

# The Impact of Unpaid Work on Employment Status in Mexico

UNU-WIDER Development Conference  
Transforming Economies – For Better Jobs

Franziska Dorn

Center for Statistics at the University of Göttingen

Bangkok,  
September, 2019

# Motivation

In arguably all countries in the world women spend at least double the amount of time on unpaid care work compared to men.

Paragraph 68b of the Forth World Conference on Women

*"[...]examine the relationship of women's unremunerated work to the incidence of and their vulnerability to poverty"*

UN 1996, p.25

# Motivation

In arguably all countries in the world women spend at least double the amount of time on unpaid care work compared to men.

Paragraph 68b of the Forth World Conference on Women

*"[...]examine the relationship of women's unremunerated work to the incidence of and their vulnerability to poverty"*

UN 1996, p.25

## **Hypothesis**

Unpaid work restricts women in their time use and therefore influences their employment status.

# Theoretical Background

- Productive and reproductive economy intersect at the labour market.
  - ▶ Hours spend on unpaid care and domestic work (unpaid work)<sup>1</sup> influence opportunities and outcomes in the productive economy.
  - ▶ Rise in female labor force participation, more total work for women (Campaña et al., 2018).
- Social norms influence labour division.
  - ▶ In contrast: comparative advantages determine labour division at home.
  - ▶ The dominant part of the gender unpaid work gap cannot be explained by individual characteristics (Amarante and Rossel, 2018).
- Flexible working arrangements to combine wage work and care work.
  - ▶ Often found in the informal economy (qualitative study on Mexico by Rodin et al. (2012)).

---

<sup>1</sup>Unpaid activities that can be assigned to a paid worker (Reid, 1934).

# Theoretical Background

- Productive and reproductive economy intersect at the labour market.
  - ▶ Hours spend on unpaid care and domestic work (unpaid work)<sup>1</sup> influence opportunities and outcomes in the productive economy.
  - ▶ Rise in female labor force participation, more total work for women (Campaña et al., 2018).
- Social norms influence labour division.
  - ▶ In contrast: comparative advantages determine labour division at home.
  - ▶ The dominant part of the gender unpaid work gap cannot be explained by individual characteristics (Amarante and Rossel, 2018).
- Flexible working arrangements to combine wage work and care work.
  - ▶ Often found in the informal economy (qualitative study on Mexico by Rodin et al. (2012)).

---

<sup>1</sup>Unpaid activities that can be assigned to a paid worker (Reid, 1934).

# Theoretical Background

- Productive and reproductive economy intersect at the labour market.
  - ▶ Hours spend on unpaid care and domestic work (unpaid work)<sup>1</sup> influence opportunities and outcomes in the productive economy.
  - ▶ Rise in female labor force participation, more total work for women (Campaña et al., 2018).
- Social norms influence labour division.
  - ▶ In contrast: comparative advantages determine labour division at home.
  - ▶ The dominant part of the gender unpaid work gap cannot be explained by individual characteristics (Amarante and Rossel, 2018).
- Flexible working arrangements to combine wage work and care work.
  - ▶ Often found in the informal economy (qualitative study on Mexico by Rodin et al. (2012)).

---

<sup>1</sup>Unpaid activities that can be assigned to a paid worker (Reid, 1934).

# Background Mexico

- Low level of social security nets
  - ▶ Often forces people to accept any kind of job to make a living.
- Conservative ideas on labor division persist
  - ▶ Breadwinner model: housework is assigned to women and men monetarily earn a living for the family.
- Women spend triple the amount of hours on unpaid work compared to men.
  - ▶ Predominantly duties that have to be accomplished on a daily basis (home and care work).

## Contribution

- Empirically test whether unpaid work inhibits employment for women in the formal economy and whether there is a difference among gender.

# Background Mexico

- Low level of social security nets
  - ▶ Often forces people to accept any kind of job to make a living.
- Conservative ideas on labor division persist
  - ▶ Breadwinner model: housework is assigned to women and men monetarily earn a living for the family.
- Women spend triple the amount of hours on unpaid work compared to men.
  - ▶ Predominantly duties that have to be accomplished on a daily basis (home and care work).

