

Women in labor market: an analysis on the **female urban wage premium** in Brazil¹

Eloiza Regina Ferreira de Almeida²
Professor Veneziano de Castro Araújo²
Professor Solange Ledi Gonçalves²

²Federal University of São Paulo - Brazil

Submitted to Brazillian Stata Conference - December, 2019

¹ We gratefully acknowledge financial support for this research from *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES*.

Outline

- 1 Introduction
- 2 Empirical Strategy
- 3 Results
- 4 Final Remarks

Introduction & Motivation

- Urban Wage Premium (UWP)
 - Positive wage differential that remains even after control for the observed and unobserved characteristics.
- The Literature of UWP in Brazil neglect the analysis for women.
- UWP has different magnitude between Men and Women:
 - **Higher for Women** due to: the better matching and access to services (as childcare) in denser areas, even with mobility restrictions (depending on the marital status) (NISIC, 2017; MADDEN; CHIU, 1990; MEEKES; HASSINK, 2018);
 - **Lower for Women** due to: career interruptions, higher turnover, less worked-hours (PHIMISTER, 2005)
- Being a Formal or Informal worker influenced the wage differentials between Men and Women, which also impact the UWP of each group.

Working-age population by Gender and Area

Table 2: Descriptive analysis of working-age population

	(a) Local					
	Mulheres		Homens			
	MA	Non-MA	MA	Non-MA		
	Avg/Share	Avg/Share	Avg/Share	Avg/Share		
<i>Características individuais</i>						
Age	39,4	39,1	38,5	38,8		
Years of Schooling	10,7	9,0	10,5	8,5		
High School and above	59,2%	44,1%	56,7%	37,4%		
Race (whites)	44,6%	46,6%	43,4%	45,5%		
Marital status (married)	52,5%	59,4%	55,1%	59,8%		
Home household head	35,4%	30,3%	51,5%	57,2%		
<i>Composição do Domicílio</i>						
No Child under 14	66,2%	61,6%	67,8%	63,3%		
Children under 7	0,21	0,25	0,20	0,23		
Children between 7 and 14	0,28	0,35	0,27	0,33		
Working-age children	0,45	0,42	0,37	0,35		
Total Household wage (R\$ month)	2.494,94	1.711,67	1.916,21	1.201,13		
Total Household members	3,52	3,61	3,51	3,60		
Household head/spouse occupied	56,7%	58,7%	49,2%	46,9%		
<i>Características do Trabalho</i>						
Unemployment rate	14,1%	12,9%	10,0%	7,7%		
Labour Participation	53,7%	46,0%	75,8%	76,0%		
Formal Worker	63,6%	56,2%	67,9%	56,8%		
Tenure (years)	5,5	5,7	6,9	8,0		
Weekly worked hours	38,7	37,3	43,4	43,1		
Weekly Hourly wage	14,2	9,9	-30,4%	17,4	12,0	-30,8%
Share of individuals	41,7%	58,3%	39,1%	60,9%		

Fonte: Elaborado pelo autor com base na PNADC (IBGE, 2018) para o período de 1^o trimestre de 2012 ao 1^o trimestre de 2019. População em idade ativa de 18 a 65 anos, excluindo trabalhadores do Setor Público, militares, estatutários e trabalhador familiar auxiliar. Considerando apenas a 1^a entrevista de cada indivíduo. IBGE PNADC 2019 25 ANOS

Objective

Objective: Evaluate the women's labor market from the specific perspective of the UWP. The focus is to verify if there are different results among MAs in Brazil comparing with the group of men.

Main contribution:

- **The goal itself is a contribution**
 - Since the literature is omitted
- We provide a in-depth analysis of Female UWP by:
 - Untangling how the characteristics of **individuals and households** influence the UWP
 - Considering the whole Labor Market (the whole country, sectors, correcting sample selection)
 - Exploring the UWP at different Agglomeration levels
 - Exploring the UWP at different **levels of the wage distribution**

Data and Sample

Continuous National Household Sample Survey (PNADC)

Sample:

- Employees aged 18 to 65 (Men and Women)
- Excluding the military, statutory and public sector workers and auxiliary family workers
- From 2012 to 2019(Q1)

Total: 843k observations for Women and 826k for Men

Agglomeration Levels

Metropolitan Areas corresponds to 41.1% of total population.

