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Revealing gender gap changes in home production and labor income in Uruguay

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Resumen

Una vasta literatura internacional provee evidencia del rol fundamental de las mujeres en las actividades del hogar así como también de la tendencia de largo plazo de la redistribución de tiempo hacia una división de trabajo más igualitaria en términos de género. Nuestro objetivo es estudiar los cambios en las brechas de género en la producción del hogar y mercado de trabajo en Uruguay entre 2006 y 2013. Nuestras principales conclusiones son: i) las brechas de género medidas por el tiempo destinado al mercado laboral y a la producción del hogar se redujeron, ii) las mujeres aumentaron el tiempo dedicado al mercado laboral y redujeron mínimamente el tiempo dedicado a la producción del hogar, mientras que lo opuesto se observa para los varones, iii) tanto mujeres como varones aumentaron el tiempo dedicado al cuidado de niños lo cual dio como resultado una brecha de género estable; iv) tanto mujeres como varones disminuyeron el tiempo dedicado a otras actividades del hogar, reduciendo la brecha de género, v) esta menor desigual división del tiempo es también capturada cuando las brechas de género se miden en términos monetarios, aunque los movimientos en los precios de producción del hogar no contribuyeron a reducir las brechas de género.

Palabras clave: producción del hogar, mercado de trabajo, brechas de género.

Abstract

A vast international literature provides evidence of the key role of women in household activities as well as a long-term trend of time reallocation towards a more egalitarian gender division of work. Our objective is to study changes in gender gaps in home production and the labor market in Uruguay between 2006 and 2013. Our main conclusions are: i) the gender gaps for time spent in the labor market and home production decreased; ii) women increased time allocated to labor market and slightly reduced time in home production whereas the opposite is observed for men; iii) both women and men increased time allocated to childcare which results in a stable gender gap; iv) both women and men decreased time spent in other household activities, narrowing the gender gap; v) this less unequal division of time is also captured when gender gaps are measured in monetary terms, although movement in home production prices did not contribute to reduced gender gaps.

Keywords: home production, labor market, gender gap.

JEL: D13, J16

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1. INTRODUCTION

A vast literature provides evidence of the key role of women in household activities, as well as a tendency in recent decades toward reduced time spent by women in home production and also significant growth in their participation in the labor market. As a result, there has been a trend towards a less unequal division of time. The aim of this work is to analyze the change in the gender gap in home production and the labor market in Uruguay, between 2006 and 2013.

In the Latin American context, Uruguay is an interesting case study. It was one of the first countries in the region to complete this first demographic transition. Nowadays, it has a low fertility rate and an ageing population structure, and is currently experiencing the second transition (Pellegrino 2013). In recent decades, there has been a postponement in the average age of starting a family, an increase in the divorce rate and cohabitation without marriage, and a change in household composition (Cabella 2007). Besides, the participation of Uruguayan women has steadily increased in the labor market, and is above average for developing countries. The social protection system has been traditionally characterized by the universal coverage of public services (education, health and pensions) initiated early in the Latin American comparison. More recently, a policy objective has been to create a national care system that alleviates women's care activities.

To study the changes in gender gaps, we use data provided by the National Transfer Accounts (NTA) and the National Time Transfer Accounts (NTTA) systems. These systems give information on pre-tax labor income and home production (valued by the specialist replacement cost method) by age and gender. As data are expressed in Uruguayan pesos, we analyze the changes in constant 2011 international dollars to avoid the effect of inflation on the measures. Changes in monetary units are the result of changes in time and/or prices. Although we do not aim to measure the effect of each of these two factors, we discuss their importance in explaining the gender gap changes.

2. DATA AND METHOD

The NTA system provides estimates of the values of goods and services produced and consumed in a year at each age, and the economic flows among ages (generations) that sustain consumption throughout the life cycle. The estimates are built using surveys and administrative data, and are consistent with the macro values provided by the National

Account System and official population data (UNPD, 2013). The available estimates from the Uruguayan NTA system for 2006 and 2013 which provide labor income by age, both in per capita units and aggregate values (<http://www.ntaccounts.org/web/nta/show>). Labor income includes earnings, taxes and contributions paid by employees and employers, and the labor share of mixed income.

For the purpose of the present work we estimate labor income by age for men and women separately, following the guidelines compiled by UNDP (2013). We calculate the aggregate and per capita labor income by gender and age as:

$$VA_{a,g} = \frac{VPC_{a,g}^{UHS} * P_{a,g}^{UHS}}{\sum_g VPC_{a,g}^{UHS} * P_{a,g}^{UHS}} * VA_a$$

$$VPC_{a,g} = \frac{VA_{a,g}}{P_{a,g}}$$

where a is age, g is gender, $P_{a,g}$ is the official population projection (*Instituto Nacional de Estadística*, 2017) and VA_a (VPC_a) is the aggregate (per capita) value of labor income by age reported by the NTA system. $VPC_{a,g}^{UHS}$ and $P_{a,g}^{UHS}$ denote the average values of labor income and population by age and gender calculated using the Uruguayan Household Survey (*Instituto Nacional de Estadística*, 2006 and 2013a). We can then obtain estimates by gender consistent with the labor income estimates provided by the NTA system.

Following a similar procedure, we also estimate time spent in the labor market in hours and its price (labor income per hour).

The NTTA system provides information about home production and consumption by age and sex in time and monetary units based on Time Use Surveys (Donehower, 2014). Home production is defined as non-remunerated activities that meet the “third party” criterion (Reid, 1934), including the following activities: cleaning, laundry, cooking, childcare, eldercare and other care, household purchases, home maintenance, gardening, pets care, home management and transport of household members. They are valued following the replacement cost method which only includes labor income paid to wage earners; as with the NTA, the price of each activity includes taxes and contributions paid by employers and employees.

Two Use of Time Surveys were carried out in Uruguay: in September 2007 and May-July 2013 (*Instituto Nacional de Estadística*, 2007 and 2013b). We use them to obtain NTTA estimates, using wages of 2006 and 2013 based on the same Household Surveys used in the

NTA estimates (*Instituto Nacional de Estadística*, 2006 and 2013a). We use these estimates as data of 2006 and 2013 NTTA system.

3. MACROECONOMIC OVERVIEW

After a severe crisis at the beginning of the millennium, the Uruguayan economy experienced a prolonged period of expansion from 2004 to the present. Between 2006 and 2013, GDP grew at an average annual rate of 6.6%. Income inequality declined, moderate poverty measured by the headcount ratio fell from 32.5% in 2006 to 11.5% in 2013 and extreme poverty practically disappeared (declining from 2.5% to 0.5% in the same period). The improved macroeconomic performance was also reflected in an inflation rate that was stable and low in historical terms for Uruguay (6.4% in 2006 and 8.5% in 2013). Meanwhile, the exchange rate decreased from 24 pesos to the USD to 20 pesos to the USD affecting relative prices with abroad. In the labor market, the unemployment rate declined from 10.8% to 6.5% whereas real wages increased at an average annual rate of 4.9%. In addition, informality (measured as the proportion of employed person who are not contributors to the social security system) declines from 34% in 2006 to 25% in 2013. In terms of PPP (constant 2011 international dollars), per capita GDP increased from 13,377 in 2006 to 19,090 in 2013 (see Table 1). Our estimates indicate that per capita home production rose even more than GDP, from PPP US\$ 3,556 to 6,116. In other words, home production was 26% and 32% of GDP, in 2006 and 2013 respectively.