## Contribution

- Empirically test whether unpaid work inhibits employment for women in the formal economy and whether there is a difference among gender.



# Data

- Data: 4th quarter 2014 of the national occupation and employment survey of Mexico (*Encuesta Nacional de Ocupación y Empleo, ENOE*).
  - ▶ 298,746 individuals in total, 156,871 women and 141,875 men
- Without unavailable population
  - ▶ 196,719 individuals in total, 82,740 women and 113,979 men
- Employment status  
Unemployment, informal employment, formal employment
- Unpaid work  
Care for children and elderly, errand, construction, housework, repair, and community work

# Data

- Data: 4th quarter 2014 of the national occupation and employment survey of Mexico (*Encuesta Nacional de Ocupación y Empleo, ENOE*).
  - ▶ 298,746 individuals in total, 156,871 women and 141,875 men
- Without unavailable population
  - ▶ 196,719 individuals in total, 82,740 women and 113,979 men
- Employment status  
Unemployment, informal employment, formal employment
- Unpaid work  
Care for children and elderly, errand, construction, housework, repair, and community work

# Hours spent on unpaid work in Mexico

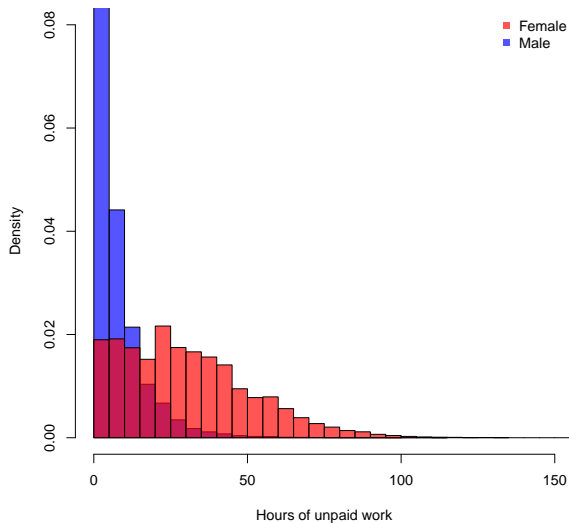


Table: Summary statistics women

| Variable       | Unavailable | Unemployed | Informal | Formal |
|----------------|-------------|------------|----------|--------|
| Age            | 40.45       | 37.74      | 39.25    | 37.67  |
| Education      | 8.26        | 8.70       | 8.66     | 12.53  |
| Unpaid work    | 32.03       | 33.03      | 28.12    | 23.99  |
| Care           | 7.47        | 7.03       | 5.82     | 5.33   |
| Errand         | 2.19        | 2.12       | 2.36     | 2.39   |
| Accompany      | 0.72        | 0.77       | 0.68     | 0.60   |
| Construction   | 0.00        | 0.01       | 0.00     | 0.00   |
| Repair work    | 0.04        | 0.04       | 0.04     | 0.04   |
| Housework      | 21.53       | 22.94      | 19.15    | 15.57  |
| Community work | 0.08        | 0.11       | 0.07     | 0.06   |

# Regression Technique

Employment status consists of the categories unemployment, informally employed and formally employed, which exhibit a hierarchical structure that allows to use the sequential logit model.

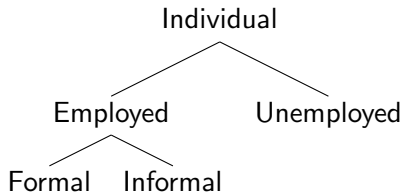


Figure: Employment tree

# Sequential Logit Model

$$P(y_1 = \text{Employed}) = F(\beta_0 + \beta_1 \text{age} + \beta_2 \text{age}^2 + \beta_3 \text{educ} + \beta_4 \text{urban} + \beta_5 \text{married} + \beta_6 \text{gender} + \beta_7 \text{unpaid} + \beta_8 \text{unpaid} * \text{gender} + \text{child5} + \text{child612} + \text{child5} * \text{gender} + \text{child612} * \text{gender}) \quad (1)$$

$$P(y_2 = \text{Informal}) = F(\gamma_0 + \gamma_1 \text{age} + \gamma_2 \text{age}^2 + \gamma_3 \text{educ} + \gamma_4 \text{urban} + \gamma_5 \text{married} + \gamma_6 \text{gender} + \gamma_7 \text{unpaid} + \gamma_8 \text{unpaid} * \text{gender} + \text{child5} + \text{child612} + \text{child5} * \text{gender} + \text{child612} * \text{gender}) \quad (2)$$