Table 1: Agglomeration levels definition

MA	State	Macro-Region	Population	Agglomeration Levels	
São Paulo	São Paulo	Southeast	21.571.281	Extra-Large MA	
Rio de Janeiro	Rio de Janeiro	Southeast	12.699.743		
Belo Horizonte	Minas Gerais	Southeast	5.916.189	Large MA	
Porto Alegre	Rio Grande do Sul	South	4.317.508		
Fortaleza	Ceará	Northeast	4.074.730		
Recife	Pernambuco	Northeast	3.975.411		
Salvador	Bahia	Northeast	3.899.533		
Curitiba	Paraná	South	3.615.027		
Distrito Federal	Distrito Federal	Midwest	2.974.703		
Manaus	Amazonas	North	2.631.239		
Goiânia	Goiás	Midwest	2.564.755		
Belém	Pará	North	2.491.052		
Grande Vitória	Espírito Santo	Southeast	1.951.673	Medium MA	
Grande São Luís	Maranhão	Northeast	1.621.102		
Natal	Rio Grande do Norte	Northeast	1.587.055		
Maceió	Alagoas	Northeast	1.330.291		
João Pessoa	Paraíba	Northeast	1.266.463		
Florianópolis	Santa Catarina	South	1.189.947		
Vale do Rio Cuiabá	Mato Grosso	Midwest	1.032.714		
Aracaju	Sergipe	Northeast	949.342	Small MA	
Campo Grande*	Mato Grosso do Sul	Midwest	885.711		
Teresina*	Piauí	Northeast	861.442		
Macapá	Amapá	North	634.450		
Porto Velho*	Rondônia	North	519.531		
Rio Branco*	Acre	North	401.155		
Boa Vista*	Roraima	North	375.374		
Palmas*	Tocantins	North	291.855		
MA			85.629.276		41,1%
Non-MA			122.865.624		58,9%

Notes: Estimated population for 2018 (IBGE, 2018).

*Only State's Capital.

Empirical Strategy

Methods:

- 1 Heckman Correction
 - 2 steps procedure
 - Selection equation with household variables
- 2 POLS - Mincer's equation
 - MA versus Non-MA and for Agglomeration Levels
 - Formal and Informal workers (separated)
 - Interactions with different **household positions and marital status**
 - Robustness tests
 - Estimated with individuals' sample weight and robust standard errors clustered by individuals.
- 3 Quantile Regressions
 - UWP magnitude by **Wage and Agglomeration Levels**
 - Formality returns by Wage and Agglomeration Levels (in the paper)
 - Cross-section approach: only the 1st observation of each individual with sample weights and robust standard errors.
- 4 Fixed Effects
 - Returns associated with individuals characteristics compared to POLS coefficients (in the paper)

Variables

svy: reg

Mincer's equation:

Dependent variable: Ln(hourly-wage) temporarily deflated using INPC.

Individual	Occupation	Firm	Region/Time
Age	Tenure	Industry	MA or Non-MA
Educational Level	Skill level	Formality Status	Agglomeration Scale
Race			Macro-Region
Marital status			Year
Head of Household (yes/no)			Quarter
			Unemployment rate*

*Calculated by Macro-Region, MA, Year, Quarter and level of education.

Selection Equation:

Dependent variable: Be employed or not.

Additional variables:

- Number of household members
- If there is at least one Child under 14 years (yes/no)
- Number of children: (i) up to 6 years old; (ii) between 7 and 14 years old in the household
- Total household wages, not including worker i wage
- If the head of household or spouse is employed (yes/no)
- Number of working-age children in the household
- If there is at least one married head children in the household
- Spouse wage
- Children wage