Table 1. Per capita GDP, home production and labor income. Uruguay, 2006 and 2013.

Variables	2006	2013	Annual change (%)
<i>PPP (constant 2011 international dollars)</i>			
Per capita GDP	13,377	19,090	5.2
Per capita annual home production	3,556	6,116	8.1
Per capita annual labor income	6,337	9,222	5.5
Ratio home production / labor income	0.561	0.663	2.4
<i>Hours per week</i>			
Per capita time in home production	18.5	19.2	0.5
Per capita time in labor market	18.4	19.7	1.0
Ratio home production / labor market	1.005	0.974	-0.5

Source: Authors' estimations based on the following sources: *Instituto Nacional de Estadística* (2006, 2007, 2013a, 2013b and 2017), Banco Central del Uruguay <https://www.bcu.gub.uy/Estadisticas-e-Indicadores/Cuentas%20Nacionales/presentacion05.htm>, World Bank <https://data.worldbank.org/indicator/PA.NUS.PPP>

The rise of home production as a share of GDP is associated with price changes and should be interpreted carefully. As shown in Table 1, the annual increase in the proportion of time spent in home production was just 0.5%, a figure well below the 8.1% rate of increase in monetary terms. This difference is due to the above mentioned rise in wages (recall that we are using the replacement cost method to value home production). A sensitivity analysis for valuation of home production by quantity and price would improve the understanding of the change in the home production-to-GDP ratio, but is outside of the scope of this study.

Per capita labor income increased from PPP US\$ 6,337 in 2006 to 9,222, that is, at a slower rate than home production (5.5%). Indeed, the home production / labor income ratio passed from 0.56 to 0.66. But once again, prices played a role in this change: when calculated in hours, the ratio decreased slightly (by 0.5%). This different pattern is explained by the decline in wage inequality since home production is mostly comprised of low-wage activities.

In Table 2 we show the average per capita home production and labor income among the population over the age of 13, which is the group whose activities are asked about. We present information for women and men separately. As expected, home production is mainly performed by females whereas males account for most of labor income. Indeed in both years the female share of work was around 70% of home production and one-third of labor income. However, the gender gaps measured as the difference between female and male outcomes a percentage of male outcomes declined from 133% to 127 % in home production and from -56 % to -47% in labor income.

We also report the average weekly hours spent in home production and in the labor market for the population over the age of 13. We find that gender gaps declined too: women spent less time in household activities but more time in the labor market in 2013 than in 2006, whereas the reallocations were in the opposite direction among men.

Table 2. Average home production and labor income for the population over age 13.
Uruguay, 2006 and 2013.

Variables	2006	2013	Annual change (%)
<i>PPP (constant 2011 international dollars)</i>			
Per capita annual home production	4,556	7,633	7.6
Female	6,258	10,409	7.5
Male	2,681	4,582	8.0
Gender gap (%)	133	127	-0.7
Per capita annual labor income	8,121	11,509	5.1
Female	5,022	8,083	7.0
Male	11,533	15,273	4.1
Gender gap (%)	-56	-47	-2.6
<i>Hours per week</i>			
Per capita time in home production	23.7	23.9	0.1
Female	33.7	32.9	-0.3
Male	12.7	14.1	1.5
Per capita time in labor market	23.5	24.6	0.6
Female	16.4	18.5	1.8
Male	31.5	31.2	-0.1

Source: Authors' estimations based on the following sources: *Instituto Nacional de Estadística* (2006, 2007, 2013a, 2013b and 2017), Banco Central del Uruguay <https://www.bcu.gub.uy/Estadisticas-e-Indicadores/Cuentas%20Nacionales/presentacion05.htm>, World Bank <https://data.worldbank.org/indicator/PA.NUS.PPP>

Note: The gender gap is calculated as the difference between female and male home production (labor income) as a percentage of male home production (labor market)

4. LABOR INCOME GENDER GAP

Labor income gender gap by age

We can see the per capita labor income by age and sex for 2006 and 2013 in Figure 1.

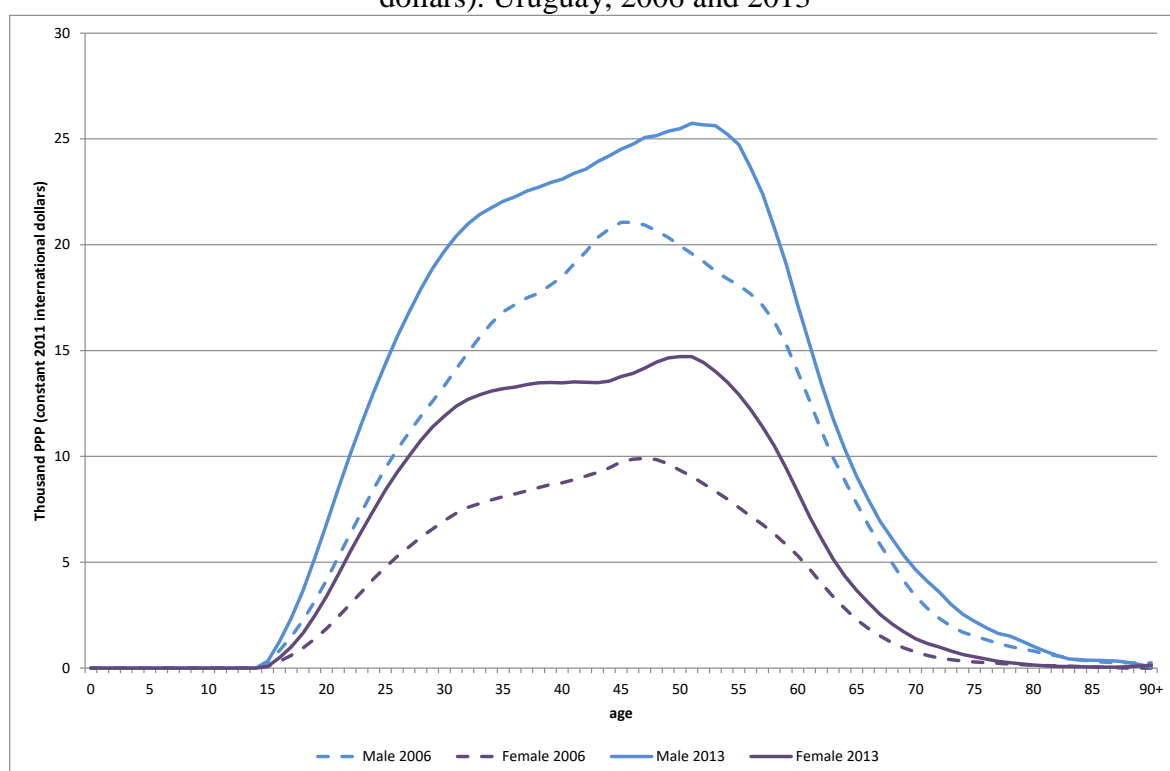
Since people who do not work have zero income, the curves are bell-shaped reflecting that the income generation is concentrated among middle-aged women and men. The comparison of the profiles between years shows a rise of real wages in the period. Also, between 2006 and 2013 the peaks of per capita labor income shifted to the right for both sexes: the highest values were for ages 44-50 in 2006 and the 50-54 age group in 2013. The slightly older age of the maximum point is a follow-up of a shift already observed when comparing average NTA estimations of 1994 and 2006 (Bucheli et al., 2010).

