven by preferences.

[3] Under the assumptions mentioned in footnote 2.

participated in the survey. This leads us to a base of 18,521 individuals. The survey is composed of several questionnaires[4]:

- A household questionnaire with information at the household level, such as family total income, socio-demographic characteristics, or location and its characteristics.

- An individual questionnaire filled in by the selected individual in the household and his/her possible partner. Information is collected about their professional situation, wages, education, official hours of work etc.

- Daily time use booklets are filled in by the selected individual and his/her possible partner. They write down their activities during a day, indicating the time spent on each activity, at 10-minute time intervals. Several activities could be performed at the same time; in this case, two activities are listed, one being considered as the main activity and the other as secondary. The activities reported by individuals have been regrouped by the INSEE on the basis of activities of the same type (140 different types of activities). The list of the domestic work activities which are used here is given in Appendix 1. Following past studies, we have retained only the main activities. A base of 27,903 diaries has been completed. Note that respondents filled one or two booklets, and we use only the first booklet whose day is selected at random, to avoid any selection bias (see details in Appendix 2).

We select 5459 couples where both partners filled in an individual questionnaire and a time use booklet. We then select a sub-sample of couples in which both partners work full-time or part-time in the labor market (2842 couples dropped), with or without children. We drop the couples for which at least one partner did not report monthly wage or official hours of work per week, making it impossible to compute an hourly wage for them (214 couples dropped). Three further couples were dropped because of an outlier in the hourly wage. Our final sample contains 2400 couples, married, pacsed[5] or cohabitating, so 4800 individuals.

A statistical description of the sample is given in Table 1 (wages and declared market work) and in Table 2 (time use diary). The average monthly wage of men is 1.75 times the

[4] Information is collected through two interviewer's visits. The "household" questionnaire and the "individual" questionnaire of the selected individual are filled in during the first visit, and the "individual" questionnaire of the partner can be filled in either during the first or the second visit. Time use booklets are given to the partners during the first visit, filled in during one or two days between the two visits, and collected by the interviewer during the second visit.

[5] The PACS (*Pacte Civil de Solidarité*, Civil Pact of Solidarity) is a civil contract in France, which implies some but not all of the rights and duties implied by a marriage.

average monthly wage of women, much larger than the hourly wage ratio which is only 1.45. This is the result of the difference in hours of labor market work between men and women, especially with many more women than men working part-time: women work 28 hours (respectively 29 hours) a month less, using the answer to the question "how many hours do you usually work"[6] (respectively the time use booklet). The difference in the hourly wage is not, however, the result of men having a higher diploma than their wives[7], as women tend to have higher degrees than men, whose median and most usual degree is a short technical degree (see Table 6). Looking at total domestic work (DW in the following, including both household work and childcare), women living in a couple in which both partners work in the labor market, do an hour and a half per weekday more than men, on average, and an hour and ten minutes more per weekend day. This results in their total work (domestic plus paid) being larger (7 hours and 54 minutes versus 7 hours and 42 minutes). This difference in total work actually takes place during the weekend (51 minutes more for women), while total work during weekdays is the same for men and women. The difference in domestic work, however, tends to decrease slightly, as compared to ten years ago when, for two-income couples, men did nearly 20 minutes more per day while women did 30 minutes more (Rizavi and Sofer, 2010, using the previous French Time Use survey 1998-1999, INSEE).

Finally, looking at the intra-household division of domestic work (Table 3), in 26.15% of couples, the man performs more DW than his wife. If we focus on couples where the woman earns a higher wage rate then her partner, we would expect a much higher ratio. However, in only 29.44% of these couples, the man does more (32.94% focusing on couples in which the woman earns a higher monthly wage).

Table 1: Descriptive statistics: wages and declared market work

	2400 two-income couples			
	Men		**Women**	
Individual variables	**Mean**	**(Std. Dev.)**	**Mean**	**(Std. Dev.)**
Hours of market work *(declared, per month)*	180.57	(49.72)	152.24	(43.52)
Monthly wage *(declared, in Euros)*	2102.42	(1344.78)	1513.82	(790.68)
Hourly wage *(in Euros)*	12.91	(13.33)	10.82	(10.16)
Household variables	**Mean**		**(Std. Dev.)**	
Ratio hourly wage *(Men's/Women's)*	1.45		(1.75)	
Ratio monthly wage *(Men's/Women's)*	1.75		(2.07)	

The averages are calculated using weighted data from the French Time Use Survey 2010, using our analysis sample.

[6] Note that this is the usual question about working time asked in other representative surveys, for example in the annual Employment Survey (*Enquête sur l'Emploi*, INSEE).

[7] In the paper, we talk about wives and husbands to mean partners, even if they are not married couples.

Table 2: Means (standard errors) of the different activities, from the time use diary

	WEEKDAY (1,722 couples)			WEEKEND (678 couples)		
	Men	**Women**	**Diff (W-M)**	**Men**	**Women**	**Diff (W-M)**
Hours of total domestic work (DW; including childcare) *(per day)*	1.90	3.49	**1.60**	3.48	4.65	**1.17**
	(2.10)	(2.59)	**(3.15)**	(2.80)	(2.58)	**(3.10)**
Hours of childcare (if at least one child < 18 years) *(per day)*	0.73	1.59	**0.86**	1.02	1.45	**0.43**
	(1.00)	(1.67)	**(1.83)**	(1.56)	(1.65)	**(1.90)**
Hours of market work *(per day)*	6.89	5.24	**-1.65**	1.44	1.12	**-0.32**
	(3.51)	(3.65)	**(4.36)**	(2.91)	(2.51)	**(3.52)**
Hours of total work (total DW + market work) *(per day)*	8.79	8.73	**-0.06**	4.92	5.78	**0.86**
	(2.89)	(2.81)	**(3.16)**	(3.26)	(2.92)	**(3.31)**

	ALL DAYS TOGETHER[1]		
	Men	**Women**	**Diff (W-M)**
Hours of market work *(per day)*	5.36	4.08	**-1.28**
	(4.15)	(3.84)	**(4.18)**
Hours of total work (total DW + market work) *(per day)*	7.70	7.90	**0.20**
	(3.46)	(3.13)	**(3.23)**

The averages are calculated using weighted data from the French Time Use Survey 2010, using our analysis sample.
The diary activities are recorded in minutes per day, but we have transformed them into hours per day, for easier readability. In the econometric analysis, minutes per days are used.
[1]For each household, the day of the diary is selected at random, such that in our sample, 5 diaries out of 7 are filled in during a weekday, and 2 out of 7 during a weekend day. Consequently, averages above all days do not require any specific weighting to take into account the distribution of the days.

Table 3: Some figures about the distribution of wages and domestic work (DW) within couples

% of couples with the following characteristics:	
Among the whole sample	
Man's DW > Woman's DW	26.15 %
Woman's hourly wage > Man's hourly wage	36.41 %
Woman's monthly wage > Man's monthly wage	23.22 %
Among couples for which Woman's hourly wage > Man's hourly wage	
Man's DW > Woman's DW	29.44 %
Among couples for which Woman's monthly wage > Man's monthly wage	
Man's DW > Woman's DW	32.94 %

Percentages calculated using weighted data from the French Time Use Survey 2010, from our analysis sample.

3. Indexes of women's investment in career

3.1. Methodology

This section presents how we identify women investing heavily in their professional lives, and the methodology used to build indexes. Our empirical analysis makes use of three different indexes of investment, each one constructed from a set of dummy indicators. Each of

these indicators reflects one dimension of women's investment in career (see also Rizavi and Sofer, 2010, and Sofer and Thibout, 2015), as following[8].