Results

Results: Labor Market Participation

svy: heckman

Table 5 - Heckman's correction detail

			Continuação...		
	(a) Mulheres	(b) Homens		(a) Mulheres	(b) Homens
	Probit	Probit		Probit	Probit
	<i>Estar</i>	<i>Estar</i>		<i>Estar</i>	<i>Estar</i>
<i>Variável Dependente</i>	<i>empregado</i>	<i>empregado</i>	<i>Variável Dependente</i>	<i>empregado</i>	<i>empregado</i>
Maritalstatus	-0.280*** (0.00604)	0.258*** (0.00544)	HHwage (ln)	0.00751*** (0.000904)	-0.0117*** (0.000898)
HHhead	0.236*** (0.00430)	0.176*** (0.00449)	PosHS	0.159*** (0.0104)	0.349*** (0.00724)
NoChild	-0.0839*** (0.00702)	-0.193*** (0.00820)	WAchild	-0.0266*** (0.00648)	0.0662*** (0.00726)
Child6 (ln)	-0.433*** (0.00756)	-0.0143* (0.00855)	MarrChild	0.0632*** (0.0104)	0.00645 (0.0125)
Child14 (ln)	-0.119*** (0.00741)	-0.0696*** (0.00824)	Spousewage	0.00408*** (0.00151)	-0.0109*** (0.00122)
HHpeople (ln)	-0.216*** (0.00573)	-0.152*** (0.00600)	Childwage	0.0176*** (0.000839)	0.0179*** (0.00101)

Reported only Probit results for selected variables.

Notes: Estimacões para a base da PNADC com população entre 18 e 65 anos, empregado e desempregado do 1st trimestre de 2012 ao 1st trimestre de 2019. Todos os modelos incluem o termo constante, erros robustos e clusterizados ao nível do indivíduo e estimacões consideram o peso individual pós-estratificacão disponível na PNADC (IBGE, 2018). Constante, controles e erros omitidos por restricão de espaço.

Nível de significância: *** p<0.01, ** p<0.05, * p<0.1.

Results: by Formality Status

svy: reg
outreg2

UWP by gender

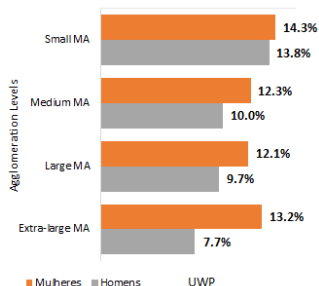


Table 7 - POLS para o Ln(Salário hora) por tipo de vínculo

<i>Var.Dep.=lnhwage</i>	(a) Mulheres		(b) Homens	
	<i>Formal</i>	<i>Informal</i>	<i>Formal</i>	<i>Informal</i>
Escala de Aglomeração				
<i>Small MA</i>	0.0774*** (0.00441)	0.204*** (0.00549)	0.0747*** (0.00422)	0.195*** (0.00511)
<i>Medium MA</i>	0.0775*** (0.00358)	0.176*** (0.00478)	0.0583*** (0.00340)	0.149*** (0.00450)
<i>Large MA</i>	0.0949*** (0.00283)	0.160*** (0.00390)	0.0735*** (0.00290)	0.126*** (0.00385)
<i>Extra-large MA</i>	0.149*** (0.00444)	0.122*** (0.00589)	0.0937*** (0.00436)	0.0597*** (0.00603)

Pattern:



Notas: Categorias base: Non-MA, Schooling Level = menos de 1 ano, Low OS, Setor Agricultura, Região Sudeste. Todos os modelos foram estimados considerando o peso individual pós-estratificação disponível na PNADC (IBGE, 2018). Coeficientes para a Constante e controles omitidos por restrição de espaço. Erros robustos clusterizados ao nível do indivíduo mostrados em parênteses. Nível de significância: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Results: Interactions with Agg Levels by Household positions

