

# **Revealing gender differences in home and market production in Uruguay, 2006 and 2013**

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## Abstract

A vast international literature evidences the key role of women in household activities together with the tendency to reallocate time spent in home production to labor market in the last decades. Our purpose is to study the change of the gender gap in home and market production in Uruguay from 2006 to 2013. We use data provided by the NTA and NTTA systems which give information of pre-tax labor income and home production (valuated by the specialist replacement cost method) by age and gender. Our main conclusions are: i) both the gender gap of labor income and home production (in monetary units) decline; ii) the gap of time spent in labor market narrowed as the result of an increase of women's time and a decrease of men's time; iii) the gender gap of hourly earnings declined; iv) the gender gap spent in home production reduced due to an increase of men's time in household activities together with a slight decline of women's time; v) the change of time in home production is composed by an increase of time allocated to childcare and a decrease of time spent in other household activities for both men and women, with a stable gender gap for the former and a reduction for the latter; vi) the reduction of home production gender gap is deeper in time than monetary units because women's household activities are more intensive in low-wage tasks and labor inequality decreased in the period.

Keywords: home production, labor market, gender gap.

JEL: D13, J16

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## **1. Introduction**

A vast literature evidences the key role of women in household activities but a tendency to reduce their time spent in home production in the last decades together with a significant growth of their participation in labor market. Consequently, there has been a path towards a more equalitarian gender division of time. The aim of this work is to analyze the change of the gender gap in home production and 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, presenting nowadays a low fertility rate level and an ageing population structure, and it is now experiencing the second transition (Pellegrino 2013). In the last decades, there has been a postponement of the age of constituting a family, a rise of the divorce rate and cohabitation without marriage, and a change of households' composition (Cabella 2007). Besides, Uruguayan women have increased steadily their participation in labor market, reaching rates higher than the average for developing countries. The social protection system has been traditionally recognized by the extended coverage of public services (education, health and pensions) constituted early in the Latin American comparison. More recently, there has been the political aim to increase family friendly work policies and create a national care system.

To study the changes in gender gap, we use data provided by the National Transfer Accounts (NTA) and the National Time Transfer Accounts (NTTA) systems. These systems give information of pre-tax labor income and home production (valuated 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 respond to changes in time and prices. Although we do not aim to measure the effect of each of these two factors, we discuss their importance to explain the gender gap changes.

The paper has the following structure. In section 2 we present the data and methods. In Section 3 we present the empirical findings, we discuss them in Section 4 and we finally we conclude in Section 5.

## 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 economics flows among ages (generations) that ensure the support of consumption along the overall cycle. The estimates are built on the base of surveys and administrative data, and are consistent with the macro values provided by the National System Account and official population data (UNPD, 2013). There are available estimations of the Uruguayan NTA system for 2006 (Bucheli & González, 2011) and 2013 (Bucheli & Troiano 2016) which provide labor income by age, both in per capita units and aggregate values. Labor income includes earnings, taxes and contributions paid by employees and employers, and the return to labor of mixed income.

For the purpose of the present work we estimate labor income age profiles for men and women separately using the official population projections (*Instituto Nacional de Estadística*, 2017) and information reported in the Uruguayan Household Surveys collected by the Statistical Office (*Instituto Nacional de Estadística*, 2006 and 2013a). 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 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 average values of labor income and population by age and gender calculated using the Uruguayan Household Survey. We also estimate time spent in labor market in hours and its price (labor income per hour), following the similar procedure used to build the NTA system.

The NTTA system provides information about home production and consumption by age and sex in time and monetary units (Donehower, 2014). There are available information of Uruguayan NTTA system for 2007 (Lara & Bucheli, 2016) and 2013 (Bucheli, González & Lara, 2018) which provide home production by age and sex, both in per capita units and aggregate values and in monetary and time units. 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 under the replacement cost method considering only labor income paid to wage earners; as with NTA, the price of each activity includes taxes and contributions paid by employers and employees.

We are interested in NTTA estimations for 2006 and 2013 but they are available for 2007 and 2013. Thus, we use the estimates of home production in time units for 2007 by Lara & Bucheli (2016) and valued them with prices of 2006 following the procedures by Donehower (2014).

### **3. Empirical findings**

#### **A. Macroeconomic overview**

After a deep crisis at the beginning of the millennium, Uruguayan economy experienced a prolonged period of expansion since 2004 to present. Between the two years of our study, 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 (going down from 2.5% to 0.5% in the same period). The macroeconomic performance improvement was also reflected in a stabilized and low inflation rate if compared with Uruguayan history (6.4% in 2006 and 8.5% in 2013). Meanwhile, the dollar exchange rate decreased from Uruguayan \$ 24 to Uruguayan \$20 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%. Besides, informality (measured as the proportion of non-contributors to social security system in employment) reduced 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 estimations indicate that per capita home production rose even more than GDP: from PPP US\$ 3,556 to 6,116. Thus, home production was 26% and 32% of GDP, in 2006 and 2013 respectively.

The rise of home production related GDP is associated with price changes and should be interpreted carefully. As shown in Table 1, the annual increase rate of time spent in home production was just 0.5%, a figure well below 8.1% which is the increase rate in monetary terms. This difference is due to the above mentioned rise of wages (remind that we are

using the replacement cost method to value home production). A sensitivity analysis valuing home production by their quantity and price would be very interesting to a better understanding of the ratio home production /GDP change but is out of our scope in this study.