Table: Logit regression: average marginal probabilities

|                     | Employed               | Informal               | Employed               | Informal               |
|---------------------|------------------------|------------------------|------------------------|------------------------|
| Female              | -0.0350***<br>(0.0027) | -0.0535***<br>(0.0055) | -0.0226***<br>(0.0028) | -0.0480***<br>(0.0058) |
| Unpaid              | -0.0039***<br>(0.0001) | 0.0006**<br>(0.0002)   | -0.0045***<br>(0.0001) | 0.0008**<br>(0.0003)   |
| Female x Unpaid     | 0.0004**<br>(0.0001)   | 0.0041***<br>(0.0003)  | 0.0007***<br>(0.0001)  | 0.0042***<br>(0.0003)  |
| Child 5             |                        |                        | 0.0545***<br>(0.0022)  | -0.0108***<br>(0.0031) |
| Child 6-12          |                        |                        | 0.0181***<br>(0.0018)  | 0.0173***<br>(0.0028)  |
| Female x Child 5    |                        |                        | -0.0206***<br>(0.0027) | -0.0292***<br>(0.0046) |
| Female x Child 6-12 |                        |                        | -0.0047*<br>(0.0022)   | -0.0042<br>(0.0042)    |

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , *Standard errors in parenthesis.*

# Results II

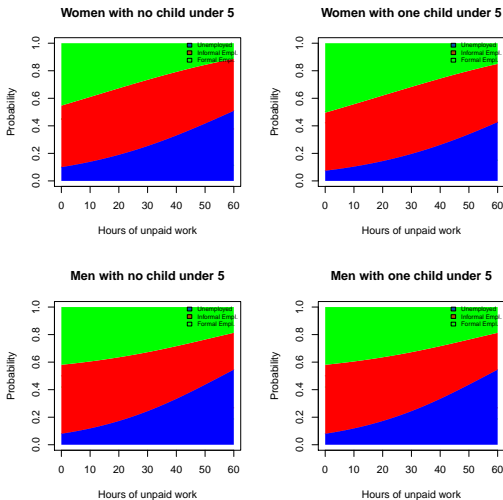


Figure: Sequential logit for 27 year old, married men and women with nine years of education in urban areas



# Main Findings

- Hours spend on unpaid work decrease the probability for women to be formally employed.
  - ▶ Unemployment:  $0.38\%_p \times 28h = 10.28\%_p$
  - ▶ Informal employment:  $0.5\%_p \times 28h = 14\%_p$
  
- Hours spend on unpaid work are not highly related with the employment status of men.
  - ▶ Unemployment:  $0.45\%_p \times 7h = 3.15\%_p$
  - ▶ Informal employment:  $0.08\%_p \times 7h = 0.57\%_p$

# Discussion

- Reverse Causality
  - ▶ Seems to be an issue especially in terms of unemployed men.
  - ▶ Women who decide to stay home are not included in the analysis.
  - ▶ No information on access to water or electricity (time use data).
  - ▶ Inference must be treated with great caution.
- Unpaid work
  - ▶ Unpaid work done by women predominantly incorporates duties that have to be accomplished on a daily basis.
  - ▶ Simultaneity issue (time use data)
- Intersectionalities (ethnicity, class, geographic aspects)

# Conclusion

- Inequalities in unpaid work inhibit women in Mexico to be formally employed.
- Slight relationship between unpaid work and employment status for men.
- Unpaid work restricts women in Mexico to get formal employment. This harms women's labor market outcomes and leads to a higher vulnerability to poverty.