Among the possible explanations, we can mention the postponement of the retirement age that has been documented by Álvarez et al. (2010).

In both years labor income was higher for men than women at all ages. However, the gender gap decreased between 2006 and 2013 at all ages as can be seen in Figure 2.

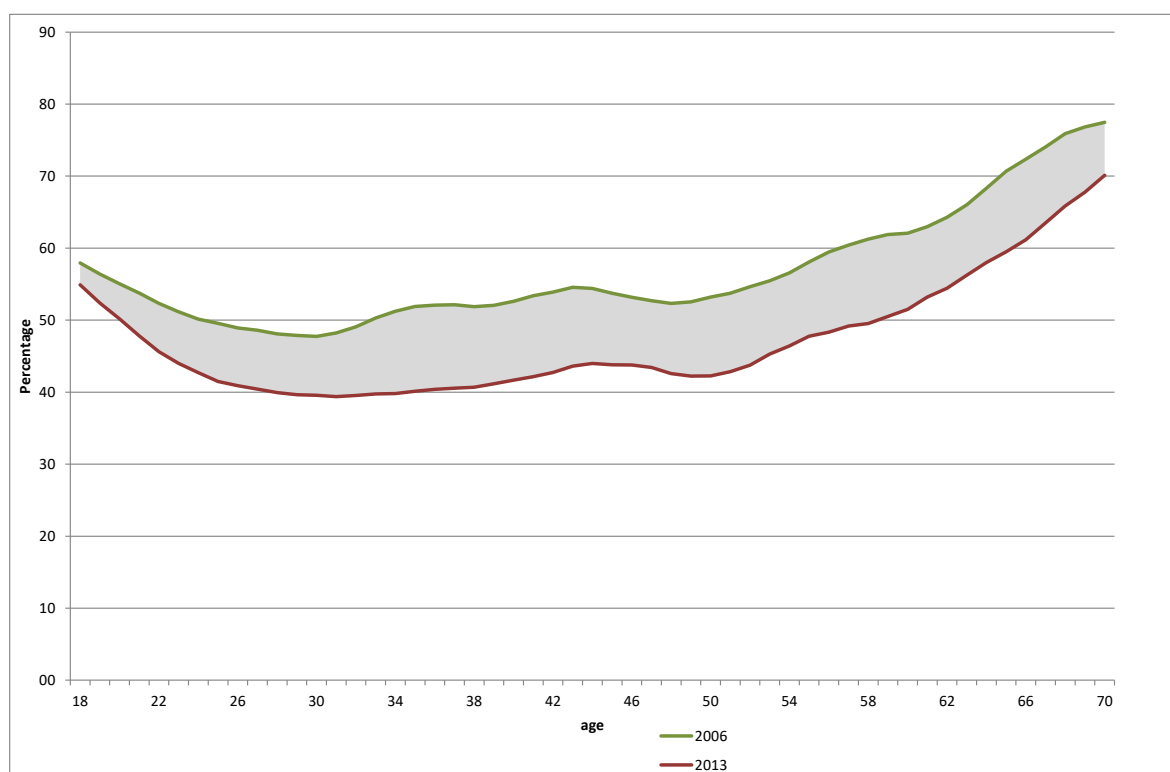
Among the population over the age of 13, the difference between male and female labor income went from 56% of male labor income in 2006 to 47% in 2013. On average for the 24-55 age-group –which covers most of working life– it declined from 52% to 42%.

Figure 1. Average annual labor income by age and sex (PPP constant 2011 international dollars). Uruguay, 2006 and 2013



Source: Authors' estimations based on *Instituto Nacional de Estadística* (2006, 2013a and 2017)

Figure 2. Gender labor income gap by age, Uruguay, 2006 and 2013



Source: Authors' estimations based on *Instituto Nacional de Estadística* (2006, 2013a and 2017)

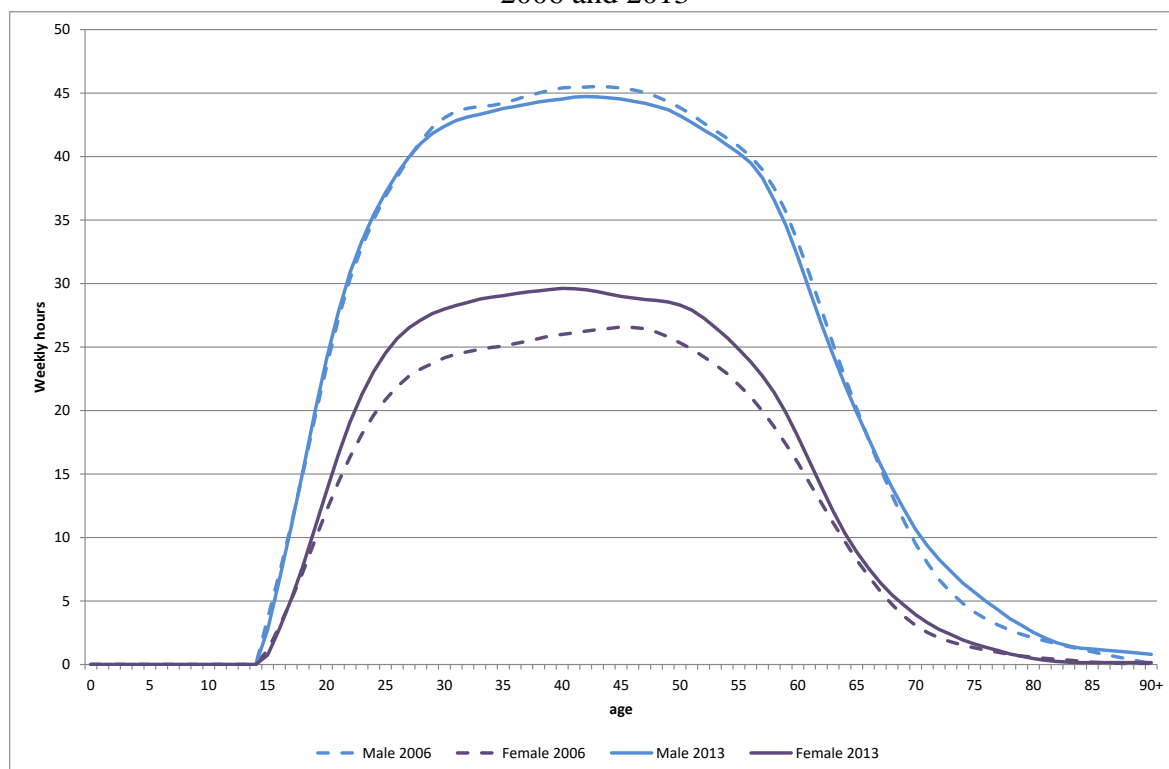
Note: The gender gap by age is equal to the difference between male and female labor income measured as a percentage of male labor income, at each age.