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

	2006	2013	Annual change (%)
<i>PPP (constant 2011 international dollars)</i>			
GDP	13,377	19,090	5.2
Home production	3,556	6,116	8.1
Female <sup>a/</sup>	4,955	8,452	7.9
Male <sup>b/</sup>	2,060	3,619	8.4
<i>Female share</i>	72.0	71.4	
Labor income	6,337	9,222	5.5
Female <sup>a/</sup>	3,976	6,564	7.4
Male <sup>b/</sup>	8,860	12,064	4.5
<i>Female share</i>	32.4	36.8	
Ratio home production / labor income	0.561	0.663	2.4
Female <sup>a/</sup>	1.246	1.288	0.5
Male <sup>b/</sup>	0.232	0.300	3.7
Gender gap in home production <sup>c/</sup>	141%	133%	
Gender gap in labor income <sup>c/</sup>	-55%	-46%	
<i>Hours per week</i>			
Home production	18.5	19.2	0.5
Female <sup>a/</sup>	26.6	26.7	0.0
Male <sup>b/</sup>	9.8	11.1	1.9
<i>Female share</i>	74.5	71.5	
Labor income	18.4	19.7	1.0
Female <sup>a/</sup>	12.9	15.0	2.2
Male <sup>b/</sup>	24.2	24.6	0.3
<i>Female share</i>	36.4	39.5	
Ratio home production / labor	1.005	0.974	-0.5
Female <sup>a/</sup>	2.058	1.775	-2.1
Male <sup>b/</sup>	0.403	0.452	1.6
Gender gap in home production <sup>c/</sup>	173%	140%	
Gender gap in labor income <sup>c/</sup>	-46%	-39%	

Notes:

<sup>a/</sup> female home production (labor income) / number of women

<sup>b/</sup> male home production (labor income) / number of men

<sup>c/</sup> the gender gap is calculated as the difference between female and male home production (labor income) as a percentage of male home production (labor income)

Per capita labor income increased from PPP US\$ 6,337 in 2006 to 9,222, that is, at a lower rate than home production. Indeed the ratio home production / labor income passed from 0.561 to 0.663. But once again, prices played a role in this change: when calculated in hours, the ratio slightly decreased 0.5%. This different pattern is explained by the decline of wage inequality since home production is mostly composed by low-wage activities.

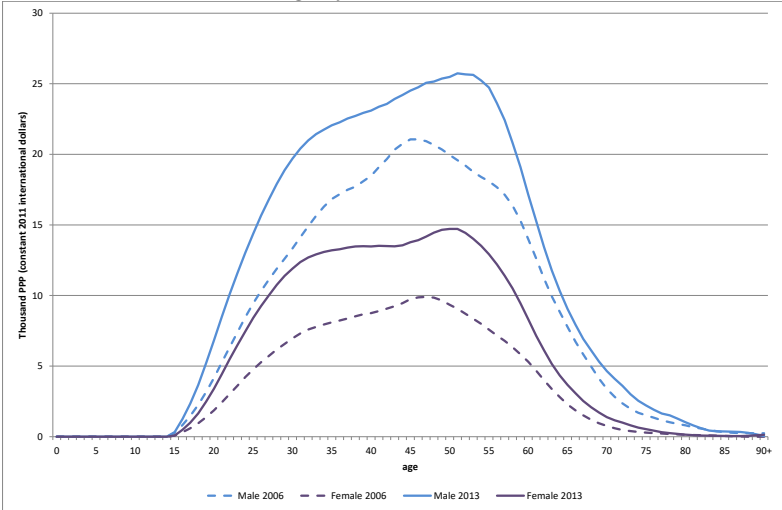
In Table 1 we also show home production and labor income for women and men separately. As expected, both in 2006 and 2013 home production is mainly made up by female work whereas males account for most of labor income. Indeed, the share of female work was in both years around 70% of home production but one third of labor income. However, the gender gaps slightly reduced when expressed both in monetary units and hours.

**B. Labor income gender gap**

*a) Labor income gender gap by age*

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

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

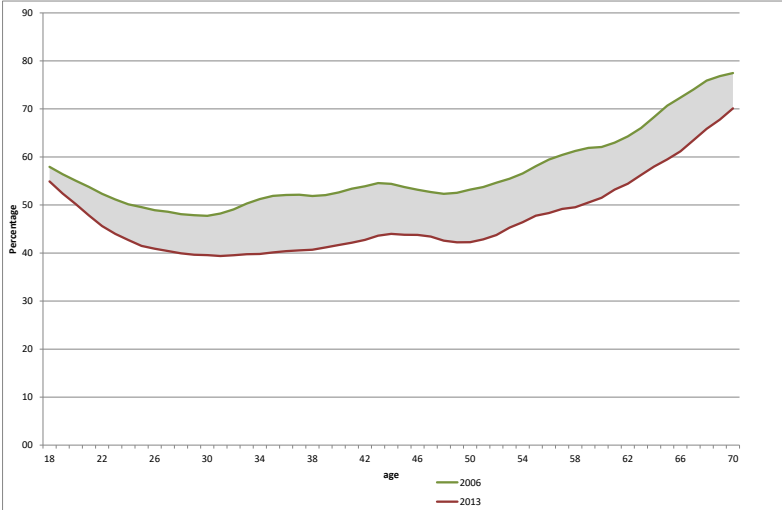


Source: Authors’ estimations based on Bucheli & González (2011), Bucheli & Troiano (2016) and *Instituto Nacional de Estadística* (2006 and 2013a)

As people who do not work have zero income, the curves are bell-shaped reflecting that the generation of income relies on middle-aged women and men. The comparison of the profiles between years captures the rise of real wages in the period. Besides, between 2006 and 2013 the peaks of per capita labor income shifted to the right for both sexes: the highest values corresponded to ages 44-50 in 2006 and moved to 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 is higher for men than women at all ages. However, the gender gap decreased between 2006 and 2013 for all ages as can be seen in Figure 2. On average for the 24-55 age-group -which captures the working life stage- it declines from 52% to 42% of male labor income.