# Conclusion

- Inequalities in unpaid work inhibit women in Mexico to be formally employed.
- Slight relationship between unpaid work and employment status for men.
- Unpaid work restricts women in Mexico to get formal employment. This harms women's labor market outcomes and leads to a higher vulnerability to poverty.

**Thank you for your attention!**

# References I

- Amarante, V. and Rossel, C. (2018). Unfolding Patterns of Unpaid Household Work in Latin America. *Feminist Economics*, 24(1):1–34.
- Benería, L. (2003). *Gender, Development, and Globalization: Economics as if All People Mattered*. Routledge, New York.
- Campaña, J. C., Giménez-Nadal, J. I., and Molina, J. A. (2018). Gender Norms and the Gendered Distribution of Total Work in Latin American Households. *Feminist Economics*, 24(1):35–62.
- Chen, M., Vanek, J., Lund, F., Heintz, J., and Jhabvala, R. (2005). *Women, Work and Poverty*, volume 2005 of *Progress of the World's Women*. United Nations Development Fund for Women, New York.
- Elson, D. (1999). Labor Markets as Gendered Institutions: Equality, Efficiency and Empowerment Issues. *World Development*, 27(3):611–627.
- Instituto Nacional de Estadística y Geografía (INEGI) (2014). *La informalidad laboral: Encuesta Nacional de Ocupación y Empleo: Marco conceptual y metodológico*. Instituto Nacional de Estadística y Geografía (INEGI), Aguascalientes, Mexico.

## References II

- Instituto Nacional de Estadística y Geografía (INEGI) (2016). *Encuesta Nacional de Ocupación y Empleo (ENOE), población de 15 años y más de edad: Microdatos - descarga*. <http://www3.inegi.org.mx/sistemas/tabuladosbasicos/tabtema.aspx?s=est&c=33698>.
- Ponthieux, S. and Meurs, D. (2015). Gender Inequality. In Atkinson, A. B. and Bourguignon, F., editors, *Handbook of Income Distribution*, volume 16 of *Handbooks in economics*, pages 981–1146. Elsevier Science, Burlington.
- Reid, M. G. (1934). *Economics of Household Production*. John Wiley, New York.
- Rodin, D. L., McNeill, K., Vite-León, N., and Heymann, J. (2012). Determinants of Informal Employment Among Working Mothers in Mexico. *Community, Work & Family*, 15(1):85–99.

| Gender | Unavailable         | Unemployed        | Informal            | Formal              | Total               |
|--------|---------------------|-------------------|---------------------|---------------------|---------------------|
| Men    | 8,225,556<br>9.2%   | 3,296,956<br>3.7% | 18,025,700<br>20.1% | 13,169,535<br>14.7% | 42,717,747<br>47.5% |
| Female | 23,299,826<br>25.9% | 5,014,109<br>5.6% | 11,061,567<br>12.3% | 7,790,548<br>8.7%   | 47,166,050<br>52.5% |
| Total  | 31,525,382<br>35.1% | 8,311,065<br>9.2% | 29,087,267<br>32.4% | 20,960,083<br>23.3% | 89,883,797          |

Table: Summary statistics



| Variable       | Unavailable | Unemployed | Informal | Formal |
|----------------|-------------|------------|----------|--------|
| Age            | 37.21       | 35.00      | 38.73    | 38.82  |
| Education      | 8.66        | 9.33       | 8.16     | 11.52  |
| Unpaid work    | 7.03        | 9.03       | 6.50     | 7.42   |
| Care           | 0.75        | 1.44       | 1.38     | 2.02   |
| Errand         | 0.82        | 0.90       | 1.06     | 1.42   |
| Accompany      | 0.10        | 0.21       | 0.18     | 0.30   |
| Construction   | 0.05        | 0.08       | 0.04     | 0.03   |
| Repair work    | 0.37        | 0.61       | 0.41     | 0.39   |
| Housework      | 4.88        | 5.71       | 3.35     | 3.22   |
| Community work | 0.07        | 0.08       | 0.08     | 0.04   |