The reduction of the labor income gender gap is the result of two forces: a relative increase in time spent in the labor market by females and a decrease in the gender gap in hourly earnings. We analyze and discuss the role of these factors in the next subsections.

Time spent in the labor market

Weekly average worked hours were higher for men than women in both 2006 and 2013 as illustrated in Figure 3. The most important feature reflected in the age profiles is that there is a reduction of the gender gap as a result of an increase of women's involvement in the labor market and a stable behavior of men. Considering the population over 13 years of age, per capita female time spent in the labor market increased from 16.4 to 18.5 hours per week whereas male time in the labor market averaged 31.3 hours. The gender gap declined by 2.4 hours per week on average; if we restrict ourselves to the 20-59 age group, when participation rates are at their highest values, the fall is 3.6 hours per week.

Figure 3. Average time spent in the labor market by age and sex (weekly hours). Uruguay, 2006 and 2013



Source: Authors' estimates based on *Instituto Nacional de Estadística* (2006, 2013a and 2017).

The increase in women's time in the labor market may be due to an increase in their participation (extensive margin) and/or due to an increase in the hours worked by

employed women (intensive margin). To better understand the role played by these factors, we report labor outcomes in Table 3.

Table 3. Labor market indicators by age groups and sex. Uruguay, 2006 and 2013

Variables	2006			2013			Change in gender gap
	Male	Female	Gender gap	Male	Female	Gender gap	
Per capita weekly hours							
Population over 13	31.5	16.4	15.1	31.2	18.5	12.7	-2.4
20-59 age-group	41.0	23.1	17.9	40.5	26.3	14.2	-3.6
Employment rate (%)							
Population over 13	68.1	44.4	23.7	70.3	49.9	20.4	-3.3
20-59 age-group	86.6	61.8	24.8	89.0	69.5	19.6	-5.2
Participation rate (%)							
Population over 13	74.0	51.7	22.3	73.9	54.3	19.6	-2.7
20-59 age-group	92.8	71.4	21.5	92.8	75.1	17.8	-3.7
Unemployment rate (%)							
Population over 13	9.7	15.3	-5.6	5.7	9.3	-3.6	2.0
20-59 age-group	7.1	13.9	-6.8	4.4	7.9	-3.5	3.3
Per capita weekly hours (employed)							
Population over 13	43.2	34.3	8.9	40.9	32.5	8.4	-0.4
20-59 age-group	47.0	37.1	9.9	45.1	36.9	8.3	-1.7

Source: Authors' estimations based on *Instituto Nacional de Estadística* (2006, 2013a and 2017).

Note: The variables are estimated following the general NTA procedures in order to be consistent with population projections by age and sex, and labor income estimates.

The overall picture for 2006 and 2013 indicates that men were more likely to be employed than women as a result of the combination of being more likely to participate in the labor market and being less affected by unemployment. Moreover, employed men worked more hours on average than employed women. Thus, both extensive and intensive margins contributed to the existence of a gender gap. But as we mentioned, the gender gap of time spent in the labor market declined. This decrease is mostly explained by an increase in the female participation rate from 52% in 2006 to 54% in 2013 (from 71% to 75% for the 20-59 age-group) whereas male participation did not change. This change was stronger when considering employment rate because of the unemployment fall, which attained both women and men. On the other hand, the intensive margin did not play a role in reducing the gender gap: both women and men who were working reduced their working hours, and the gender gap for this statistic did not change much over the period (although it declined slightly for the 20-59 age group). The analysis of weekly working hours and the labor

market participation rate in the years between 2006 and 2013 suggests that these changes resulted from a converging trend during the period.

Hourly labor income

Men benefit from higher hourly wages than women when controlling for productive attributes as documented in several studies on gender discrimination in the Uruguayan labor market (Amarante and Espino, 2004; Bucheli and Sanromán, 2005; Espino, 2013; Espino, Salvador and Azar, 2014). According to these works, the measures of discrimination have been stable over the last two decades, increase with years of schooling, and indicate evidence of a glass ceiling phenomena for the most educated women. Women also face occupational segregation. According to Espino et al. (2014), the level of segregation has been stable and higher for the less educated women compared to more highly educated ones.

These findings are based on wages net of taxes and contributions, and in some cases only on private wages. In Table 4 we report the gender gap using the NTA system variable, that is, considering gross hourly labor income of wage earners and the self-employed. The gender gap was on average 2011 PPP US\$ 1.2 in 2006, equivalent to 16% of male labor income. As the income of women increases by more than that of men, the gap declined to 2011 PPP US\$ 1.0 (11% of male labor income) in 2013. We also present the gender gap of income after subtracting contributions and taxes. The conclusion is the same: the gender gap decreased. Thus, the hourly gap contributed to the decline of the overall gender labor income gap registered in 2006 and 2013. However, the above mentioned evidence suggests that this fall in the hourly earnings gender gap is not part of a broader trend.

Table 4. Hourly labor income by sex. Uruguay, 2006 and 2013

Variables	2006			2013		
	Male	Female	Gender gap as a percentage of males	Male	Female	Gender gap as a percentage of males
NTA labor income						
All workers	7.3	6.1	16.2	9.7	8.7	10.8
25-59 age-group	7.4	6.2	15.9	10.0	8.8	11.3
Labor income less contributions						
All workers	6.2	5.2	16.1	7.8	6.8	11.9
25-59 age-group	6.3	5.3	15.7	8.0	7.0	12.3
Labor income less contributions and taxes on labor						
All workers	6.1	5.1	16.4	7.3	6.5	10.6
25-59 age-group	6.2	5.2	15.9	7.5	6.6	11.1

Source: Authors' estimations *Instituto Nacional de Estadística* (2006, 2013a and 2017)

Notes: The gender gap is equal to the difference between male and female labor income measured as a percentage of male labor income.