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



Note: The gender gap by age is equal to the difference of male and female labor income measured as a percentage of the male labor income, at each age.  
 Source: Authors’ estimations based on Bucheli & González (2011), Bucheli & Troiano (2016) and *Instituto Nacional de Estadística* (2006 and 2013a)

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

*b) Time spent in the labor market*

Weekly average worked hours are 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 the result of an increase of women’s involvement of labor market and a stable behavior of men. Considering the population over 13 years old, per capita female time spent in labor market increased from 16.4 to 18.5 hours per week whereas male time remained at around 31.3 hours. Thus, the gender gap declines on average 2.4 hours per week; if we restrict the population to the 20-59 age group, when participation rates reach the maximum values, the decrease is 3.6 hours per week.

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

(intensive margin). To better understand the role played by these factors, we report labor indicators in Table 2.

**Figure 3.** Average weekly hours spent in labor market by age and sex. Uruguay, 2006 and 2013



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

**Table 2.** Labor market indicators by age groups and sex. Uruguay, 2006 and 2013

	2006			2013			Gender difference change
	Male	Female	Gender difference	Male	Female	Gender difference	
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

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

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

The overall picture for 2006 and 2013 indicates that men are more likely employed than women as the result of the combination of being more prone to participate in the labor



market and less affected by unemployment. Besides, employed men worked on average more hours than employed women. Thus, both extensive and intensive margins contribute to the existence of a gender gap. But as we mentioned, the gender gap of time spent in labor market declined. This decrease is mostly explained by an increase of the female participation rate that passes from 52% in 2006 to 54% in 2013 (from 71% to 75% for the 20-59 age-group) whereas male participation does not change. This change is stronger when considering employment rate because of the unemployment decline, which attained both women and men. On the other hand, the intensive margin did not play a role in the gap narrowing: both women and men reduced their time spent in the labor market when employed, and the gender difference remains at similar levels (though slightly decreases for the 20-59 age-group).<sup>1</sup>

*c) Hourly labor income*

Men benefit from higher hourly wages than women when controlling productive attributes as documented in several studies of 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 discrimination measures have been stable in the last two decades and are characterized by an increasing pattern across years of schooling, existing evidence of a glass ceiling phenomena for the most educated women. Besides, women face occupational segregation. According to Espino et al. (2014), the level of segregation has been stable and higher for the low than high educated women. We did some estimations to illustrate the wage gender gap and segregation level in our period of analysis. First, we calculated the hourly labor earnings gender gap (net of tax and contributions) by year of schooling. Second, we estimated the Dissimilarity Index for the period 2006-2013 using both an occupational and industry classification.<sup>2 3</sup>

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<sup>1</sup> The analysis of working hours and participation rate in the years between 2006 and 2013 suggests that these changes are the result of a convergence path during the period.

<sup>2</sup> A very common strategy to measure segregation in the labor market is to estimate the dissimilarity index D (Duncan & Duncan, 1955). Being  $F$  and  $M$  the number of female and male employed, and  $f_j$  ( $m_j$ ) the total number of female (male) in the  $j$ th occupation  $j=\{1, \dots, T\}$ , the D index is:

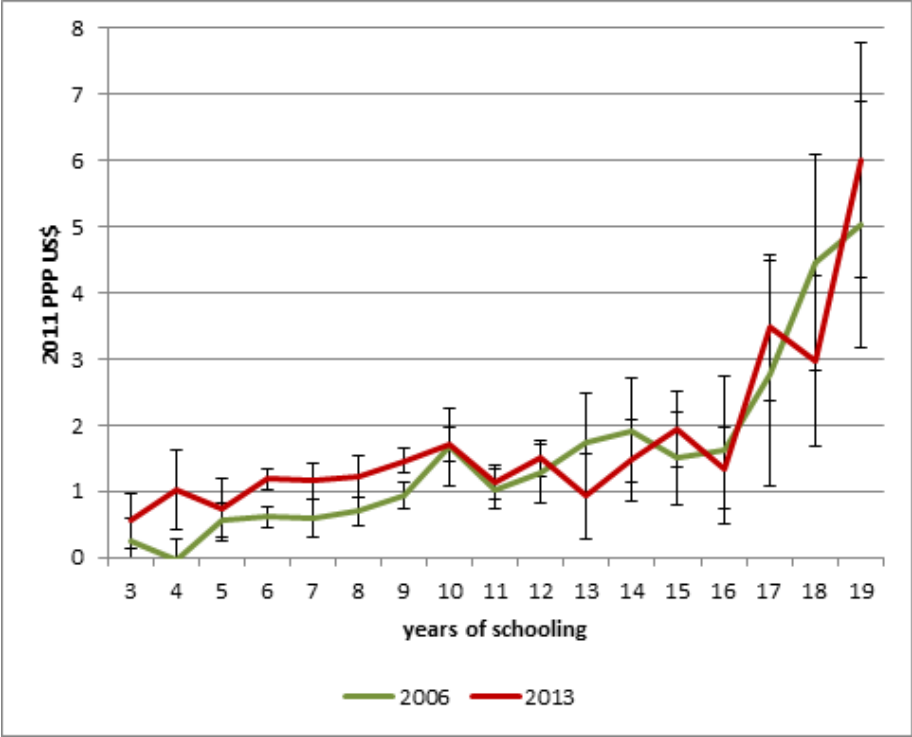
$$D = \frac{1}{2} \sum_{j=1}^T \left| \frac{f_j}{F} - \frac{m_j}{M} \right| \text{ where } F = \sum_{j=1}^T f_j \text{ and } M = \sum_{j=1}^T m_j$$