First, a strong investment in professional life might be reflected in terms of earning a high hourly wage. As the wage rate is highly correlated with education and occupational status, we will compare the hourly wage of each woman with the wage of the other women with the same level of education, and then of the other women with the same occupational status or type of profession. Consequently, our first indicator is **"High hourly wage/education"**, which takes a value of one for women whose hourly wage is in the last quartile of the distribution of women with the same level of education. Education is measured in six levels (see Table 6). In the same way, the indicator **"High hourly wage/status"** identifies women whose wage is in the last quartile of the distribution of women with the same occupational status. The occupational status is measured in four categories (see Table 6; 1/ blue collars, clerks and saleswomen, 2/ technicians and intermediary employment, 3/ self-employed, 4/ executives)[9].

A second way of signalling a strong investment is occupational status. As the status is highly correlated with education, we will identify these high status women on the basis of the previous reference group based on education. The idea of the indicator **"High status/education"** is similar to the previous indicators, that is it will take a value of one for women whose status is approximatively in the last quartile of the distribution of women with the same level of education. Of course the threshold of the last quartile cannot be strictly satisfied, as the status is a four-category indicator. For instance, among women with the lowest educational level, 87% also get the lowest status, meaning that only 13% of these low-educated women will be identified as investing a lot regarding their status. Conversely, among women with the two highest levels of education, respectively 39% and 60% of them achieve the highest occupational status, and these women are identified as investing a lot regarding their status. But as a whole, as the other educational levels are more balanced regarding the distribution of status, 25.2% of all the women in our sample get a value of 1 at the indicator "High status/education".

[8] Investment has to be taken in a broad sense here: for instance, it could mean a high return of an investment or success (a high hourly wage).

[9] Besides the fact that these categories – called CSP (socio-professional category) – are widely used in the French surveys and the literature, we verified that the average women's wage in our sample is increasing with these four categories.

So these three indicators consider two different reference groups: women with the same level of education, and women with the same occupational status.

Finally, another possible reference is the woman's partner, in order to identify women investing more than their partners in the labor market. These indicators will be constructed looking at educational level, employment status, and hourly wages. With the partner as a reference, it will be possible to investigate, as far as possible, assumptions such as "doing gender" or efficiency. The following three indicators take a value of one if:

For **"Diploma > partner"** the woman has a (strictly) higher level of education than her partner.

For **"Hourly wage > partner"** the woman has a (strictly) higher hourly wage than her partner.

And for **"Status > partner"**, the woman has a (strictly) higher status than her partner.

Note that the hourly wage represents the opportunity cost of time, allowing to investigate efficiency and to look at the phenomenon of role reversals. However, we will investigate in a robustness check (section 4.3) what happens if we use an indicator "Monthly wage > partner" instead, to look at the "doing gender" hypothesis[10].

Finally, developing further the study by Rizavi and Sofer (2010) and Sofer and Thibout (2015), we consider in the empirical analysis three aggregate indexes based on those six indicators, allowing us to capture the degree or the intensity of the investment. The idea is that a woman having a value of 1 at only one of the six indicators, should be considered as investing less than a woman getting a value of 1 at several indicators at a time. **"Index Women"** adds the three indicators with other women as the reference group, and takes values from 0 to 3. A higher value signals a higher intensity of the woman's investment, measured in comparison to women with similar characteristics (in terms of education and status). **"Index Partner"** adds the three indicators with respect to the partner, and takes values from 0 to 3. A higher value signals a higher intensity of woman's investment compared to the investment of her partner. This means that a woman getting a value of 3 at "Index Partner" strictly exceeds the professional situation of her partner above the three dimensions (education, hourly wage and status). With a value of 1 (respectively 2), she achieves a better situation than her partner above one (respectively two) dimension(s) only. Finally, **"Global Index"** simply adds the

[10] See the introduction for details about the "doing gender" hypothesis.

values of "Index Women" and "Index Partner", hence of the six dummy indicators defined above, to get a global picture of women's investment. Theoretically, this index takes values from 0 to 6, but we grouped the three highest values which, for each of them, include only a few women. The "Global Index" hence takes values from 0 to 4, a higher value indicating a higher intensity of the woman's investment in the labor market. A value of 0 means that none of the six indicators identifies the woman as investing heavily, while a woman getting a value of 4 means that she is identified as investing heavily with at least 4 indicators equal to one.

Table 4 shows descriptive statistics for the three aggregated indexes, plus the three indicators relative to the partner used to form "Index Partner". Slightly more than half of the women have a value of 0 at "Index Women" (54%), 41% have a value of 0 at "Index Partner", and more than half of the women are concentrated in values 0 and 1 for the "Global Index". Thus roughly speaking, half of the women in our sample are considered as not investing in their careers. The percentage of women for each of the index values is monotonically decreasing when the index value increases, for the three indexes. So globally, the number of women in our sample is decreasing as the investment in career is stronger, which is not surprising given the way our indexes are constructed. Nearly one woman out of four, however, has a value of the "Global Index" over or equal 3, and still 12% of women have the highest value of 4. Regarding "Index Partner", almost 60% of women have at least one of their professional characteristics higher than one of their partners. But then the proportion of women for whom at least two characteristics are higher than their partners strongly decreases to 21%. Looking more precisely at the indicators relative to the partner (Table 4.3), it is worth noting that more than one third of women have an education level or an hourly wage strictly higher than their partners (36%). The percentage drops to less than 15% when considering the status[11].

Table 5 looks now at which indicators contribute the most to each value of "Index Partner". We observe that in most cases, women get a value of 1 to "Index Partner" because they have either a higher level of education or a higher hourly wage than their partners. Only 7% of women get a value of 1 because they have (only) a higher status than their partners. Not surprisingly, among women having two professional characteristics higher than their partners, about two thirds of them have both a higher diploma and wage, then 18% of them have both a higher wage and status, and finally 17% both a higher diploma and status.

[11] Note however that a more detailed definition of status would automatically increase this percentage.

Table 4: Descriptive statistics for the indexes: frequencies and percentages of women for each value of the indexes

Table 4.1: Global Index

Global Index	Freq.	%
0	650	27.1
1	646	26.9
2	480	20.0
3	326	13.6
4	298	12.4
Total	**2400**	**100**

Table 4.2: Index Women

Index Women	Freq.	%
0	1306	54.4
1	502	20.9
2	468	19.5
3	124	5.2
Total	**2400**	**100**

Table 4.3: Indicators relative to partner

	0 = No	1 = Yes
Hourly wage > partner	63.59	36.41
Diploma > partner	63.67	36.33
Status > partner	85.66	14.34

Table 4.4: Index Partner

Index Partner	Freq.	%
0	984	41.0
1	899	37.5
2	361	15.0
3	156	6.5
Total	**2400**	**100**

Source: weighted data from the French Time Use Survey 2010, from our analysis sample.

Table 5: Which indicators contribute the most to "Index Partner"?

Index Partner = 1	
Diploma > partner	46.7 %
Hourly wage > partner	46.3 %
Status > partner	7.0 %
TOTAL	**100 %**
Index Partner = 2	
Wage > partner & Diploma > partner	65.4 %
Wage > partner & Status > partner	18.0 %
Diploma > partner & Status > partner	16.6 %
TOTAL	**100 %**

Source: weighted data from the French Time Use Survey 2010, from our analysis sample.

3.2. Who are these couples where the woman invests heavily in her career?

Table 6 shows the main characteristics of couples and partners along with the values taken by "Global Index". Many characteristics are continuously (or almost) varying with the index values: couples where women invest more in career tend to be more often married or pacsed (civil contract), and to have slightly fewer children. Surprisingly, the ratio of women's time spent in the labor market compared to their partners' decreases with values 3 and 4 of the index, but the ratio of monthly wages is monotonically increasing with index values. This might suggest that women with a low income need to spend longer hours in the labor market.