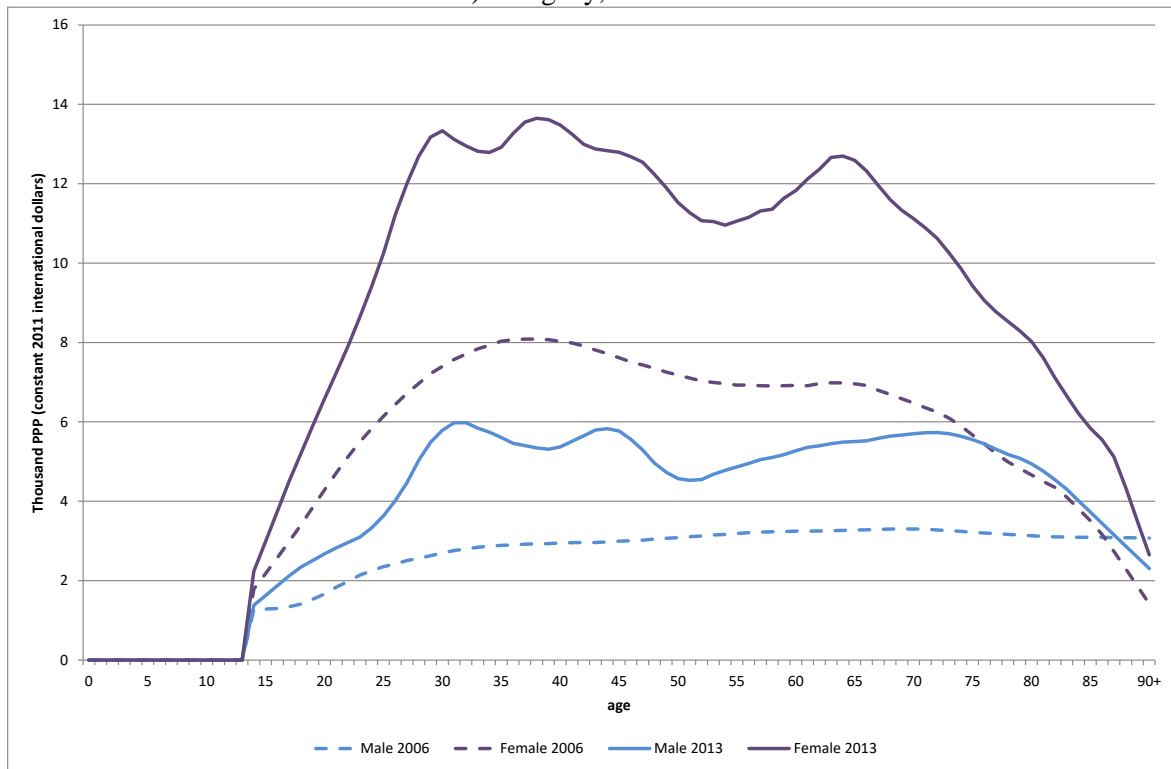
5. HOME PRODUCTION GENDER GAP

Home production gender gap by age

In Figure 6 we show the average per capita home production by age and sex in 2006 and 2013. The age profiles are similar in both years and are common to other countries: home production of both women and men increases at young ages, reaches a plateau at reproductive ages, and then decreases. Moreover, female home production is higher at all ages than male production, a tendency that is observed worldwide (Jiménez-Fontana, 2014 and 2016; Renteria et al., 2016; Sambt et al., 2016; Zagheni and Zannella, 2013; Zagheni et al., 2015).

In Figure 6 we can see that both male and female home production increased across all ages. The increase in average male home production surpassed that of females: as shown in Table 5, the average gender gap decreased from 133% of male home production in 2006 to 127% in 2013. We also present the gender gap by age group. We can see that the reduction in the gender gap is linked to changes in the 30-49 age group. This is the stage of life in which most individuals start their families and spend more time taking care of children.

Figure 6. Average annual home production by age and sex (PPP constant 2011 international dollars). Uruguay, 2006 and 2013.



Source: Authors' estimations based on *Instituto Nacional de Estadística* (2006, 2007, 2013a, 2013b and 2017).

Table 5. Average gender gap in home production as a percentage of male home production, by age group. Uruguay, 2006 and 2013.

	2006	2013	Difference 2006-2013
Population over age 13	133.5	127.2	-6.3
14-19	105.8	107.6	1.8
20-29	164.3	164.7	0.4
30-39	176.2	133.7	-42.4
40-49	156.1	134.2	-21.9
50-59	120.7	133.5	12.8
60 +	77.0	87.7	10.6

Source: Authors' estimations based on *Instituto Nacional de Estadística* (2006, 2007, 2013a, 2013b and 2017)

Note: The gender gap is equal to the difference between male and female home production measured as a percentage of male home production. The values were multiplied by (-1) to improve their visual presentation.

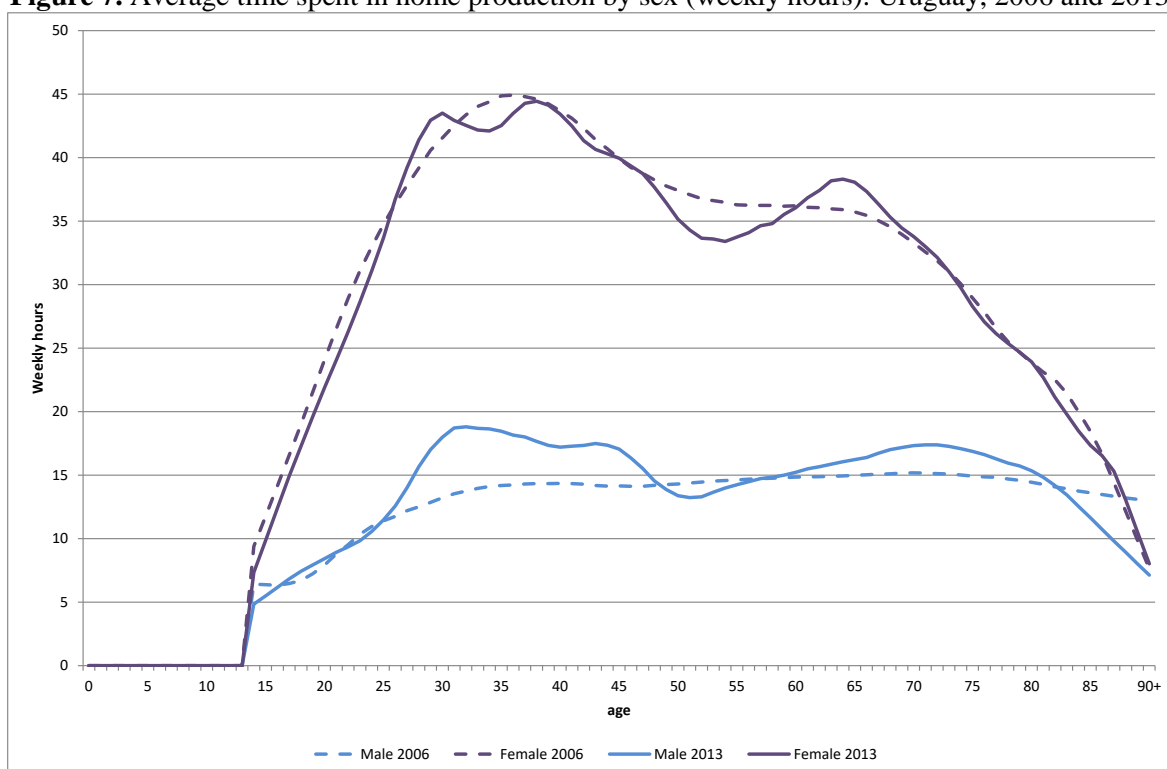
The decrease in the gender gap is the result of two effects: i) a change in time spent by males and females in home production, and ii) a change in the implicit price of home production activities. We explore the role of these variables in the next subsections.