The D index may be interpreted as the proportion of female (male) that would have to move to another occupation to produce the same occupational distribution within each sex group. As stemmed from the formula, the D index increases with segregation and its range is (0,1).

<sup>3</sup> We used the International Standard Industrial Classification of Economic Activities (Rev.3) at the 2-digit-level and the International Standard Classification of Occupation (ISCO-88) at the 2-digit-level. The

As shown in Figure 4, the gender gap increases with education, particularly in the range corresponding to the tertiary level of education. The profiles are similar for both years and according to the confidence intervals, the gap differences between years may be neglected.

**Figure 4.** Gender gap of the hourly labor earning by years of schooling and confidence interval at 95%. Uruguay, 2006 and 2013.



Note: the vertical bars show the range values of the confidence interval at 95%  
 Source: Authors’ estimations based on *Instituto Nacional de Estadística* (2006 and 2013a)

In turn, as shown in Figure 5, both Index have a sharp decrease in 2011; ignoring this leap, we may see an increasing trend of segregation based on occupations but a stable level when using the industry classification.

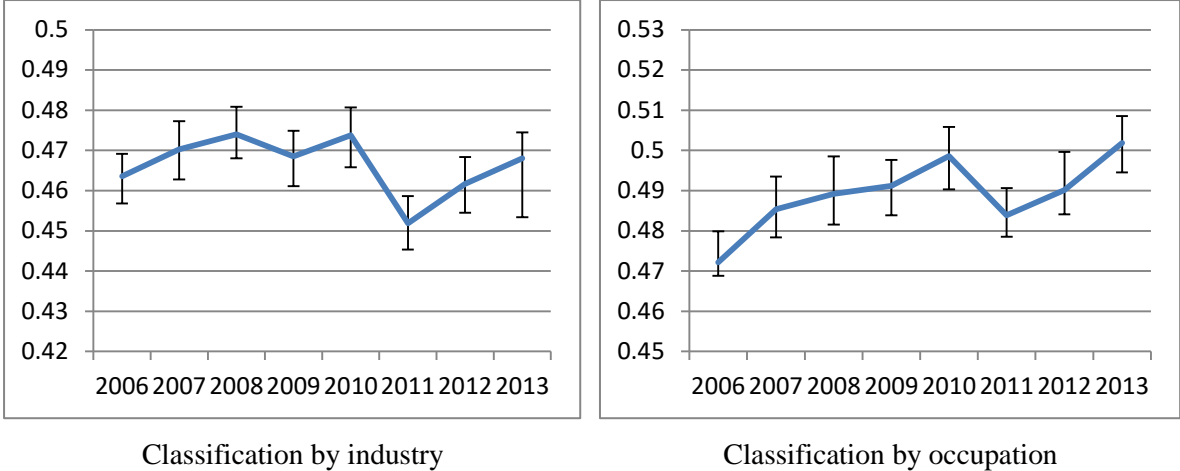
The analysis of industry indicates that women were underrepresented in the construction sector (around 3% of employment), mining (7%) and manufacture of machinery and equipment (less than 10%), whereas they were overrepresented in garment sector (around 90%), health care, education and personal services (more than 70%). According to the occupation classification, women account for more than 70% of jobs among teachers, health care technicians and non-qualified workers in sailing and services. On the other

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Household Survey updated the classification codes in 2012 so we converted the reported occupation and industry information of 2012-2013 to the old codes to obtain harmonized series.

extreme, they are less than 5% among heavy equipment operators and blue collars in building and metallurgical manufacture.

**Figure 5.** Index of dissimilarity based on industry classification and occupation classification and confidence interval at 95%



Note: Vertical bars: confidence interval at 95% estimated by bootstrapping techniques  
 Source: Authors’ estimations based on *Instituto Nacional de Estadística* (2006 to 2013a)

The above mentioned evidence is based on the data usually used in the analysis of labor market: net labor income reported in the Household Surveys. In Table 3 we report the gender gap of labor income using the NTA system variable. Labor income gender gap per hour was on average 2011 PPP US\$ 1.2 in 2006, that is, 16% of male labor income. As the income rise of women was higher than for men, the gaps reduced to 2011 PPP US\$ 1.0 (11%) in 2013. We also present the gender gap of income when subtracting contributions and taxes. The conclusion is the same: the gender gap decreases.