Table 6: Couple and individual average characteristics along with "Global Index" values

			GLOBAL INDEX									
	Together		**0**		**1**		**2**		**3**		**4**	
Couples characteristics												
Percentage of couples	*100.0*		*27.09*		*26.91*		*19.98*		*13.60*		*12.41*	
Married (%)	67.05		66.80		61.10		71.31		68.90		71.64	
Pacs (civil union) (%)	5.89		5.78		4.68		6.43		6.97		6.70	
Ratio monthly wage (woman/man)	0.86		0.62		0.76		0.81		1.12		1.43	
Ratio declared working time (woman/man)	0.97		0.98		0.97		1.08		0.87		0.86	
Number of children between 0-3	0.14		0.10		0.16		0.14		0.18		0.15	
Number of children between 0-18	0.99		0.98		1.05		1.01		0.97		0.92	
Paid domestic help (%)	9.18		3.78		6.81		13.13		12.10		16.52	
Partners characteristics	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**
Age	41.55	39.70	41.90	40.20	39.45	37.44	41.91	39.86	42.25	40.25	43.98	42.65
***Education* (%)**												
No diploma or short general degree (*CEP/BEPC*)	15.23	15.16	12.00	29.54	19.06	12.14	16.63	10.36	10.99	10.39	16.41	3.31
Short technical degree (*CAP/BEP*)	40.03*	27.70*	42.53	40.60	40.44	24.30	35.19	24.32	37.18	21.32	44.65	19.32
High school degree (*Baccalauréat*)	11.02*	15.65*	11.03	10.55	8.91	19.91	13.53	18.52	12.44	13.12	9.96	15.74
College degree (*Bac +2*)	16.47*	18.79*	19.85	11.24	14.60	21.68	15.97	21.39	17.85	20.46	12.48	22.99
Bachelor degree (*Bac +3 or +4*)	6.92*	13.02*	5.61	5.88	6.17	14.76	9.21	13.94	8.55	18.33	5.97	17.56
Master degree or more (*3ème cycle*, *grande école*, PhD)	10.32*	9.67*	8.99	2.19	10.83	7.20	9.48	11.48	13.00	16.38	10.52	21.08
***Status* (%)**												
Blue collar, clerk	39.94	59.63	46.88	88.08	41.35	70.87	32.06	49.02	34.37	40.51	40.55	11.21
Technician	24.45	16.07*	26.74	10.73	21.40	14.19	20.93	19.08	25.87	23.80	30.18	18.51
Self-employed	10.69	6.87*	4.26	1.19	11.90	5.43	16.90	15.14	11.61	4.76	11.07	11.37
Executive	24.92*	17.43*	22.13	0.00	25.35	9.52	30.11	16.76	28.15	30.93	18.19	58.91
***Sector of employment* (%)**												
Public	18.26	30.47	19.22	22.18	15.84	31.67	17.59	29.73	20.33	33.00	20.19	44.44
Private	67.79	61.18	74.09	75.67	68.05	61.59	62.52	53.14	63.31	60.74	66.84	42.06
Self-employed or CEO	13.96	8.35*	6.69	2.15	16.11	6.75	19.89	17.13	16.35	6.26	12.97	13.50

Figures calculated using weighted data from the French Time Use Survey 2010, from our analysis sample.

Asterisks in column "Together": indicate that the variable has a coefficient significant at 1%, in an ordered probit estimation of "Global Index" according to all the different characteristics displayed in this table (except for the ratio of monthly wages, which prevents the convergence-"No diploma", "Blue collar" and "Public" are the reference categories for education, status and sector of employment respectively).

Women's age is also increasing. We observe high variations at the tails of the education distribution: fewer women with no diploma or a low level of professional degree when the index value is high, and, conversely, a proportion of women with a master's degree increasing with index values. Looking at their job status, not surprisingly, the percentage of blue collar workers and employees decreases from 88% when "Global Index" takes a value of 0 to 11% when the value is 4. Conversely, the percentage of self-employed women increases from 1% to more than 11% and particularly, that of executives increases strongly and continuously, from no woman with a zero value of the index to almost 60% for a value of 4. Interestingly, they also work more in the public sector (from 22% with a zero value to 44% with a value of 4) and less in the private sector (from 76% to 42%).

When looking now at their partners, the figures vary much less and generally not monotonically. For all values of "Global Index", husbands' characteristics are close to average values or do not deviate in a specific direction: there is no specific profile for the partners of those women who invest strongly in the labor market.

3.3. Domestic time of women and men along with the indexes

Our empirical analyses throughout the paper make use of total domestic work (DW), which is the sum of "pure" household work (excluding childcare), and childcare. We do not study separately both components, first because childcare alone is less sensitive to women's investment in career. In addition, household work (without childcare) appears to globally react in a similar way to total DW. Table 7 shows average times of total domestic work for men and women for the different indexes values. What can be noted first is that in any case, men's domestic activities are lower than women's, on average.

Table 7: Time of total domestic work, according to the indexes

Average total domestic work, in minutes per day, according to the indexes								
Global Index	**Women**	**Men**	**Index Women**	**Women**	**Men**	**Index Partner**	**Women**	**Men**
0	235.0	139.7	**0**	232.8	136.8	**0**	228.9	133.1
1	228.3	132.0	**1**	230.1	156.1	**1**	237.7	143.9
2	236.5	145.5	**2**	221.6	128.4	**2**	214.8	144.1
3	220.4	139.3	**3**	215.0	161.6	**3**	214.6	158.8
4	215.8	153.7						
% variation from 0 to 4	-8.2	10.0	**% variation from 0 to 3**	-7.6	18.1	**% variation from 0 to 3**	-6.2	19.3

Averages calculated using weighted data from the French Time Use Survey 2010, from our analysis sample.

For women, whatever index considered, the results are always the same: with two exceptions for lower values of indexes, the more they invest in career, the less domestic work they do. The amplitude of women's decrease in DW is fairly similar with the three indexes, with a slightly stronger decrease with "Global Index". For men, the results are more mitigated: though they tend, on average to do more domestic work when their partners have an increasing value of the indexes, the tendency is not monotonous with the values of "Global Index" and "Index Women". The increase in man's DW between the lowest and the highest value of both indexes is higher (in absolute value) than the corresponding decrease in woman's DW, but mainly due to a strong increase for the highest value of the indexes. Interestingly, with "Index Partner", the increase in man's DW is continuous, with an increase of 19% between the lowest and the highest value of "Index Partner".

Note that from these averages, the "doing gender" hypothesis is not validated on French data: looking at "Index Partner", the higher the professional situation of women relative to their husbands', the less DW women perform, not more[12]. Conversely, their partners tend to do more DW in that case, hence their sharing of DW is more egalitarian than that of average couples. However, equality in DW time itself is not reached on average, even for the highest value of "Index Partner". Still less can we observe a role reversal[13]. Hence, this result seems inconsistent with efficiency as well, except if it could be shown that there exists a significant difference in average productivities in DW between men and women, advantaging the latter. As most domestic tasks are unskilled, and as women who are paid to perform them are generally not better paid, on average, than men who do the same jobs, significant productivity differences seem unlikely. To reconcile our results with efficiency, another possibility would be to assume differences in preferences between women and men: women having less "displeasure" than men performing DW. Assuming innate differences in preferences would imply an "essentialist" approach[14], moreover not really confirmed empirically by what is found in the literature on relative preferences of men and women for domestic tasks (Stratton, 2012; Couprie, Cudeville & Sofer, 2015). By contrast, assuming differences in indirect preferences, such as a cost for deviating from "social norms" (Akerlof & Kranton, 2000) or

[12] The same result holds when considering monthly wages instead of hourly wages, i.e. when a higher professional situation includes earning a higher income than her partner.

[13] In our sample, in 26% of the couples, the man does more DW than his wife. It is the case only for 29% of those for whom the woman's hourly wage is higher than her partner's (see Table 3). See also Champagne, Pailhé and Solaz (2015).