Time spent in home production

In Figure 7 we present the average weekly hours spent in home production by age and sex. The overall picture looks very different from Figure 6: we interpret that most of the above mentioned increase of home production came mainly from changes in prices rather than quantities.

The patterns by age were similar in 2006 and 2013. However, in the case of men we see an increase in time spent in home production across some range of ages.

Figure 7. Average time spent in home production by sex (weekly hours). Uruguay, 2006 and 2013.



Source: Authors' estimates based on *Instituto Nacional de Estadística* (2007, 2013b and 2017).

In Table 6 we show the gender differences for the population over the age of 13. The average gap dropped from 21 hours per week in 2006 to 18.8 in 2013. This was the result of an increase in men's time in household activities accompanied by a slight decline in women's time. In the rest of the rows of Table 6 we report the estimations of time and gender gaps by age group. Between 2006 and 2013, the gender difference decreased for all groups and most especially so at ages 30-49. Male time spent in home production increased from 14 hours per week to 18 for the 30-39 age group and to 16 for the 40-49 age group whereas female time remained at 40/43 hours.

Table 6. Time spent in home production by age group and sex (average hours per week). Uruguay, 2006 and 2013

	2006			2013			Change in gender gap
	Male	Female	Gender gap	Male	Female	Gender gap	
Pop. over age 13	12.7	33.7	21.0	14.1	32.9	18.8	-2.2
14-19	6.6	15.4	8.8	6.4	13.6	7.1	-1.6
20-29	10.8	33.3	22.5	11.7	32.4	20.7	-1.7
30-39	14.0	43.9	29.9	18.2	43.2	24.9	-5.0
40-49	14.2	40.5	26.3	16.4	40.1	23.6	-2.7
50-59	14.6	36.6	22.0	14.0	34.3	20.2	-1.8
60 +	14.8	29.5	14.7	15.7	29.7	14.0	-0.7

Source: Authors' estimates based on *Instituto Nacional de Estadística* (2007, 2013b and 2107).

To analyze the sources of this reduction we report the gender gap by task in Table 7. The reduction of the gender gap came from changes in time spent in basic chores (cooking, laundry and cleaning). Both men and women devoted less time to basic chores in 2013 than in 2006, but the change was more pronounced for women than for men: 3 for the former and 0.7 hours for the latter. Contrary to this result, both men and women increased their time spent in childcare by 1.1 hours per week, so the gender gap in this task remained the same. We can also see a sharp increase in time assigned to care given to other than children, but a modification to the questionnaire makes this result hard to interpret: indeed, in 2006 a broad question inquired about “other care” but in 2013 the survey introduced specific questions about time devoted to taking care of disabled persons and the elderly.

Table 7. Time spent in home production, childcare and other activities by sex (hours per week).

Uruguay, 2006 and 2013

Household activity	2006			2013			Change in gender gap
	Male	Female	Gender gap	Male	Female	Gender gap	
Total	12.7	33.7	21.0	14.1	32.9	18.8	-2.2
Childcare	2.4	6.2	3.8	3.5	7.3	3.8	0.0
Other care	0.4	1.0	0.6	1.5	2.3	0.8	0.2
Laundry	0.7	3.7	3.0	0.4	2.9	2.4	-0.6
Cooking	3.2	10.5	7.3	3.0	9.2	6.2	-1.0
Cleaning	1.6	7.9	6.3	1.4	6.9	5.5	-0.7
Maintenance	2.0	1.5	-0.6	1.9	1.4	-0.5	0.0
Management	2.5	3.0	0.5	2.3	2.9	0.5	0.0

Source: Authors' estimations based on *Instituto Nacional de Estadística* (2007, 2013b and 2017).

Note: Management includes purchases of goods and services for the household and household management; maintenance includes home repairs, gardening and pet care; other activities include care for non-children household members and home production directed to other households.

Implicit price of home production

To analyze the effect of prices on the change in the gender gap we estimate the implicit price of home production, which is home production divided by the time spent in home production. In Table 8 we report the estimated implicit price by task in 2006 normalized by the price of childcare and their change between 2006 and 2013.¹

In 2006 men devoted more time than women to the most expensive activities. Indeed, women assigned more time than men to childcare and basic chores (tasks related to low-wage activities) whereas men assigned more time than women to management and maintenance (high-wage activities). The pattern is similar in 2013. The division of housework activities thus contributed to an increase in the home production gender gap. Between 2006 and 2013, the prices of childcare and basic chores increased at a higher rate than maintenance and management prices. This is consistent with the decline in wage inequality that characterized the period under analysis. Consequently, although the home production gender gap decreased, the evolution of prices did not contribute to this change. On the contrary, prices had the effect of broadening the gender gap, which was more than offset by changes in the number of hours.

¹ The valuation method is based on tasks and prices at a more disaggregated level than the reported estimates.

Table 8. Distribution of time spent in home production and implicit prices of task (base = childcare 2006). Uruguay, 2006 and 2013.

Household activity	Implicit price 2006 (childcare = 100)	Implicit price, change 2006-2013 (%)	Distribution of time spent in home production (%)			
			2006		2013	
			Male	Female	Male	Female
Total	192.4	65.9	100.0	100.0	100.0	100.0
Childcare	100.0	69.6	18.9	18.3	24.8	22.2
Other care	171.3	14.4	3.2	3.1	10.3	6.9
Laundry	126.0	69.6	5.4	11.0	3.2	8.7
Cooking	129.3	88.7	25.4	31.2	21.2	28.1
Cleaning	125.5	96.5	12.7	23.4	9.8	21.0
Maintenance	179.8	40.8	15.9	4.3	13.4	4.2
Management	206.5	38.0	19.7	9.0	16.4	8.7

Source: Authors' estimations based on *Instituto Nacional de Estadística* (2006 and 2013).

Notes: a. Maintenance includes home repairs, gardening and pet care; other activities include care towards other non-children household members and home production directed to other households. b. In the distribution of time, totals may not correspond to the sum of all figures shown due to rounding.

6. DISCUSSION

The above analysis shows that the gender gap in home production and the labor market declined between 2006 and 2013. When decomposing this change between quantities and prices (using an accounting approach that does not account for issues such as behavioral responses and general equilibrium) we find that prices contribute to this reduction in the labor market gender gap, although probably not in the context of a long term reduction, but did not in home production where prices had the effect of widening the gap (and not narrowing it). Unambiguously, the decline of the gender gap came from changes in the use of time. In the labor market, the main changes were an increase in female participation and a decline in male working hours. In contrast, male time spent in household activities increased whereas female time slightly decreased. These changes in home production are comprised of two different movements. On the one hand, both women and men increased their time allocated to childcare in such a way that the gender gap in this activity remained stable. On the other hand, both reduced their time spent in other home production; as the reduction was larger for women than for men, the gender gap in these activities rose. Theoretical and empirical literature proposes several arguments to explain changes in allocation of time. In this section we briefly review some of these arguments and discuss their suitability to explain our findings.