**Table 3.** Hourly labor income by sex. Uruguay, 2006 and 2013

	2006			2013		
	Male	Female	Gender gap as a percentage of males	Male	Female	Gender gap as a percentage of males
<b>NTA labor income</b>						
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
<b>Labor income less contributions</b>						
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
<b>Labor income less contributions and taxes on labor</b>						
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

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

Source: Authors’ estimations based on Bucheli & González (2011), Bucheli & Troiano (2016) and *Instituto Nacional de Estadística* (2006 and 2013a)

## C. Home production

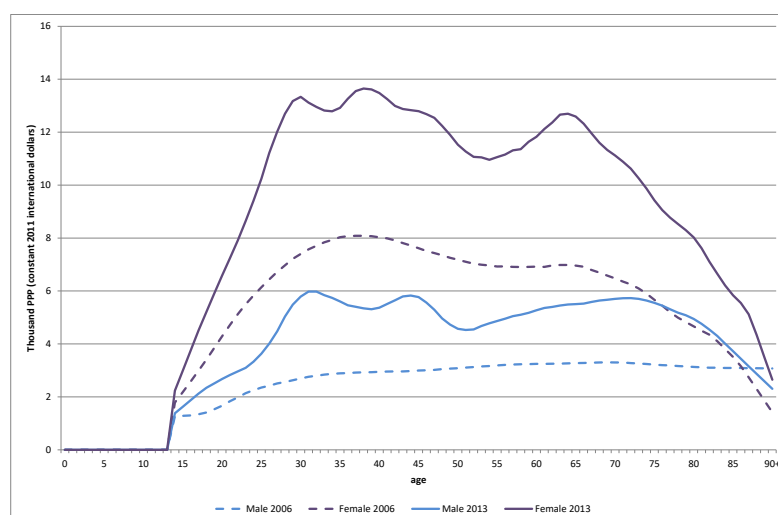
### a) Home production gender gap by age

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. Besides, female production is higher at all ages than male production as worldwide (Jiménez-Fontana, 2014 and 2016; Renteria, Scandurra, Souto and Patxtot, 2016; Sambt, Donehower & Verbic, 2016; Zagheni and Zannella, 2013; Zagheni et al., 2015).

In Figure 6 we appreciate that both male and female home production increased for all ages. As we mentioned in section A, the increase of average male home production surpassed female's: as shown in Table 4, 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 may see that the reduction of the gender gap relies on modifications occurred between ages 30 and 49. This is the stage of life in which most individuals constitute their families and take care of children more intensely.

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

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



Source: Authors' estimations based on Lara & Bucheli (2016), Bucheli, González & Lara (2018) and Instituto Nacional de Estadística (2007 and 2013ba)

**Table 4.** 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

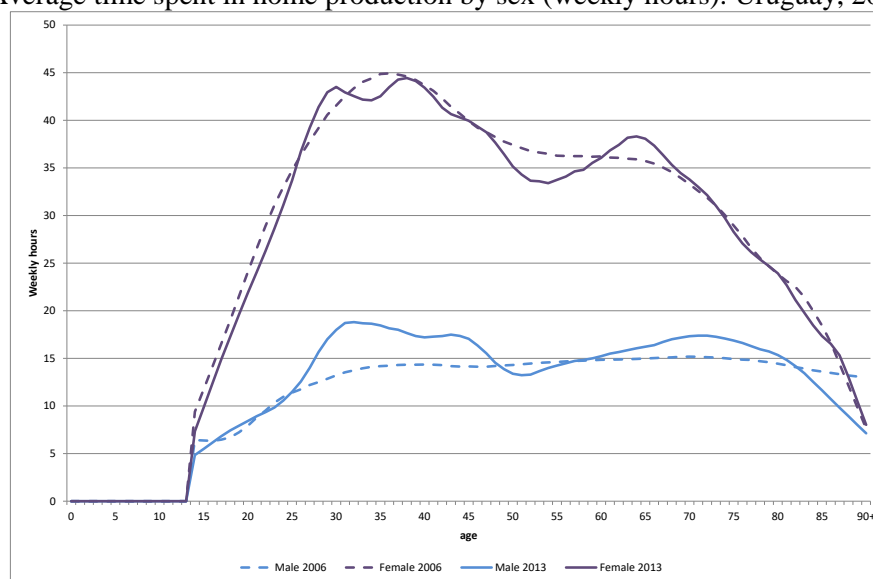
Note: The gender gap is equal to the difference of male and female home production measured as a percentage of male home production. The values were multiplied by (-1) to improve their visual presentation. Source: Authors' estimations based on Lara & Bucheli (2016), Bucheli, González & Lara (2018) and *Instituto Nacional de Estadística* (2007 and 2013ba)

*b) 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 comes mainly from changes in prices than quantities.

The patterns by age measured in unit times and the amount of time are similar in 2006 and 2013. However, in the case of men we see an increase of time spent in home production at some range of ages.

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



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

In Table 5 we report the gender differences for population over age 13. The average gap drops from 21 hours per week in 2006 to 18.8 in 2013. This is the result of an increase of men’s time in household activities accompanied by a slight decline of women’s time. In the rest of the rows of Table 5 we report the estimations of time and gender gaps for age groups. Between 2006 and 2013, the gender difference decreases for all groups and is especially sharp at ages 30-49. Male time spent in home production increase from 14 hours per week to 18 for the age group 30-39 and to 16 for the age group 40-49 whereas female time remains at 40/43 hours.