[14] See Loury's (2002) axiom of anti-essentialism. Loury considers two different ethnic groups, and the axiom consists in assuming an identical distribution of ability in the two groups. It could also be called an axiom of non-racism. Mutatis, mutandis, we assume the same axiom considering (non) differences between women and men.

from gender stereotypes seems a more promising approach. Note, however, that both assumptions would imply getting rid of the separability axiom between production and consumption, which is at the core of standard microeconomics. For these reasons, we can conclude that this preliminary finding, that is women still perform the majority of DW even when they achieve a better professional situation, including higher wage rates than their partners, seems to seriously challenge the efficiency assumption in household behavior usually made in the literature. Further results below do not contradict that conclusion.

4. An empirical model of household division of labor

4.1. The specification

In order to study more precisely how partners allocate time according to the investment of the woman in her career, we estimate models of household division of labor, taking into account the interrelationship of decisions taken within the household. As they show different patterns, the estimated models differ for weekdays and weekend days. For both types of day, we estimate three systems, each one considering a different index. We first present the specification for the weekday model, and then we explain the variations made to the model for weekend days. We assume that the different uses of time are determined simultaneously within couples, hence we consider a system composed of four time equations: total domestic work time as well as labor market time of both partners[15]. These time equations are allowed to depend on woman's investment in career. As said before, we focus on total DW (including childcare). Simple OLS estimations of men and women childcare time, focusing on couples with children and including the same controls as the one used in our model, show a little more childcare from men, a little less for women, for couples where the woman invests a lot in career, but those effects are generally insignificant. In addition, OLS estimations of pure household work (excluding childcare) go nearly always in the same direction as those of total DW[16].

In addition, in our model, we aim to take into account the impact on DW times of the hours of external paid domestic help used by the household (paid help for childcare is excluded, because it is too strongly correlated with the presence of children and mother's paid work). Indeed, we might expect that couples where the woman strongly invests in her career, more

[15] Leisure and physiological activities (sleep, personal care etc.) being the remaining time after total work, we do not add equations for them.

[16] Detailed results of the OLS estimations available upon request to the authors.

often make use of paid help, allowing the partners to reduce their DW in turn. Thus we include a variable for the hours of paid help as a control in DW equations. However, this variable is likely to be endogenous, as some unobserved characteristics might explain both DW times of the partners and the use of paid help. For instance, some couples might place a high value on home cleanliness, leading them to make use of paid help more often, but also spend more time by themselves doing DW. Consequently, in order to take into account the endogeneity of this variable and get unbiased estimated coefficients, we incorporate in our system another equation for the hours of domestic help bought by the household, and we include in this equation, among others, some exclusion variables to ensure identification of the model.

More formally, five equations are simultaneously estimated. The first equation represents the number of hours of domestic help bought by the couple i, $Help_i$, estimated as a left censored Tobit. $Help_i^*$ is the latent variable, and $\boldsymbol{X_{help,i}}$ a vector of household and individual characteristics.

$$Help_i^* = \boldsymbol{\beta_{Help}}\, \boldsymbol{X_{Help,i}} + \varepsilon_{Help,i}$$

$$Help_i = \begin{cases} 0 & if\ Help_i^* \leq 0 \\ Help_i^* & if\ Help_i^* > 0 \end{cases} \quad (1)$$

The two following equations represent respectively domestic work time by female f and male m partners in couple i. $Index_i$ corresponds successively to "Global Index", "Index Women" and "Index Partner". The variable $Help_i$ is incorporated as an explanatory variable.

$$DW_{f,i} = \boldsymbol{\beta_{DWf1}}\ \boldsymbol{X_{DWf,i}} + \beta_{DWf2}\ Index_i\ + \beta_{DWf3}\ Help_i\ + \varepsilon_{DWf,i} \quad (2)$$

$$DW_{m,i} = \boldsymbol{\beta_{DWm1}}\ \boldsymbol{X_{DWm,i}} + \beta_{DWm2}\ Index_i + \beta_{DWm3}\ Help_i + \varepsilon_{DWm,i} \quad (3)$$

Finally, the two last equations stand for respectively female and male labor market work:

$$MW_{f,i} = \boldsymbol{\beta_{MWf1}}\ \boldsymbol{X_{MWf,i}} + \beta_{MWf2}\ Index_i + \varepsilon_{MWf,i} \quad (4)$$

$$MW_{m,i} = \boldsymbol{\beta_{MWm1}}\ \boldsymbol{X_{MWm,i}} + \beta_{MWm2}\ Index_i + \varepsilon_{MWm,i} \quad (5)$$

DW and market work time are taken from the time use booklet, and are considered as continuous. Indeed, as our sample only includes two-income couples, spending zero minutes on market work does not mean being not employed, but rather not working this day. Hence, the time equations include as controls, indicators of whether individuals worked during the booklet day, and whether this day was of an exceptional nature. Regarding DW, the literature

discussed the meaning of zero time values in time use diaries. Stewart (2013) argued that individuals reporting no time spent on housework on a given day may actually do it the next day, such that these zeros are random and capture infrequency rather than censoring. In addition, given our definition of DW, it seems very unlikely or rare that someone never carries out that activity. Thus we use a linear equation model for DW equations rather than a Tobit[17]. In our sample, 14% of men and a little less than 4% of women report spending no time on DW on a given day.

Due to a possible specific matching of preferences and productivities in the marriage market, we consider that the error terms of all the equations of the system can be correlated, as follows:

$$\omega_i = (\varepsilon_{Help,i}, \varepsilon_{DWf,i}, \varepsilon_{DWm,i}, \varepsilon_{MWf,i}, \varepsilon_{MWm,i})' \quad (6)$$

$$\omega_i \sim N(0, \Sigma) \quad (7)$$

Σ is the unrestricted variance-covariance matrix of errors of the system, of dimension 5×5. The errors are assumed to be normal. The matrix Σ is not constrained, in order to take into account the interdependence of time use and hours of help decisions, and the possible effect of the same unobservable variables on these decisions. Unobserved factors might refer to the valuation of the domestic output, or productivity in home production. Hence, we estimate the cross-equation correlation terms, allowing not only to improve the efficiency of the parameter estimates, but also to know more about the effects of unobservable factors on decisions (Bloemen & Stancanelli, 2014; Stancanelli & Stratton, 2014). The system is estimated by Simulated Maximum Likelihood using the Geweke, Hajivassiliou and Keane (GHK) method, which allows to simultaneously estimate left censored Tobit and continuous equations[18].

The identification of the model relies on exclusion variables in the hours of help equation (as this is the variable for which we take into account its endogeneity), that do not appear in the other equations of the system. The exclusion variables retained are the square age of the man and the level of education of the woman's father (in years), who exert a significant effect on the hours of help, and we checked that they do not significantly impact each of our other explained variables. We chose the education of the woman's father as this variable probably captures a wealth effect. Also, women with a highly educated father might have grown up in a

[17] We have estimated the systems using a Tobit for the equation of men's DW. They yield estimates very similar to that of the systems that consider this equation as continuous.

[18] We used the STATA command CMP (Roodman, 2011).

family using domestic help more frequently, leading them to use it for their own family as well. Regarding our second instrument, our estimates show that the coefficient of the man's age is positive and significant in the hours of help equation, while the square age is negative (and significant). So older men make use of longer hours of domestic help, but the effect of age is significantly weaker as men get older.