Wages and time allocation

The basic labor supply model is based on the time allocation choices of an individual that has only two options: labor market and leisure. Under this model, a rise in wages leads to an increase in time allocated to the labor market if the substitution effect (substitution of leisure by labor stemming from the rise of the opportunity cost of leisure) offsets the income effect (increase in leisure stemming from the increase in income). The new home economics (Becker, 1965; Gronau, 1977) enriched this proposal by introducing home production which included the possibility of incorporating another use of time and considering the substitution between market and home goods. In this context, the response of labor supply to wages increases with respect to the basic model because of the possibility for substitution of household activities. Usually trade-offs between market labor and home production are neglected for men studies. But not for women.

Ample evidence underpins a positive relationship between wages and time spent in labor market although there is a broad range of estimated elasticities; in any case, there is a relative consensus that the elasticities are weak for married men but strong for married women (Blundell and MaCurdy, 1999). To a lesser extent, empirical literature has also focused on the home production side. In particular for women, the literature tends to support the hypothesis of a negative relationship between wages and time allocated to household activities, and the existence of a positive elasticity of substitution between home and market goods (Gelber and Mitchell, 2011; Aguiar and Hurst, 2007).

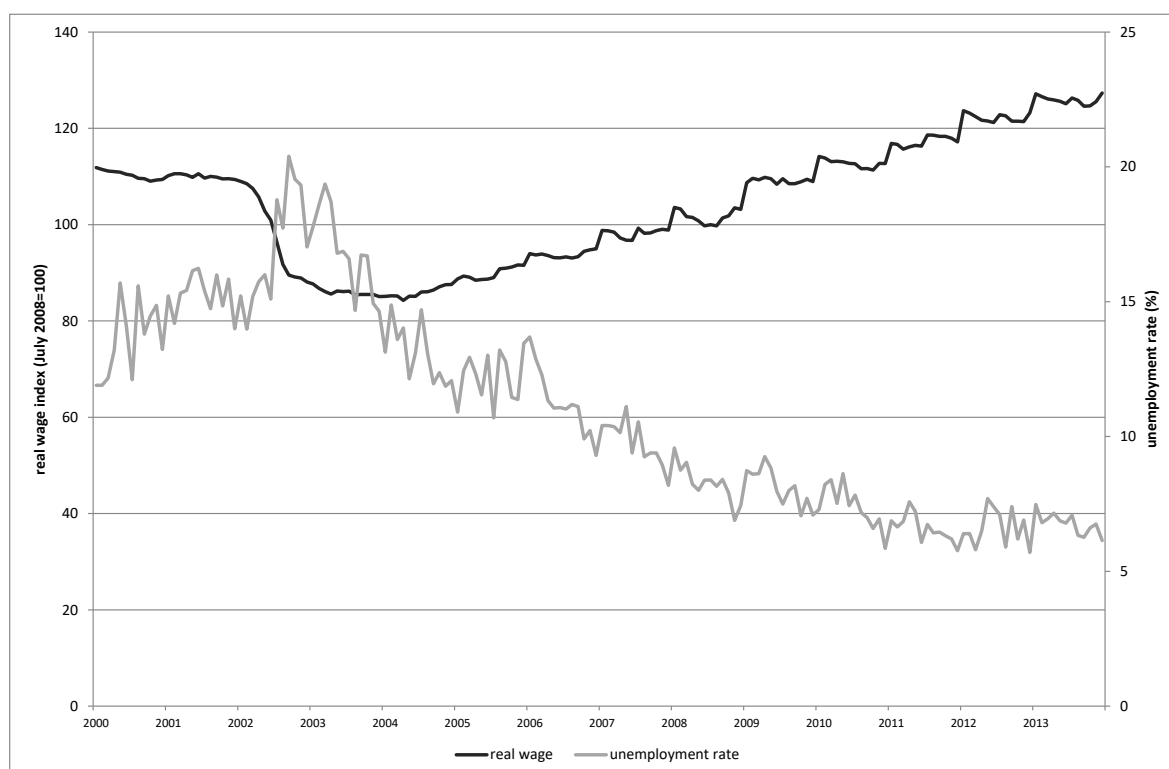
An important aspect for our discussion is the reallocation of time in the business cycle. Aguiar, Hurst and Karabarbounis (2013) study a recessionary period in the US and provide evidence of the existence of high elasticity substitution between the market and home sector; they estimate that nonmarket work absorbs around 35% (including childcare) of the forgone market hours. Also, Burda and Hamermesh (2010) find that a temporary increase in unemployment results in an increase in household production, although their results do not support this type of response to high long-term unemployment. On the other hand, Krueger and Mueller (2012) provide evidence that at the time of reemployment, time spent on home production declines.

As we mentioned in the macroeconomic overview, our study corresponds to a period of growth after a recession. The business cycle is depicted in Figure 8 by the evolution of wages and unemployment from January 2000 to December 2013. After an increasing trend, the unemployment rate reached a peak (around 18.6%) in the first quarter of 2003, and

then declined to 10.8% in 2006 and 6.5% in 2013. The recovery of real wages began in 2005 and continued to rise steadily thereafter; the annual increase between 2006 and 2013 was 4.9%. If we interpret that the evidence for the United States is applicable for other countries, and especially for Uruguay, the female time reallocation (more time in the labor market and less time in home activities) is a suitable response to the change in the macroeconomic context.

Figure 8. Monthly real wage index (July 2008=100) and unemployment rate (in percentages).

Uruguay, January 2000-December 2013



Source: Instituto Nacional de Estadística, Uruguay.

The quantity-quality trade-off hypothesis

An increase in wages may produce a reallocation of time from household activities to the labor market together with an increase in time spent on childcare. This argument is based on the well-known quantity-quality trade-off hypothesis introduced by Becker (1960). The increase in wages has an income effect that makes the demand for both quality and quantity of children to grow. But the rise of quality leads to a higher shadow price of child quantity, reducing the demand for children. In sum, increases in wages may explain the decline in fertility together with a higher investment in children. This hypothesis is supported by many authors but debated by others. For example, Blake (1968) questions the

assumption of freedom of choice (quantity and quality); Ferber and Birnbaum (1977) criticize the assumption of rational behavior in the allocation of time and the unitary based model in the decision-making. From the empirical perspective, there is also a strong debate about the direction of the causality, as reviewed by Schultz (2008) and Clarke (2017).

In the Uruguayan case, we observe a long-term increasing trend in the female labor force participation rate and a decline in fertility (from 2.9 children per woman in 1975 to 1.9 children per woman in 2011 according to the population census). In our time period study, this path was accompanied by an increase in wages. Besides, our findings indicate an increase in parental time spent on childcare. Moreover, as we show below, we can see that investment in childcare per child increased between 2006 and 2013.