Table: Summary statistics men

# Results

**Table:** Partial marginal effects for married women and men with children

| Unpaid work | No child   |          |        | One child under 5 |          |        |
|-------------|------------|----------|--------|-------------------|----------|--------|
|             | Unemployed | Informal | Formal | Unemployed        | Informal | Formal |
| Women       |            |          |        |                   |          |        |
| 5           | 0.12       | 0.46     | 0.42   | 0.09              | 0.44     | 0.47   |
| 14          | 0.16       | 0.48     | 0.36   | 0.12              | 0.46     | 0.42   |
| 27          | 0.23       | 0.48     | 0.28   | 0.18              | 0.48     | 0.34   |
| 42          | 0.35       | 0.46     | 0.20   | 0.28              | 0.48     | 0.24   |
| Men         |            |          |        |                   |          |        |
| 5           | 0.10       | 0.49     | 0.41   | 0.06              | 0.50     | 0.44   |
| 14          | 0.14       | 0.48     | 0.38   | 0.09              | 0.49     | 0.42   |
| 27          | 0.22       | 0.44     | 0.34   | 0.15              | 0.47     | 0.38   |
| 42          | 0.35       | 0.37     | 0.27   | 0.25              | 0.42     | 0.33   |

**Table:** Marginal average effects logit regression 4 trimester 2014

|                    | Employed               | Informal               | Employed               | Informal               |
|--------------------|------------------------|------------------------|------------------------|------------------------|
| Age                | 0.0227***<br>(0.0003)  | -0.0242***<br>(0.0007) | 0.0223***<br>(0.0003)  | -0.0254***<br>(0.0007) |
| Age <sup>2</sup>   | -0.0003***<br>(0.0000) | 0.0003***<br>(0.0000)  | -0.0002***<br>(0.0000) | 0.0003***<br>(0.0000)  |
| Education          | 0.0029***<br>(0.0002)  | -0.0510***<br>(0.0004) | 0.0037***<br>(0.0002)  | -0.0511***<br>(0.0004) |
| Urban              | 0.0011<br>(0.0020)     | -0.2094***<br>(0.0037) | 0.0041*<br>(0.0020)    | -0.2089***<br>(0.0038) |
| Married            | 0.0256***<br>(0.0018)  | -0.0626***<br>(0.0034) | 0.0188***<br>(0.0018)  | -0.0644***<br>(0.0035) |
| Female             | -0.0350***<br>(0.0027) | -0.0535***<br>(0.0055) | -0.0226***<br>(0.0028) | -0.0480***<br>(0.0058) |
| Unpaid             | -0.0039***<br>(0.0001) | 0.0006**<br>(0.0002)   | -0.0045***<br>(0.0001) | 0.0008**<br>(0.0003)   |
| Female x Unpaid    | 0.0004**<br>(0.0001)   | 0.0041***<br>(0.0003)  | 0.0007***<br>(0.0001)  | 0.0042***<br>(0.0003)  |
| Child 5            |                        |                        | 0.0545***<br>(0.0022)  | -0.0108***<br>(0.0031) |
| Child 612          |                        |                        | 0.0181***<br>(0.0018)  | 0.0173***<br>(0.0028)  |
| Female x Child 5   |                        |                        | -0.0206***<br>(0.0027) | -0.0292***<br>(0.0046) |
| Female x Child 612 |                        |                        | -0.0047*<br>(0.0022)   | -0.0042<br>(0.0042)    |
| Num. obs.          | 162313                 | 138310                 | 155790                 | 132835                 |
| AIC                | 106900.4952            | 133041.9922            | 101450.9432            | 128028.7458            |