We allow the time equations to be affected by some household and individual characteristics that have been found to be predictors of time allocation in previous studies[19]. Some variables are included in some time equations but not others, because we expect that they affect these uses of time but not the others, and we have systematically tested that they do not explain the latter outcomes. Note that all the variables incorporated in at least one of the time equations are automatically incorporated in the help equation. An indicator for living in the Parisian region is only included in partners' DW equations, as apartments are generally smaller in this region, reducing the amount of DW required, but this variable has no impact on partners' market work equations. In the same way, the hours of help are only included in partners' DW equations, as we do not expect that making use of domestic help allows people to increase or reduce their market work time. Woman's education is only incorporated in her market work equation, as it exerts almost no effect on her DW, while man's education appears in both his DW and his market work. Several individual variables are included separately in man's and woman's time equations: the age of the man [woman], indicators of whether he [she] worked during the booklet day and whether this day was of an exceptional nature, and his [her] sector of employment (public, private or self-employed[20]) affect both man's [woman's] domestic and market works. The index and the log nonlabor income appear in the four time equations, as well as the number of children per age category (less than 3 years, and between 3 and 18). Regarding the log hourly wages and their log ratio, the specification differs according to the index considered. In the model using "Global Index", we do not include any of those variables in the woman's time equations, as this index is strongly related to her wage rate by construction, and even with the ratio of wages. However, we include the man's wage rate in his time equations, as there is no "problematic" relation between "Global Index" and his wage, and theoretically, his wage is an important determinant of his DW (opportunity cost of time) and his market work. The model using "Index Women"

[19] Several studies have shown that the division of domestic tasks differs by type of couple (married or cohabiting). We found no impact on DW times of both partners, in our case.

[20] The self-employed sector is a little broader than the self-employed occupational status. The former includes chief executive officers, which are not part of the latter.

includes only the log of the ratio of hourly wages (man's divided by woman's) in the four time equations, as this index is strongly correlated with the woman's wage but not with the ratio. As "Index Partner" itself is strongly correlated with the ratio of wages, we only consider the man's [woman's] log hourly wage in the man's [woman's] time equations.

The way our system is built leads to consider the hourly wages and the indexes of investment as exogenous. This is certainly a strong assumption, as we might imagine a lot of reasons why some unobserved characteristics would impact those variables on one hand, and DW and market work times on the other hand. Nevertheless, estimating properly a system which corrects from these endogeneities would require different exclusion variables for each endogenous variable (partners' wages, indexes) but without any impact on the other equations, which is a very difficult task. As making use of "weak" instruments will certainly provide poorer results, this is the first reason why we chose to stick with the consideration of hourly wages and indexes as exogenous. In addition, the objective of this paper is to understand how the partners make their daily time use decision, according to the investment of the woman in career and the partners' wages as they are today, but not to investigate wage formation nor the reasons for women's investment. Investigating the dynamics of the decision-making would be a fascinating work, and this is left for further research.

Regarding the weekend specification, we make a few changes to the system. We do not include the hours of help as an explanatory variable in DW equations, thus no hours of help equation too, first because the smaller size of the sample in this case prevents the convergence, but also because the use of domestic help during the weekend is less relevant[21]. In addition, we only consider the partners' DW equations, as few people are working in the labor market over the weekend[22]. Thus the weekend systems are composed of two equations of DW that are simultaneously estimated. The specification for the control variables included in each equation is the same as in the weekday systems.

Before presenting the results of the systems, note that we have run simple OLS estimations of total DW of both partners, separately for weekday and weekend, including successively and exclusively the three indexes[23]. The systems globally confirm what we found in the OLS estimations, but the systems often provide more significant and stronger results.

[21] Using domestic help during the week might allow partners to devote less time to domestic work during the weekend (Stancanelli and Stratton, 2014), but our data do not show such a pattern.

[22] 72.36% of men and 75.07% of women in our weekend sample report zero minutes of market work.

[23] OLS results can be obtained upon request to the authors.

4.2. Results

The three next tables display the estimation results of the systems of equation. Table 8 presents two separate estimation results, for the weekday system and the weekend system, when considering "Global Index" as an explanatory variable in all the equations. Tables 9 and 10 present the estimation results when considering "Index Women" and "Index Partner" respectively (only the key variables are shown here, as the other explanatory variables are the same as in Table 8, and their coefficients very similar). In the tables, each column corresponds to one equation of the system, with the five first columns representing estimation results of the weekday system, and the two last columns the weekend results.

Looking at the domestic work time equations in Table 8, though the sign of the parameters remains often the same, their values and significance vary greatly depending on whether the household completed the booklet during a weekday or a weekend day. The number of children of any age, with a higher impact for children under three, has a strong positive impact on their mother's DW, significantly more than it does for their father's during the week (nearly 2 hours instead of 75 minutes for children under three, 37 minutes instead of 16 for older children). During the weekend, the increase in DW due to the presence of very young children is slightly higher for the father (136 minutes) than for the mother (105 minutes), but DW also increases for mothers of older children (32 minutes), while there is no significant effect for the father.

Interestingly, man's DW is increasing with age and household nonlabor income mainly on weekends. Woman's DW is increasing with age on any day, but is not affected at all by nonlabor income. Men do significantly less DW on weekdays when they live in the Paris area, very likely because flats are smaller and/or they have longer commuting times, while there is no effect on women's DW. Man's employment sector also has a significant effect on his DW, again only on weekdays: compared to a man employed in the private sector, a man working in the public sector does significantly more DW during the week (23 minutes), and a self-employed man does significantly less (26 minutes less). Women's employment sector has a different impact from men's on their DW: self-employed women spend on average almost an hour more on weekday DW compared to similar women working in the private sector. Men with higher levels of education seem to do more DW, but only on weekends and the increase is almost never significant.

Table 8: Simultaneous equations model results, using "Global Index". All the explanatory variables are displayed.

	Model 1: WEEKDAY					Model 2: WEEKEND	
Dependent Variables → Explanatory Variables↓	**Hours of help**	**DW Woman**	**DW Man**	**Work Woman**	**Work Man**	**DW Woman**	**DW Man**
Day worked Man	-0.97		-186.65***		451.07***		-87.34***
	(1.117)		(13.767)		(7.509)		(15.796)
Exceptional day Man	-1.39		-11.50		-1.54		-41.75**
	(1.269)		(13.449)		(11.790)		(17.329)
Day worked Woman	1.26	-195.57***		397.21***		-107.85***	
	(1.110)	(9.801)		(6.723)		(18.169)	
Exceptional day Woman	0.27	-55.41***		-23.17*		-42.54**	
	(1.118)	(12.154)		(13.281)		(17.754)	
Number of Children < 3	2.84***	115.67***	75.60***	-18.72*	-1.78	105.13***	135.90***
	(0.953)	(11.854)	(10.577)	(10.238)	(13.111)	(22.571)	(23.687)
Number of Children 3-18	0.99**	36.81***	15.91***	-8.11**	-2.76	32.05***	8.28
	(0.426)	(3.759)	(3.089)	(3.965)	(4.139)	(8.401)	(7.765)
Age Man	1.63***		0.55		-0.04		2.06**
	(0.512)		(0.342)		(0.478)		(0.808)
Age Woman	0.16*	2.25***		0.28		2.64***	
	(0.093)	(0.381)		(0.511)		(0.740)	
Parisian region	2.79*	-15.29	-40.66***			31.75	-22.90
	(1.551)	(12.058)	(8.309)			(24.199)	(21.020)
Log nonlabor income	0.17***	-0.24	0.63	-0.49	-0.56	0.14	1.78**
	(0.049)	(0.466)	(0.403)	(0.462)	(0.535)	(0.828)	(0.839)
Hours of help		-6.70***	0.39				
		(2.245)	(1.832)				
EDUCATION MAN ***(Ref: No diploma or short general degree)***							
Short technical degree M	2.10		3.57		12.41		16.18
	(1.370)		(9.454)		(10.997)		(22.347)
High school degree (Bac) M	2.47		9.37		24.02		31.43
	(1.684)		(12.899)		(15.280)		(28.980)
College degree (Bac + 2) M	4.00**		9.81		0.82		32.58
	(1.732)		(11.925)		(13.768)		(26.013)
Bachelor degree M	6.86***		-10.55		32.46**		59.43*
	(2.191)		(11.886)		(14.366)		(33.241)
Master degree or more M	6.60***		-10.01		33.20**		29.12
	(1.848)		(11.626)		(16.202)		(27.116)
EDUCATION WOMAN ***(Ref: No diploma or short general degree)***							
Short technical degree W	0.68			19.76			
	(1.508)			(16.017)			
High school degree (Bac) W	-0.72			-4.94			
	(1.934)			(19.146)			
College degree (Bac + 2) W	1.91			25.97			
	(1.512)			(18.451)			
Bachelor degree W	3.51**			32.10*			
	(1.722)			(19.130)			
Master degree or more W	4.10**			46.45**			
	(1.883)			(20.929)			
Public sector M	-0.50		23.14***		-26.27***		-17.28
	(0.872)		(7.907)		(10.066)		(14.799)
Self-employed M	2.73**		-26.14***		49.54***		-24.45