svy: reg
outreg2

Table 8 - Efeitos Agregados para as Interações com a Escala de Aglomeração

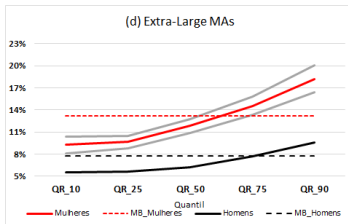
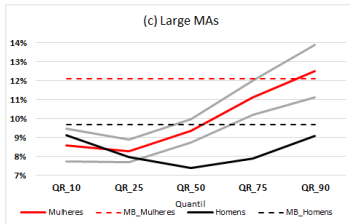
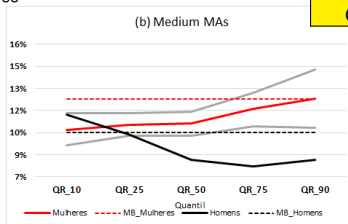
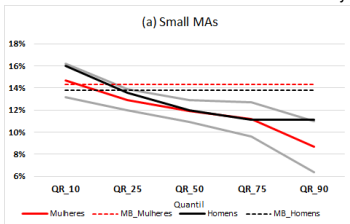
	Escala de Aglomeração			
	Small MA	Medium MA	Large MA	Extra-large MA
Modelo Base				
<i>Mulheres</i>	14,3%	12,3%	12,1%	13,2%
<i>Homens</i>	13,8%	10,0%	9,7%	7,7%
Interações com a Escala de Aglomeração				
(A) Casado				
<i>Mulheres</i>	20,5%	17,8%	18,0%	19,4%
<i>Homens</i>	18,5%	14,6%	14,5%	12,9%
(B) Solteiro				
<i>Mulheres</i>	14,0%	13,2%	12,1%	12,7%
<i>Homens</i>	12,8%	9,4%	8,5%	5,5%
(C) Chefe do Domicílio				
<i>Mulheres</i>	14,4%	13,1%	12,9%	13,9%
<i>Homens</i>	18,9%	14,8%	14,7%	13,0%
(D) Outras posições				
<i>Mulheres</i>	14,7%	12,1%	11,9%	13,0%
<i>Homens</i>	11,5%	8,4%	7,4%	4,6%

Notas: Soma dos β associados a MA_{it} , $Maritalstatus_{it}$ ou $HHhead_{it}$ e a interação entre eles. Considera apenas a primeira entrevista de cada indivíduo (309.837 observações para Mulheres, 501.048 observações para Homens). Categorias base: Non-MA, Schooling Level = menos de 1 ano, Low OS, Setor Agricultura, Região Sudeste. Todos os modelos foram estimados considerando o peso individual pós-estratificação disponível na PNADC (IBGE, 2018). Todos os modelos foram estimados considerando controles para as características do indivíduo, ocupação e firma (setor de atividade), dummies para Ano, Trimestre e Macro-Região e correção de Heckman, seguindo a especificação do Modelo Base. Coeficientes para a constante, demais controles e erros omitidos por restrição de espaço.

Results: Quantile regressions (1)

Quantiles UWP by Agglomeration Levels

qreg
outreg2



Notas: Elaborado pelo autor com base nos resultados da Tabela 10. Intervalo de confiança a 95%. Eixo vertical denota a magnitude do UWP (coeficiente associado a cada nível de MA). Considera apenas a 1a entrevista de cada indivíduo (309.837 observações para Mulheres, 501.048 observações para Homens). Estimações consideram o peso individual pós-estratificação disponível na PNADC (IBGE, 2018) e controles para as características do indivíduo, ocupação e firma (setor de atividade), dummies para Ano, Trimestre, Macro-Região e correção de Heckman, seguindo a especificação do Modelo Base. Categorias base: Non-MA, Schooling Level = menos de 1 ano, Low OS, Setor Agricultura, Região Sudeste. Coeficientes para a constante e controles omitidos por restrição de espaço.

UNIFESP
25 ANOS

Results: Quantile regressions (2)