**Table 5.** Time spent in home production by age group and sex (average hours per week). Uruguay, 2006 and 2013

	2006			2013			Gender difference change
	Male	Female	Gender difference	Male	Female	Gender difference	
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’ estimations based on *Instituto Nacional de Estadística* (2007 and 2013b).

If we express the gender difference reported in Table 5 as a percentage of male time spent in home production, the gender gap is 165% in 2006 and 133% in 2013. Remind that in monetary units it is 133% in 2006 and 127% in 2013 (Table 4), that is, it lower than in time units. Besides, the reduction of the gender gap expressed as a percentage of male in time units is 19% but only 5% in monetary units.

To analyze the sources of this reduction we report the gender gap by task in Table 6. The reduction of the gender gap comes from changes in time spent in basic chores (cooking, laundry and cleaning). Both men and women devote less time to basic chores, but the change for women is more pronounced: 0.7 hours in the case of men and 3 hours in the case of women. Contrary to this result, both men and women increase their time spent in childcare by 1.1 hours per week so the gender gap in this task remains the same. We also appreciate a sharp increase of time assigned to care other given to other than children, but a modification of the questionnaire makes this result to be 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 elder.

**Table 6.** Time spent in home production, childcare and other activities by sex (hours per week).  
Uruguay, 2006 and 2013

	2006			2013			Gender Difference change
	Male	Female	Gender difference	Male	Female	Gender difference	
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* (2006 and 2013).

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 towards other non-children household members and home production directed to other households.

### c) *Implicit price of home production*

To analyze the effect of prices in the change of the gender gap we estimate the implicit price of home production, that is, the result of dividing home production by the time spent in home production. In Table 7 we report the estimated implicit price by task in 2006 indexed to the price of childcare and their change between 2006 and 2013.

In the last subsection we mention that the gender gap is higher in time than monetary units. This is easily explained by figures of Table 7. Let's focus on the effect of prices on the estimation of home production in 2006: the gender gap is lower in monetary than time units because men devote more time than women to the most expensive activities. Indeed, women devote more time than men to childcare and basic chores (task related to low-wage activities) whereas men assign more time than women to management and maintenance (high-wage activities). The pattern is similar for 2013.

Between 2006 and 2013, childcare and basic chores prices increased at a higher rate than maintenance and management prices. This is consistent with the decline of wage inequality that characterizes the period under analysis. Consequently, though the home production gender gap decreases, the evolution of prices did not contribute to this change. In the contrary, prices had the effect to broaden the gender gap which was more than offset by changes in time units.

**Table 7.** Distribution of time spent in home production and implicit prices of task (base= childcare 2006). Uruguay, 2006 and 2013.

	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.

#### 4. Discussion

The above analysis shows that the gender gap in home production and labor market declined between 2006 and 2013. When decomposing this change between quantities and prices using an “accounting approach” we find that prices did not contribute to these reductions: in the labor market, the gender gap remained stable whereas the effect of home production prices was to widen the gap (and not to narrow it). Thus, the decline of the gender gap came from changes in the use of time. In the labor market, the main changes were an increase of female participation and a decline of the male working hours. In home production, male time spent in household activities increased whereas female time slightly decreased. These changes in home production are composed by two different movements. On one hand, both women and men increased their time allocated to childcare in such a way that the gender gap remained stable. On the other hand, both reduced their time spent in other home production, and the reduction was deeper for women than for men so the gender gap rose.

Theoretical and empirical literature proposes several explanations to changes of allocation of time. In this section we briefly review these arguments and discuss their suitability to explain our findings.

##### a) Wages and time allocation

The basic labor supply model is based on the choice of allocation of time by an individual that has only two options: labor market and leisure. Under this model, an increase of wages



leads to an increase of time allocated to labor market if the substitution effect (substitution of leisure by labor stemmed from the rise of the opportunity cost of leisure) offsets the income effect (the rise of leisure stemmed from the increase of income). The new home economics (Becker, 1965; Gronau, 1977) enriched this proposal 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 respect to the basic model because of the possibility of substitution of household activities. Usually trade-offs between market labor and home production are neglected for men studies. But not for women.