To analyze investments in childcare, we estimated the average consumption of childcare by age in time units (hours per week) following the guidelines of the NTTA system estimates. We divided the total hours of childcare consumed by children (defined as younger than age 13) by the total population of children. We find that, on average, per child consumption of childcare increased from 17 hours per week in 2006 to 24 in 2013.

Appliances and home production

Based on standard microeconomic theory, we expect that a change in the price of capital goods used in home production affects the allocation of time between home production and the labor market. But the sign of the effect is dubious because it depends on the elasticity of substitution between capital and labor in home production. In an extreme case, in which capital and labor are perfect substitutes, a fall in the price of capital leads to buying more capital and substituting it with labor; as a result, we will observe a reduction in time allocated to home production. At the other extreme, if capital and labor are complementary, the increase in capital stemming from the fall in its price induces additional time allocation in home production. Something similar is applied to technical innovations such as appliances: time spent in home production may rise, fall or stay at the same level.

In fact, the effect of the development and dissemination of appliances on time spent in home production in the long run is controversial. On the one hand, some studies support the hypothesis that labor-saving technologies in household production freed up time allocated to home production, as pointed out in a study for the US by Greenwood et al. (2005). Cubas (2016) analyzes the Latin American case and concludes that female labor

participation was able to increase when policies that prevented prices of household appliances from falling were abandoned. In a cross-country study, Birgman et al. (2018) use this argument to explain that time devoted to household work is strongly negatively related to the level of development: as countries get richer, investments in labor-saving appliances increase. Interestingly, they also find that the higher the level of development, the less the female time in household work and the higher their market work; but the opposite occurs in the male case (the higher his time in household work, the lower his market work).

On the other hand, using US data, Jones et al. (2015) find that the effect of technological changes on female home production is very small, which means that the reduction in the time allocation gender gap was mainly due to the decline in the wage gender gap. In turn, Ramey (2009) finds that total housework time barely changed during the period of rising household capital but gender specialization declined: a reduction in female time was accompanied by an increase in male time.

As we already mentioned, we find that in Uruguay both female and male time allocated to home production (except childcare) declined between 2006 and 2013. This process occurred in a context of relative price decline of appliances compared to wages as shown in Figure 9. In this Figure we also depict the evolution of the exchange rate: it is similar to the evolution of appliance prices due to the tradable nature of these goods. Thus, beyond the potential long-term trend of the decline in appliance prices, in the period under study the exchange rate policy contributed to the decline of the price of capital in home production. As housing goods are another possibility for household investment, we also show the evolution of its price relative to wages: this ratio is much more stable.

The changes in prices and time allocation are consistent with the increased adoption of labor-saving technologies in the household production. To analyze the change in household investments in capital goods we calculated the percentage of households that own selected appliances (fridge, washing machine, microwave, clothes dryer and dishwasher) in 2006 and 2013. In Table 8 we can see that, on average, households' investment increased; this also happened across the income distribution, except for the clothes dryer and dishwasher at the top decile.

Figure 9. Monthly price index of household appliance prices, exchange rate and price of housing relative to wage index. Uruguay, January 2000-December 2013.



Source: Instituto Nacional de Estadística, Uruguay.

Table 8. Percentage of households that own selected appliances. Uruguay, 2006 and 2013

	Fridge		Washing machine		Microwave		Clothes dryer		Dishwasher	
	2006	2013	2006	2013	2006	2013	2006	2013	2006	2013
Total	93.8	97.6	38.0	77.4	38.0	61.1	6.0	6.6	3.6	3.6
Bottom 10%	79.2	91.4	25.3	53.0	6.5	25.1	0.8	1.1	0.1	0.3
5 th decile	95.4	98.2	60.6	78.1	33.0	60.4	3.9	4.5	1.2	1.2
Top 10%	99.0	99.5	79.4	87.0	76.4	87.2	18.8	17.0	16.3	15.3

Source: Authors' estimations based on *Instituto Nacional de Estadística* (2006 and 2013)

Cultural and social norms

Economic studies use the concept of culture differently, but in most works they include values, beliefs and attitudes (Alesina and Giuliano, 2015). These factors have been used to explain the gender division of household production and labor market participation and

how gender divisions of labor vary across countries or over time. Van der Lippe et al. (2010) use a “masculinity-femininity” score that captures the extent to which gender roles are present in a society; using panel data for seventeen countries, they find that gender specialization among married couples is deeper in masculine cultures.

In turn, social norms refer to behaviors considered normal for a reference group which may lead to an individual suffering a cost when deviating from some norm. In an analysis of OECD countries, De Laat and Sevilla (2011) find evidence about the effect of social norms on the gender division of time and highlight their importance: greater men’s involvement in home production helps to produce a social norm that further motivates their commitment.

We could interpret that the decline in time allocation gender gaps is consistent with cultural change in Uruguay as long as the country appears to be undergoing a long-term change towards the acceptance of more egalitarian gender roles. Information about attitudes supports the idea of this type of change.

We analyze the responses to questions that come in the form of statements strongly related with gender division of time, to which respondents either agree or disagree (5-point scale). The data come from a survey carried out among teens and young adults (12 to 29 years old) in 2008 and 2013. The two first statements reported in Table 9 fit attitudes that, in the spirit of Hakim (2003), may be interpreted as responding to female home-centered preferences, that is, women for whom family life and children are the main priority. We can see a trend towards disagreement with those statements. The third statement pertains to an egalitarian distribution of labor: we see a change towards agreement with this attitude.

Table 9. Attitudes towards gender specialization in home production. Uruguay, 2008 and 2013. In percentages.

Responses to statements	Childbearing must be primarily a woman's task		Household activities should be carried out mostly by women		Women should share household activities with men in order to develop their own projects inside and outside the home	
	2008	2013	2008	2013	2008	2013
Strongly disagree	10.9	25.6	13.6	31.7	0.5	0.6
Disagree	33.6	26.9	39.9	31.3	1.6	1.6
Indifferent	23.1	15.6	21.6	18.0	52.4	5.2
Agree	14.0	14.7	16.2	11.9	5.1	29.8
Strongly agree	18.4	17.2	8.7	7.1	40.3	62.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: ENAJ (2008) and ENAJ (2013), Instituto Nacional de Estadísticas, Uruguay.

7. CONCLUSIONS

In this work we analyzed the change in the gender gaps in home production and labor income between 2006 and 2013. Our main conclusions are: i) the gender gaps of time spent in the labor market and home production declined; ii) women increased time allocated to the labor market and slightly reduced their time in home production, whereas the opposite is observed for men; iii) both women and men increased time allocated to childcare which resulted in a stable gender gap; iv) both women and men decreased their time spent in other household activities, thereby narrowing the gender gap; v) this less unequal division of time is captured when gender gaps are measured in monetary units through changes in home production prices did not contribute to it. These changes in time reallocation are consistent with long-term trends and short-term movements in macroeconomic variables. Since 2013 Uruguay has expanded family friendly work policies and created a national care system. These changes could have an impact on the gender division of time which could be assessed by collecting new time use surveys.

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