Ref: Private sector M	(1.151)		(8.833)		(13.673)		(19.140)
Public sector W	-1.52*	11.78		8.83		4.92	
	(0.822)	(8.129)		(7.780)		(14.788)	
Self-employed W	3.59***	58.58***		-49.95***		-0.22	
Ref: Private sector W	(1.368)	(13.795)		(16.058)		(24.956)	
Education father (years) W	0.15*						
	(0.090)						
Age^2 M	-0.02***						
	(0.006)						
Log hourly wage Man	1.43**		-3.96		-2.06		23.18*
	(0.704)		(6.077)		(8.359)		(12.439)
Log hourly wage Woman	1.65*						
	(0.870)						
GLOBAL INDEX *(Ref: =0)*							
Global Index = 1	2.27*	-14.15	-12.70	11.34	-8.69	-15.84	24.02
	(1.267)	(10.413)	(8.595)	(11.728)	(11.749)	(18.025)	(19.239)
Global Index = 2	3.47***	-13.15	-4.23	18.59	7.65	10.88	57.46***
	(1.251)	(11.352)	(9.486)	(12.307)	(12.586)	(19.559)	(20.151)
Global Index = 3	2.02	-22.26*	0.13	24.47**	-3.78	-10.32	28.97
	(1.423)	(12.772)	(9.412)	(12.134)	(13.186)	(20.726)	(22.450)
Global Index = 4	2.89*	-52.70***	-11.22	37.71**	-9.27	12.86	84.36***
	(1.525)	(11.275)	(11.857)	(14.709)	(14.144)	(27.406)	(22.079)
Constant	-72.44***	237.84***	243.30***	-11.88	24.98	159.53***	23.87
	(13.117)	(18.721)	(28.156)	(26.595)	(26.102)	(35.526)	(48.838)
Observations	1,722	1,722	1,722	1,722	1,722	678	678

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

M: Man / W: Woman. Two separate estimation results are displayed: on weekdays and on weekend days.

Table 9: Simultaneous equations model results, using "Index Women". Only key variables shown.

	Model 1: WEEKDAY					**Model 2: WEEKEND**	
Dependent Variables → Explanatory Variables↓	**Hours of help**	**DW Woman**	**DW Man**	**Work Woman**	**Work Man**	**DW Woman**	**DW Man**
Hours of help		-6.34***	0.46				
		(2.305)	(1.893)				
Education father (years) W	0.14						
	(0.090)						
Age^2 M	-0.02***						
	(0.005)						
Log hourly wage Man	1.44**						
	(0.698)						
Log hourly wage Woman	0.62						
	(0.816)						
Log ratio hourly wage (M/W)		14.57**	-4.47	1.08	2.84	6.40	6.71
		(6.218)	(5.503)	(8.116)	(7.345)	(14.796)	(13.170)
INDEX WOMEN *(Ref: = 0)*							
Index Women = 1	1.91**	-23.34**	-0.16	23.55**	4.48	23.48	55.94***
	(0.955)	(9.463)	(8.566)	(10.542)	(10.325)	(18.192)	(20.041)
Index Women = 2	3.86***	-13.95	-12.00	28.00***	10.08	5.33	29.73
	(1.175)	(10.693)	(7.650)	(10.745)	(11.233)	(21.141)	(21.267)
Index Women = 3	3.19**	-34.63**	-14.49	21.66	32.89*	4.13	93.70***

	(1.489)	(16.686)	(16.116)	(21.047)	(16.961)	(42.649)	(31.725)
Constant	-66.83***	229.17***	221.55***	-7.52	20.72	147.00***	89.86**
	(12.481)	(18.078)	(23.277)	(27.912)	(22.540)	(34.860)	(45.797)
Observations	1,722	1,722	1,722	1,722	1,722	678	678

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
M: Man / W: Woman. Two separate estimation results are displayed: on weekdays and on weekend days.
Only the key variables are shown. Other control variables are the same as those shown in Table 8.

Table 10: Simultaneous equations model results, using "Index Partner". Only key variables shown.

	Model 1: WEEKDAY					**Model 2: WEEKEND**	
Dependent Variables → Explanatory Variables↓	**Hours of help**	**DW Woman**	**DW Man**	**Work Woman**	**Work Man**	**DW Woman**	**DW Man**
Hours of help		-4.05**	0.42				
		(2.005)	(1.932)				
Education father (years) W	0.16*						
	(0.092)						
Age^2 M	-0.02***						
	(0.006)						
Log hourly wage Man	0.99		-2.76		-4.53		31.24**
	(0.808)		(6.087)		(8.505)		(13.344)
Log hourly wage Woman	2.28***	-33.47***		16.54		-25.67*	
	(0.801)	(8.944)		(10.263)		(14.706)	
INDEX PARTNER *(Ref: = 0)*							
Index Partner = 1	-0.72	-1.37	-0.22	-1.76	-5.41	11.71	35.52**
	(1.052)	(8.621)	(7.319)	(9.432)	(9.844)	(15.863)	(16.490)
Index Partner = 2	-1.28	-14.76*	12.41	-2.36	-30.21**	21.87	54.66***
	(1.441)	(8.932)	(9.871)	(12.733)	(14.402)	(22.622)	(20.291)
Index Partner = 3	-1.97	-29.09**	-8.58	23.15	-18.18	21.38	86.90***
	(1.825)	(12.772)	(14.460)	(16.531)	(14.851)	(33.396)	(28.833)
Constant	-73.44***	298.70***	230.87***	-37.92	34.05	194.60***	-1.57
	(12.907)	(24.289)	(28.601)	(32.246)	(27.847)	(45.829)	(51.024)
Observations	1,722	1,722	1,722	1,722	1,722	678	678

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
M: Man / W: Woman. Two separate estimation results are displayed: on weekdays and on weekend days.
Only the key variables are shown. Other control variables are the same as those shown in Table 8.

Regarding the effects of wages on men's DW, the wage ratio (man/woman) has the expected sign (negative) on weekdays but not on weekends, and is never significant (Table 9). Conversely, the man's wage is found to have an unexpected significant positive impact on DW on weekends (Tables 8 and 10). Interestingly for women, the effect of her own hourly wage during the week is strongly significant and in the expected direction, i.e. negative: about 3 minutes less of DW for a 10% increase in her wage (Table 10). During the weekend, the effect is still negative but slightly less significant. Finally, the higher the man's wage compared to the woman's, the higher is her DW during the week, which corresponds with the efficiency assumption. There is no effect on the weekend. Stancanelli and Stratton (2014) using French (1998-9 Time Use survey) and UK data, and Rizavi and Sofer (2010) using also the older French survey, also find that woman's wage is negatively associated with her DW, while man's DW is never affected by his own wage.