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , *Standard errors in parenthesis*

|                      | Informal               | Informal               | Informal               | Informal               | Informal               |
|----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Age                  | -0.0464***<br>(0.0020) | -0.0458***<br>(0.0020) | -0.0478***<br>(0.0020) | -0.0467***<br>(0.0020) | -0.0447***<br>(0.0020) |
| Age <sup>2</sup>     | 0.0005***<br>(0.0000)  | 0.0005***<br>(0.0000)  | 0.0005***<br>(0.0000)  | 0.0005***<br>(0.0000)  | 0.0005***<br>(0.0000)  |
| Education            | -0.0857***<br>(0.0020) | -0.0852***<br>(0.0020) | -0.0847***<br>(0.0020) | -0.0803***<br>(0.0020) | -0.0809***<br>(0.0020) |
| Urban                | -0.2569***<br>(0.0099) | -0.2552***<br>(0.0097) | -0.2547***<br>(0.0099) | -0.2144***<br>(0.0109) | -0.2154***<br>(0.0107) |
| Married              | -0.0757***<br>(0.0100) | -0.0730***<br>(0.0100) | -0.0811***<br>(0.0102) | -0.0757***<br>(0.0102) | -0.0676***<br>(0.0100) |
| Female               | -0.0234<br>(0.0130)    | 0.0378***<br>(0.0106)  | -0.0251<br>(0.0134)    | -0.1321<br>(0.0705)    | -0.0661<br>(0.0689)    |
| Unpaid work          | -0.0001<br>(0.0004)    |                        | -0.0001<br>(0.0004)    | -0.0002<br>(0.0004)    |                        |
| Female x unpaid work | 0.0026***<br>(0.0004)  |                        | 0.0026***<br>(0.0004)  | 0.0027***<br>(0.0004)  |                        |
| Child 0-5            |                        | -0.0142<br>(0.0103)    | -0.0093<br>(0.0106)    | -0.0131<br>(0.0107)    | -0.0187<br>(0.0104)    |
| Child 6-12           |                        | 0.0256**<br>(0.0081)   | 0.0284***<br>(0.0083)  | 0.0220**<br>(0.0084)   | 0.0193*<br>(0.0082)    |
| Female x Child 0-5   |                        | 0.0333<br>(0.0185)     | -0.0290<br>(0.0198)    | -0.0286<br>(0.0197)    | 0.0346<br>(0.0184)     |
| Female x Child 6-12  |                        | 0.0477***<br>(0.0134)  | 0.0215<br>(0.0137)     | 0.0274*<br>(0.0137)    | 0.0534***<br>(0.0134)  |
| water                |                        |                        |                        | -0.2134***<br>(0.0205) | -0.2073***<br>(0.0204) |
| Female x water       |                        |                        |                        | -0.1869***<br>(0.0206) | -0.1836***<br>(0.0202) |
| Electricity          |                        |                        |                        | 0.1102*<br>(0.0501)    | 0.0979*<br>(0.0496)    |
| Female x electricity |                        |                        |                        | -0.0002<br>(0.0526)    | 0.0107<br>(0.0510)     |
| Num. obs.            | 15712                  | 16074                  | 15712                  | 15712                  | 16074                  |
| AIC                  | 17087.1480             | 17519.8975             | 17058.2421             | 16875.3516             | 17340.2758             |

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , *Standard errors in parenthesis*