Quantiles UWP by Agglomeration Levels - Coefficients

qreg
outreg2

<i>Var.Dep.=lnhwage</i>	<i>Modelo Base</i>	<i>Q10</i>	<i>Q25</i>	<i>Q50</i>	<i>Q75</i>	<i>Q90</i>
(a) Mulheres						
Escala de Aglomeração						
<i>Small MA</i>	0.142*** (0.00575)	0.147*** (0.00777)	0.129*** (0.00495)	0.119*** (0.00505)	0.112*** (0.00783)	0.0868*** (0.0117)
<i>Medium MA</i>	0.131*** (0.00497)	0.102*** (0.00560)	0.105*** (0.00372)	0.106*** (0.00417)	0.116*** (0.00571)	0.123*** (0.00997)
<i>Large MA</i>	0.126*** (0.00375)	0.0859*** (0.00441)	0.0828*** (0.00309)	0.0935*** (0.00321)	0.111*** (0.00448)	0.125*** (0.00707)
<i>Extra Large MA</i>	0.147*** (0.00555)	0.0925*** (0.00591)	0.0966*** (0.00437)	0.118*** (0.00466)	0.145*** (0.00624)	0.182*** (0.00941)
<i>Formality</i>	0.0817*** (0.00312)	0.415*** (0.00456)	0.209*** (0.00312)	0.0564*** (0.00288)	-0.0796*** (0.00381)	-0.176*** (0.00558)
(b) Homens						
Escala de Aglomeração						
<i>Small MA</i>	0.144*** (0.00520)	0.160*** (0.00680)	0.136*** (0.00488)	0.120*** (0.00514)	0.111*** (0.00685)	0.111*** (0.0102)
<i>Medium MA</i>	0.104*** (0.00432)	0.112*** (0.00553)	0.0988*** (0.00392)	0.0814*** (0.00405)	0.0769*** (0.00526)	0.0813*** (0.00798)
<i>Large MA</i>	0.103*** (0.00371)	0.0912*** (0.00442)	0.0798*** (0.00342)	0.0738*** (0.00346)	0.0789*** (0.00448)	0.0907*** (0.00694)
<i>Extra Large MA</i>	0.0860*** (0.00521)	0.0552*** (0.00594)	0.0564*** (0.00462)	0.0616*** (0.00502)	0.0774*** (0.00615)	0.0956*** (0.00916)
<i>Formality</i>	0.164*** (0.00262)	0.326*** (0.00365)	0.223*** (0.00261)	0.144*** (0.00252)	0.0740*** (0.00311)	0.0180*** (0.00463)

Notas: Considera apenas a 1a entrevista de cada indivíduo (309.837 observações para Mulheres, 501.048 observações para Homens). Estimacões consideram o peso individual pós-estratificação disponível na PNADC (IBGE, 2018) e controles para as características do indivíduo, ocupação e firma, dummies para Ano, Trimestre e Macro-Região e correção de Heckman, seguindo a especificação do Modelo Base. Categorias base: Non-MA, menos de 1 ano de escolaridade, Low OS, Agricultura, Sudeste. Coeficientes para a constante e demais controles omitidos por restrição de espaço. Erros robustos clusterizados ao nível do indivíduo mostrados em parênteses. Nível de significância: *** p<0.01, ** p<0.05, * p<0.1.

Final remarks

- Female-LMP is influenced differently by household structure
- The Women-UWP:
 - It's bigger and more constant
 - Has a similar pattern between sectors, while Men are influenced by Informal workers
 - Has a different magnitude and trajectory across the wage distribution and Agglomeration levels
 - **Extra-Large MAs are an advantage for Women, independently of the wage level, household position and marital status**

Next steps

Paper improvements - working in progress:

- Correct for the cost of living
- Evaluate sample selection correction for quantile regression
- Robustness checks for quantile regression
- Control for industry composition ? (with an instrument variable as Bartik)
- Control for firm size
- Include coefficients tests
- Describe and justify endogenous issues & solutions

Thank you!

Support material

Dissertation

Theme: Urban Wage Premium in Brazil: new evidence with informality and gender

Structure: Two papers

1. Urban Wage Premium






- UWP x Agglomeration levels
- Workers' heterogeneity
- Intra-groups characteristics

2. Female UWP

- Female UWP x Male UWP
- Household position x UWP
- UWP across wage distribution

Agglomeration Levels

References I

-  IBGE. Pesquisa Nacional por Amostra de Domicílios Contínua (PNADC) 2012-2019. Instituto Brasileiro de Geografia e Estatística, 2018. Disponível em: <<http://www.ibge.gov.br>>.
-  MADDEN, J. F.; CHIU, L.-i. C. The wage effects of residential location and commuting constraints on employed married women. *Urban Studies*, Sage Publications Sage UK: London, England, v. 27, n. 3, p. 353–369, 1990.
-  MEEKES, J.; HASSINK, W. H. Endogenous local labour markets, regional aggregation and agglomeration economies. *USE Working Paper series*, USE Research Institute, v. 18, n. 03, 2018.
-  NISIC, N. Smaller differences in bigger cities? Assessing the regional dimension of the gender wage gap. *European Sociological Review*, Oxford University Press, v. 33, n. 2, p. 292–3044, 2017.
-  PHIMISTER, E. Urban effects on participation and wages: are there gender differences? *Journal of Urban Economics*, Elsevier, v. 58, n. 3, p. 513–536, 2005.