Turning now to the effect of the three indexes of investment in career, we can see a mainly negative impact on men's DW on weekdays of values of the indexes higher than 0, and an always positive impact on men's DW on weekends. The negative impact on weekdays is never significant, while the positive impact on weekends is very often strongly significant with the three indexes. For instance, a man whose wife gets the highest value at "Global Index", makes almost an hour and a half more DW on the weekend than a similar man whose wife gets a value of 0 (a little more than an hour and a half for the highest value of "Index Women"). Also, the impact of "Index Partner" is strongly increasing with the values of this index: from 36 minutes when it takes a value of 1 to an hour and a half when the value is 3. So these results suggest that men's DW is inelastic to the investment in career of their wives on weekdays (although a negative tendency), while men spend more time doing domestic tasks on the weekend when their wives invest in career. Note that Rizavi and Sofer (2010), and Sofer and Thibout (2015, using the same survey as ours), looking at the separate effects of the same kind of binary indicators, without separating weekdays from weekends, find that men's DW is positively associated with the indicators relative to the partner, but not much with those relative to other women.

Looking at the effects of the indexes on women's DW, we find a rather opposite pattern to what was found for men: for weekend days, results are less clear, never significant and with changing signs, but quite often, women tend, as their partners, to do more DW on weekends (this is especially true with "Index Partner"). It is very likely that this small increase compensates partially, the change observed on weekdays: we observe a negative impact of

woman's investment in career on her DW during the week, with an increasing trend (in absolute value) with the values of the indexes, except when "Index Women" is equal to 2. The amplitude of these decreases is lower (in absolute value) than the increases in men's weekend DW, and their level of significance is also a little weaker (and not significant for the lower values of the indexes). For the highest value of "Index Women", the decrease is 35 minutes each weekday for women, while the increase is 94 minutes each weekend day for men (respectively 29 and 87 minutes with "Index Partner"; 53 and 84 minutes for "Global Index"). Despite this stronger sensitivity of men's DW to the investment of their wives, remember that women still perform more DW than men on average, for all the different values of the indexes (Table 7): the increase in men's DW takes place only during the two days of the weekend. Sofer and Thibout (2015) find that woman's DW is negatively associated with each of the dummy indicators relative to other women, but only with an indicator of monthly wage regarding those relative to the partner (all types of days together).

What these results tell us is that when women invest in their careers, this has an impact on both partners' domestic work. First, women who invest more do less DW during the week, compared to women who are not so invested in their careers. Women do not overly compensate during the weekend for the decrease in their DW during the week. Their partners do significantly more but only on weekends. These effects hold for the three indexes, but a continuous trend occurs only with "Index Partner", both for weekday women's and weekend men's DW. To look more deeply at those compensations, we run some OLS estimations of the share of men's total domestic work in the couple, controlling among others for the sum of man's and woman's DW[24]. They show that the man's share of DW on weekdays tends to increase with index values. But this increase is significant only with "Global Index" equal 4, and "Index Partner" equal 2, and we observe even negative coefficients for "Index Women" equal 1 and 3. So on weekdays, though women do gradually less DW as they strongly invest in the labor market, as their partners generally also do (slightly) less DW at the same time, the man's share of DW tends to only slightly increase or remain stable. On weekends, we observe a similar pattern, but in the opposite direction: though men gradually do more DW as their partners invest heavily in career, as career-oriented women generally also do slightly more DW on weekends, the coefficients of the indexes are positive but never significant in OLS estimations of the man's share of DW. It is also interesting to note that Stancanelli and Stratton (2014), looking at the effects of partners' wages, get similar sensitivities for the UK

[24] Complete results upon demand.

regarding the opposition weekday/weekend. Man's DW is positively associated with her wage only on weekends, while her DW is negatively associated with her own wage only on weekdays. For France, they find those effects for all types of days. The UK results still hold true when adding information about preferences regarding domestic tasks (Stratton, 2012).

Looking at the hours of domestic help (external childcare is excluded from this variable) as an explanatory variable, the more the couple makes use of domestic help, the less DW the woman performs during the week. This effect is significant at 1% when using "Global Index" and "Index Women", and at 5% when using "Index Partner". Note that OLS estimations of women's DW, considering the hours of help as exogenous, revealed some insignificant coefficients for this variable. Regarding man's DW in the systems, the parameter for the hours of external help is found to be insignificant. When estimating childcare only using OLS, we found that having external help allows men to spend more time with their children during the weekend, and we observed that their share of childcare is increasing (however, these coefficients are most of the time slightly significant, or insignificant, certainly due to the fact that only 9.2% of couples in our sample pay for domestic help).

Looking now at the equation "Hours of help", we find a positive impact of both man's and woman's log wages, only slightly significant certainly because we also control for indexes of investment. We find a significant increase in the hours of help with "Global Index" and "Index Women", but not necessarily increasing with the value of the index. "Index Partner" has no effect on the hours of help. So women's decrease in DW when they invest more in the workplace compared to other women, is partially compensated by an increase in their husbands' DW during weekends, as we already described, and also partially by an increase in domestic help. In the situation where she invests more than her partner, the decrease in her DW on weekdays is also partly compensated by an increase in his DW on the weekend, but also by a slight increase in her own DW on the weekend, rather than by domestic help.

Now, what drives labor market work time of the partners? We see that the more she invests relative to other women, the longer are men's and women's market work hours (although not always significant), suggesting a positive assortative mating. However, we observe a (rather weak) substitutability of their times when she invests relative to the partner: the man does less market work with the positive values of "Index Partner" and, conversely, she increases (not significantly) her market time with the highest value of "Index Partner". Looking at "Global Index", the higher its value, the more time she spends in the labor market, while there is no impact on her partner's market work time.

Finally, Table 11 presents the estimates of the unrestricted correlations between the errors of the five equations (weekday diaries), and of the correlations between the errors of the two DW equations (weekend diaries), corresponding to the "Global Index" systems. The correlation coefficients between the unobservables of own market work and own DW are significantly negative and large in absolute value for both partners (equal to -0.46 for women; -0.32 for men). The correlations of the errors of own DW and partner's market work equations are insignificant, suggesting no substitution between partners. However, the correlation between the errors of the market work times of the two partners is positive and significant (equal to 0.18), suggesting a positive correlation in partners' preferences for market work, and/or positive assortative mating. Interestingly, the correlation between the errors of DW times of the two partners is positive and significant, both for weekdays and weekend days, while Bloemen and Stancanelli (2014) and Stancanelli and Stratton (2014) found negative correlations on weekdays. So our results suggest a positive correlation in preferences for DW, and/or positive assortative mating, or even shared production time, maybe due to the fact that we consider two-income couples, that are partners whose attachment to the labor market is fairly high. Finally, the correlation of the errors of the hours of help and women's DW equations is positive and significant, suggesting that valuation for domestic outputs is an important component of preferences. The correlations of the errors of the hours of help equation and the other equations of time are not significant. The cross-equation correlations between the unobservables of the systems using "Index Women" and "Index Partner" are identical to "Global Index", with one exception: the correlation between the errors of the hours of help and woman's DW is not significant in the system using "Index Partner". Globally, our results reveal that common couple preferences, or similar productivity in home production and market work, might be important components of the residuals.