|                      | Employed               | Employed               | Employed               | Employed               | Employed               |
|----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Age                  | 0.0019***<br>(0.0003)  | 0.0016***<br>(0.0004)  | 0.0017***<br>(0.0003)  | 0.0017***<br>(0.0003)  | 0.0016***<br>(0.0004)  |
| Age <sup>2</sup>     | -0.0000***<br>(0.0000) | -0.0000***<br>(0.0000) | -0.0000***<br>(0.0000) | -0.0000***<br>(0.0000) | -0.0000***<br>(0.0000) |
| Education            | 0.0005<br>(0.0005)     | 0.0008<br>(0.0005)     | 0.0008<br>(0.0005)     | 0.0010*<br>(0.0005)    | 0.0011*<br>(0.0005)    |
| Urban                | -0.0134***<br>(0.0021) | -0.0114***<br>(0.0023) | -0.0126***<br>(0.0021) | -0.0100***<br>(0.0023) | -0.0086***<br>(0.0026) |
| Married              | 0.0150***<br>(0.0024)  | 0.0104***<br>(0.0026)  | 0.0117***<br>(0.0024)  | 0.0119***<br>(0.0024)  | 0.0107***<br>(0.0026)  |
| Female               | 0.0108***<br>(0.0030)  | 0.0110***<br>(0.0025)  | 0.0117***<br>(0.0029)  | -0.0065<br>(0.0143)    | -0.0063<br>(0.0151)    |
| Unpaid work          | -0.0005***<br>(0.0001) |                        | -0.0005***<br>(0.0001) | -0.0005***<br>(0.0001) |                        |
| Female x unpaid work | 0.0003***<br>(0.0001)  |                        | 0.0002***<br>(0.0001)  | 0.0002***<br>(0.0001)  |                        |
| Child 0-5            |                        | 0.0079**<br>(0.0029)   | 0.0104***<br>(0.0028)  | 0.0101***<br>(0.0028)  | 0.0074*<br>(0.0029)    |
| Child 6-12           |                        | 0.0036<br>(0.0021)     | 0.0044*<br>(0.0020)    | 0.0042*<br>(0.0020)    | 0.0033<br>(0.0021)     |
| Female x Child 0-5   |                        | 0.0071<br>(0.0070)     | 0.0110<br>(0.0067)     | 0.0110<br>(0.0067)     | 0.0073<br>(0.0070)     |
| Female x Child 6-12  |                        | -0.0013<br>(0.0039)    | 0.0001<br>(0.0036)     | 0.0003<br>(0.0036)     | -0.0009<br>(0.0038)    |
| water                |                        |                        |                        | -0.0061<br>(0.0043)    | -0.0069<br>(0.0045)    |
| Female x water       |                        |                        |                        | -0.0126***<br>(0.0031) | -0.0124***<br>(0.0034) |
| Electricity          |                        |                        |                        | -0.0020<br>(0.0120)    | -0.0011<br>(0.0128)    |
| Female x electricity |                        |                        |                        | 0.0196*<br>(0.0084)    | 0.0181*<br>(0.0088)    |
| Num. obs.            | 16134                  | 16501                  | 16134                  | 16134                  | 16501                  |
| AIC                  | 3790.5556              | 3912.4533              | 3750.2112              | 3742.1701              | 3906.7919              |

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , *Standard errors in parenthesis*

## Informal employment

Informal employment is defined as suggested by the Mexican statistical office. It is comprised of those employees who operate in economic units not registered in the non agricultural sector, production modes formed by families who operate within the agricultural sector and those employees who perform work which is not registered under any type of economic activity. Family workers who get not paid in money are considered informal if they work in economic units which are defined as informal. If they have no workers' rights but contribute to the creation of products and services then they are as well considered as informal (Instituto Nacional de Estadística y Geografía (INEGI), 2014).

# The Sequential Logit Model

Every transition of the sequence can be modeled via a binary regression model. The binary decision is between staying in a category or moving to a higher category. Therefore the process of transition ( $r$ th step) is described by

$$P(Y_i = r | Y_i \geq r) = F(\theta_r + x_i' \beta), \quad r = 1, \dots, c. \quad (3)$$

The process stops as soon as a transition to a next category is not taking place. Then the process remains in category  $r$ . Where  $\theta_r$  is the transition-specific intercept and  $x_i' \beta$  are the regression effects.

The probabilities of choice of each stage should be independent of each other, thus conceptually distinct and statistically independent.

# The Sequential Logit Model

$$\text{Prob}(Y_i = \textit{Unemployed}) = \text{Prob}(Y_{1i} = \textit{unemployed}) \quad (4)$$

$$\text{Prob}(Y_i = \textit{Informal}) = (1 - \text{Prob}(Y_{1i} = \textit{unemployed})) * \text{Prob}(Y_{2i} = \textit{Informal}) \quad (5)$$

$$\text{Prob}(Y_i = \textit{Formal}) = (1 - \text{Prob}(Y_{1i} = \textit{unemployed})) * (1 - \text{Prob}(Y_{2i} = \textit{Informal})) \quad (6)$$