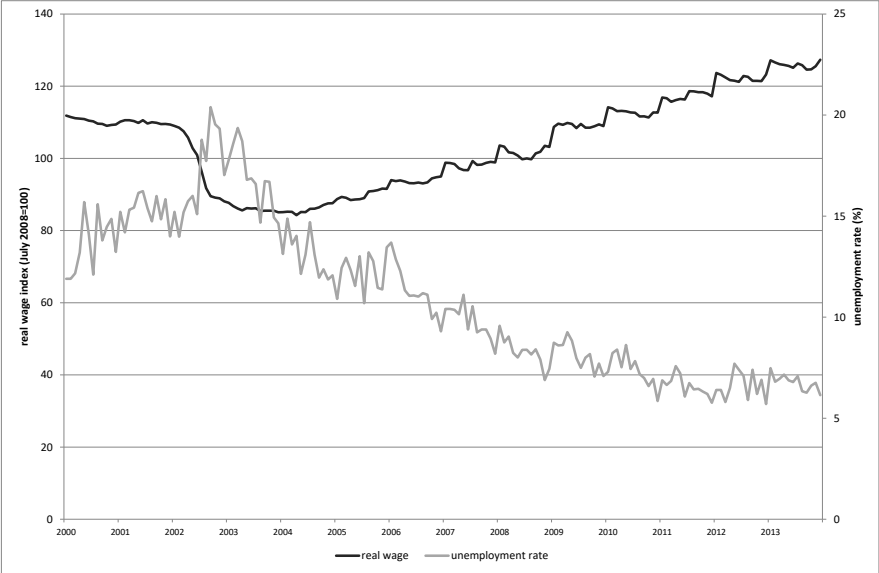
Ample evidence underpins a positive relation between wages and labor market time though there is a broad range of estimated elasticities; however, there is a relative consensus that they are weak for married men but strong for married women (Blundell and MaCurdy, 1999). In a lesser extent, empirical literature has also focused on the home production side giving support, especially in the case of women, to the hypothesis of a negative relation 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 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 temporarily increase of unemployment results in an increase of household production, though their results do not support this type of responses 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 documented in the macroeconomic overview (section 3.A), 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 up to 10.8% in 2006 and 6.5% in 2013. The recovery of real wages began in 2005 and they continued to rise steadily since then; the annual increase between 2006 and 2013 was 4.9%. If we interpret that the evidence for United States is

applicable for other countries, and especially for Uruguay, the female reallocation of time (increase of labor market and decrease of 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 2103



Source: Instituto Nacional de Estadística, Uruguay

*b) Appliances and home production*

Based on the standard microeconomic theory, we expect that a change of the price of capital goods used in home production affects the allocation of time between home production and 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 substitute, a fall of capital price leads to buy more capital and substitute it by labor; consequently, we will observe a reduction of time allocated to home production. At the other extreme, if capital and labor are complementary, the increase of capital stemmed from the fall of its price induces to allocate more time to 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 one hand, some studies support the hypothesis that the labor-saving technological process in the household production freed up time allocated in home production, as pointed out in a study for 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 to diminish. In a cross-country study, Birgman et al. (2018) use this argument to explain that time devoted to household work is strongly negative related to development level: as countries get richer, investments in labor-saving appliances increase. Interestingly, they also find that the higher the development level, the lower 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 and 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, so the narrowing of the gender gaps in allocation of time declined mainly because of the decline of the wage gender gap. In turn, Ramey (2009) finds that total housework time barely changed during the rise of household capital but gender specialization declined: a reduction of female time was accompanied of an increase of male time.

As we already mentioned, between 2006 and 2013 both female and male time allocated to home production (except childcare) diminished. This process occurred in a context of decline of the ratio appliances' price / wage as shown in Figure 9.

**Figure 9.** Monthly index price of household appliances price, exchange rate and price of housing related to wage index. Uruguay, January 2000-December 2103.



Source: Instituto Nacional de Estadística, Uruguay

In this Figure we also depict the evolution of the exchange rate: it is similar to the evolution of appliances' price due the tradable nature of these goods. Thus, beyond the potential long term trend of the decline of appliances' price, 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 of prices and time allocation are consistent with the deepening of the adoption of labor-saving technological process in the household production. To analyze the change of 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 appreciate that on average, households' investment increased and this happened at different positions of the income distribution. The only exceptions are observed for the clothes dryer and dishwasher at the top decile which can be explained by the high proportion of elder who probably maintain traditional patterns of consumption.

**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 <sup>th</sup> 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)

### c) *Culture and social norms*

Economic studies use the concept of culture in a different way but in most works they include values, beliefs and attitudes (Alesina and Giuliano, 2015). In any case, all these factors have been used to contribute to explain the gender division of household production and labor market participation and their difference in cross-country or time comparisons. Van der Lippe et al. (2010) use a “masculinity-femininity” score that captures the degree 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 so an individual suffers a cost when deviating from a 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: the increase of men’s involvement in home production helps to produce a social norm that further motivate their involvement.

We could interpret that the decline of gender gaps in time allocation is consistent with a cultural change in Uruguay as long as we may state that in the country there is 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 to teen and young people (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), we may interpret that respond to female home-centered preferences, that is, women for whom family life and children are the main priority. We can see a movement towards disagreement with those statements. The third statement claims for 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 a primary task for women		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 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

**5. Conclusions**

We analyzed home production and labor income by age and gender. Our main conclusions are i) both the gender gap of labor income and home production (in monetary units) decline; ii) the gap of time spent in labor market narrowed as the result of an increase of women’s time and a decrease of men’s time; iii) the gender gap of hourly earnings declined; iv) the gender gap spent in home production reduced due to an increase of men’s time in household activities together with a slight decline of women’s time; v) the change of time in home production is composed by an increase of time allocated to childcare and a decrease of time spent in other household activities for both men and women, with a stable

gender gap for the former and a reduction for the latter; vi) the reduction of home production gender gap is deeper in time than monetary units because women's household activities are more intensive in low-wage tasks and labor inequality decreased in the period. The changes in time reallocation are consistent with long term trends and short term changes in macroeconomic variables.