Table 11: Estimates of the covariance matrices of the systems using "Global Index": standard deviations and correlation coefficients

		Weekday					Weekend	
		Hours of help	DW Woman	DW Man	Work Woman	Work Man	DW Woman	DW Man
Weekday	Hours of help	1.94***						
	DW Woman	0.17**	4.78***					
	DW Man	-0.05	0.10***	4.62***				
	Work Woman	0.04	-0.46***	0.01	4.83***			
	Work Man	0.00	-0.02	-0.32***	0.18***	4.86***		
Weekend	DW Woman						4.95***	
	DW Man						0.36***	5.01***

* p < 0.1; ** p < 0.05; *** p < 0.01

4.3. Robustness checks

The first sensitivity analyses consist in varying the definition of the indexes of investment in career. We compared the above results with those obtained when including in our indexes "Global Index" and "Index Partner" an indicator for a higher monthly wage of the woman than her partner's, instead of an hourly wage. Indeed, previous sociological literature emphasized the role of woman's contribution to the household income as an important factor, especially regarding the "doing gender" hypothesis[25]. The effects of the indexes on time use are very similar than before. The (small) differences are the following: the decrease in women's DW on weekdays and the increase in men's DW on weekends with indexes values, are slightly more significant, and the coefficients of the indexes in the men's market work equation are now significantly negative, strongly with "Index Partner" and slightly with "Global Index".

We also considered "Global Index" and "Index Women" with two additional indicators of whether the woman works long hours in the labor market compared to other similar women (in terms of education and status). Although these indicators are mechanically endogenous to the allocation of time, one might expect that women spending very long hours working in the

[25] See the introduction for details about the "doing gender" hypothesis.

market, are indeed investing a lot in their professional life[26]. The effects of the indexes remain globally similar. We can notice that the impact of "Index Women" on women's DW on weekdays is slightly stronger than with our main definition of this index, and the effects of both indexes on men's DW are slightly weaker than before. We also observe a strong increase in men's and women's market work with "Index Women", which is not surprising (especially for women) given that in the latter definition this index includes a market work time component.

So our main conclusions remain similar when considering these different definitions of the indexes. Another sensitivity check consisted in estimating a system incorporating both "Index Women" and "Index Partner" in all the equations. Indeed, they represent different types of investment, even if they might be much correlated in practice. We observe in this case that "Index Women" has a significantly positive effect on the hours of help bought by the couple, while "Index Partner" is insignificant, which confirms our previous results. Interestingly, the effects of both indexes on women's DW during weekdays are very similar than before, with the impacts of "Index Partner" even stronger. On weekends, the positive impacts of both indexes on men's DW still hold, but they are weaker than previous results that considered them separately. These findings show that both types of investment exert distinct effects on the amount of time that women devote to DW, and once controlling for the degree of their investments in career compared to other women, their professional situations compared to their partners' matter even more. On the contrary, the effects of both indexes on men's DW overlap, such that once controlling for one type of investment, the other type matters to a lesser extent.

We also re-estimated the weekend systems by adding two equations for labor market work time, using the question about the declared (official) hours of work. The effects of the indexes on weekend DW of men and women are very similar than previous results considering a system with the DW equations only. The effects of the indexes on declared working time do not present clear patterns, and are most of the time insignificant.

Finally, we disaggregated the DW activities (cooking, doing crafts, basic childcare etc.). The decrease in women's DW on weekdays and the increase for men on weekends with indexes values, are not due to specific activities that women would leave more and men would perform more. We observe instead some global variations in all the different activities,

[26] Market hours could also reflect a (more or less chosen) constraint. Some women might also need to work more because of a low income.

meaning that there is no gendered specialization in the type of tasks when women invest heavily in their careers.

5. Conclusion

In this paper, we first build some indexes of women's investment in the labor market, using several factors that may reflect the fact that a woman strongly invests in her career. Women can, alternatively or simultaneously, have a higher wage rate than a reference group of other women of similar characteristics, as education or occupational status, or have a higher occupational status than women with the same level of education. A second reference that we chose is the partner, considering women who have a higher education level, a higher hourly wage and/or a higher occupational status than their partners. We then build three indexes. The first one represents the intensity of women's investment in career in comparison with other similar women only, and the second index only considers the investment of the woman compared to her partner. Finally, we build a third index gathering all these aspects of women's investment in the labor market.

Our results show that, total domestic work is highly sensitive to women's investment in career: we find that, with the three definitions of investment, women who invest more spend less time doing domestic work during weekdays, compared to similar women who do not invest as much, and the more they invest, the less the amount of domestic work they perform. The domestic work that they do not assume during the week is partly compensated for by their partners on weekends: man's domestic work significantly increases during the weekend with the investment of his wife, as measured by any of our indexes. The decrease in women's domestic work on weekdays is also compensated for (very slightly) by themselves on the weekend, when they invest more than their partners, and by using domestic help more often when they invest heavily compared to other women. But overall, the total amount of domestic work is still higher for women than for men on average. The decrease in women's domestic work on weekdays and the increase in men's domestic work on weekends with indexes values, imply as a result an increase in the man's share of domestic work on both types of day. But these increases are small and not always significant, first because his own amount of domestic work is also slightly decreasing on weekdays and her domestic work is slightly increasing on weekends with indexes values, though these variations are not significant.

All in all, the sharing of domestic work within couples where women invest heavily in their careers, is finally more egalitarian than that of average couples. However, the trend towards equality for higher values of the indexes is only a trend and equality itself is not reached on average, even for the highest value of the indexes. Still less can we observe a role reversal. Hence, though we do find some efficiency effects, such as a positive effect of his relative wage compared to hers on her weekday domestic work, our results do not support the efficiency or cost minimisation assumption, usually made in theoretical approaches in family economics. However, as women who invest heavily do less domestic work rather than more, and as their partners do more domestic work rather than less, the so called "doing gender" phenomenon is not confirmed for France either (which is especially true when they outperform their partners in the labor market).

These results no doubt raise theoretical questions: must efficiency as the basis for household behavior really be totally abandoned, or is it only the simplest model implying separability between consumption and production spheres which is seriously called into question? There are some promising developments, such as models including social norms (Akerlof and Kranton, 2000; Cudeville and Recoules, 2015) or gender stereotypes about abilities in domestic production (Sofer and Thibout, 2011), which could be further developed and helping to answer this question.

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Database

Emploi du temps - 2010 - (2010) [fichier électronique], INSEE [producteur], Centre Maurice Halbwachs (CMH) [diffuseur]
Time use survey - 2010 - (2010) [Electronic file], INSEE [producer], Centre Maurice Halbwachs (CMH) [broadcaster]

APPENDIX

Appendix 1: Description of domestic work activities

The different domestic tasks recorded, which today correspond to international standards in the now very many Time Use surveys in the world, are described here.
"Pure" household work includes all activities around:

- food and drink: preparation (cutting, peeling, cooking), presentation (setting the table, serving the meal), kitchen clean-up (doing the dishes)
- housework: cleaning and storing (interior or exterior), clothes activities (laundry, hanging out, ironing, sewing, storing, knitting)
- Maintenance, repairing of house and vehicles, water and heating upkeep, gardening
- household management: account, administrative mail, using administrative services
- shopping
- care for animals and pets
- care for household adults

Childcare activities:

- physical and medical care
- other: kisses, hugs, reprimand
- playing and instruction, homework help, reading, talking with and listening to children
- picking up/dropping off children

Appendix 2: Administration of the time use diaries in the French Time Use survey (2010)

If respondents had answered a special questionnaire called "Couple Decision-Making Module[27]", they filled only one time use booklet (day selected at random). If they did not answer the module, they filled two booklets (one on a weekday, the other on a weekend day). The special module was administered in this way. In the first two waves, one couple out of two was selected at random, and if the couple met the conditions (partners live together for at least one year; neither of the two is a student; and at most one of them is retired), they could answer the module if they agreed. No other couple could answer the module. In wave 3, the module was offered to all couples meeting the above conditions, such that only those who refused did not answer it. From wave 4 to 6, the module was again offered to all couples meeting the conditions, and who further did not belong to a specific sample answering a questionnaire about life quality.

To avoid any selection bias between people answering or not answering the module, we use only the first time use booklet in our analyses. As such, our sample contains couples who may have, or not, answered the module.

[27] We do not use the "Couple Decision-Making Module" in our analysis.