## References

- Aguiar, M., & Hurst, E. (2007). Life-cycle prices and production. *American Economic Review*, 97(5), 1533-1559.
- Álvarez, Ignacio, Natalia Da Silva, Alvaro Forteza, and Ianina Rossi (2010). ¿Qué incentivos al retiro genera la seguridad social?: el caso uruguayo. *Cuadernos de Economía*, 47(136), 217-248.
- Amarante, Verónica and Alma Espino (2004). La segregación ocupacional de género y las diferencias en las remuneraciones de los asalariados privados. Uruguay, 1990-2000. *Desarrollo Económico* 44(173): 109-129.
- Becker, Gary S. (1965). A Theory of the Allocation of Time. *The Economic Journal* 75 (299): 493–517.
- Blundell, R., & MaCurdy, T. (1999). Labor supply: A review of alternative approaches. In *Handbook of labor economics* (Vol. 3, pp. 1559-1695). Elsevier.
- Bucheli, Marisa y Sanromán, Graciela (2005). Salarios femeninos en Uruguay: ¿existe un techo de cristal? *Revista de Economía*, 12(2): 63-88.
- Bucheli, M. and González, C. (2011). “Public transfer flow between generations”, in Lee, R. and A. Mason (Editors): Population Aging and the Generational Economy: A Global Perspective, Cheltenham, UK: Edward Elgar Publishing Limited, Chapter 24, pp: 434-445, ISBN: 978 1 55250 514 4.
- Bucheli, Marisa, Cecilia González and Olivieri Cecilia (2010). Transferencias del sector público a la infancia y vejez en Uruguay. *Notas de Población* 90, Chile, ISBN 978-92-1-323446-4, pgs. 163-184.
- Bucheli, M. and Troiano, S. (2016). “National Transfer Accounts”, in Rofman R., V. Amarante and I. Apella (Editors): Demographic Change in Uruguay. Economic Opportunities and Challenges, The World Bank, Washington D.C. Chapter 2, pp 41-74. ISBN: 978-1-4648-0844-9.
- Cubas, G. (2016). Distortions, infrastructure, and female labor supply in developing countries. *European Economic Review*, 87, 194-215.
- De Laat, J., & Sevilla-Sanz, A. (2011). The fertility and women's labor force participation puzzle in OECD countries: the role of men's home production. *Feminist Economics*, 17(2), 87-119.
- Donehower, G. (2014). Incorporating gender and time use into NTA: National time transfer accounts methodology.
- Duncan, Otis D. and Bervely Duncan, (1955), A Methodological Analysis of Segregation Indexes, *American Sociological Review*, 20(2): 210-217.
- Espino, Alma (2013). Brechas salariales en Uruguay: género, segregación y desajustes por calificación *Revista Problemas del Desarrollo*, 174 (44): 89-117.
- Espino, Alma, Soledad Salvador and Paola Azar (2014). Desigualdades persistentes: mercado de trabajo, calificación y género. *El futuro en foco: Cuadernos sobre Desarrollo Humano*, PNUD, Uruguay.

- Gelber, A. M., & Mitchell, J. W. (2011). Taxes and time allocation: Evidence from single women and men. *The Review of Economic Studies*, 79(3), 863-897.
- Greenwood, J., Seshadri, A., & Yorukoglu, M. (2005). Engines of liberation. *The Review of Economic Studies*, 72(1), 109-133.
- Gronau, R. (1977). Leisure, home production and work: The theory of the allocation of time revisited. *The Journal of Political Economy*, 85(6): 1099–1124.
- Hakim, C. (2003). A new approach to explaining fertility patterns: Preference theory. *Population and development review*, 29(3), 349-374.
- Jiménez-Fontana, P. (2014). Analysis of non-remunerated production in Costa Rica. *The Journal of the Economics of Ageing*, 5, 45-53.
- Jiménez-Fontana, P. (2016). Retos para materializar el dividendo de género perfiles de uso de tiempo en Costa Rica. *Población y Salud en Mesoamérica*, 13(2), 1-23.
- Jones, L. E., Manuelli, R. E., & McGrattan, E. R. (2015). Why are married women working so much?. *Journal of Demographic Economics*, 81(1), 75-114.
- Lara, C. and Bucheli, M. (2016). Producción del hogar por edad y sexo: nueva evidencia para Uruguay. *Desarrollo y Sociedad* 78, Bogotá, ISSN 0120-3584, pgs. 201-232.
- Ramey, V. A. (2009). Time spent in home production in the twentieth-century United States: New estimates from old data. *The Journal of Economic History*, 69(1), 1-47.
- Reid, M. (1934). *Economics of household production*. New York: John Wiley.
- Rentería, E., Scandurra, R., Souto, G., and Patxtot, C. (2016). Intergenerational money and time transfers by gender in Spain: Who are the actual dependents? *Demographic Research*, 34(24), 689-704.
- Sambt, J., Donehower, G., and Verbi, M. (2016). Incorporating household production into the national transfer accounts for Slovenia. *Post Communist Economies*, 28, 249-267.
- UNDP - United Nations Population Division (2013). National Transfer Accounts Manual: Measuring and Analysing the Generational Economy. New York, United Nations.
- Van der Lippe, T., De Ruijter, J., De Ruijter, E., & Raub, W. (2010). Persistent inequalities in time use between men and women: A detailed look at the influence of economic circumstances, policies, and culture. *European Sociological Review*, 27(2), 164-179.
- Zagheni, E., and Zannella, M. (2013). The life cycle dimension of time transfers in Europe. *Demographic Research*, 29(35), 937-948.
- Zagheni, E., M. Zannella, Movsesyan, G., and Wagner, B. (2015). A comparative analysis of European time transfers between generations and gender. Springer.