



LUND UNIVERSITY

School of Economics and Management

Master programme in Economic History

The gender wage-gap in Brazil and the role of discrimination

Igor Baccin Martins

igor.baccin_martins.743@student.lu.se

Abstract: The gender pay-gap is not a new phenomenon in Brazil. Since the increase of female participation on the labor market, the gap has remained a persistent problem that has generated a wide range of studies on the topic. The Human Capital Theory argues that individuals' education and on-the-job experience are essential determinants on wage estimations. This assessment is not disputed in the literature however; there are still differences on wages that are not explained by the traditional variables suggested in the theory. These differences are usually attributed to active discrimination against women. This study suggests that discrimination is not just one reason behind the gap but instead, it is the most relevant reason since women have achieved equal or even higher productive characteristics as men and their ability on obtaining financial compensation for their work is being severely affected.

Key words: wage differentials, discrimination, labor market

EKHM51

Master thesis, (15 credits ECTS)

June 2015

Supervisor: Maria Stanfors

Examiner: Anders Nilsson

Word Count: 10.862

Table of Contents

1. Introduction.....	3
2. Theory	6
2.1) Human Capital Theory	6
2.2) Discrimination Theories.....	9
2.3) Hypotheses	11
3. Previous Research	12
4. Data and Methodology.....	15
4.1) Data	15
4.2) Theoretical Model.....	16
4.2.1) Age	17
4.2.2) Tenure on the Job.....	17
4.2.3) Hours of Housework	18
4.2.4) Educational Level	18
4.2.5) Gender	18
4.2.6) Ethnical Group.....	19
4.2.7) Region of Residence	21
4.2.8) Position within the Family	21
4.2.9) Family Structure.....	22
4.3) First estimates and Modifying factors	23
4.4) Blinder-Oaxaca decomposition method.....	29
5. Results	32
5.1) Gender-specific Regressions	32
5.2) Adjusted Average Wages.....	34
5.3) Gap Decomposition.....	35
6. Conclusion and Final Remarks	39
7. Bibliography.....	41
8. Appendix.....	45

Summary of Tables

Table 1 – First OLS Estimates excluding modifying factors.....	23
Table 2 - First OLS Estimates excluding modifying factors (percentages).....	24
Table 3 – Average years of education in Brazilian Labor Market.....	25
Table 4 - OLS Estimates with modifying factors.....	27
Table 5 – OLS Estimates with modifying factors (percentages)	28
Table 6 – OLS estimates with modifying factors sorted by gender (percentages)	33
Table 7 – Log of Adjusted average wage (BRL).....	35
Table 8 – Log of Adjusted average wage (BRL) and gap decomposition	36
Table 9 – Years of study sorted by gender.....	37
Table 10 – Tenure on the job sorted by gender (months).....	38
Table 11 – Summary Statistics	45
Table 12 – Variables’ Description.....	46
Table 13 - Returns with modifying factors sorted by gender.....	47

1. Introduction

Throughout the twentieth century, women's participation in the labor market systematically increased, especially in the Western world. However, the conditions women are brought into the labor market are not always ideal. In most contexts, women take on family responsibilities and housework to a far greater extent than men, which reflects an unequal division of labor within the family (Hartmann 1981, Blau & Kahn 2007, Hersch & Stratton 1994, Lundberg 2008).

Adding to the unequal division of labor, women have, throughout history, received lower wages when compared to men, being that an undisputed issue (Waldfogel 1998, England 1982, Polachek 1975, Korenman & Neumark 1992, Goldin 2006).

What is disputed, however, is the interpretation of this fact alongside its causes. That controversy is divided into two different branches of ideas being one relying on the market forces and the other one relying on the idea of customary wages.

The first branch argues that differences in wages reflect differences in productivity. The idea is heavily based on the classical economic theory suggesting that employers will maximize profits and, in order to do so, the wage paid to an employee must be his/her marginal product of labor. Any other output different than that would imply in non-maximization of profits, thus, irrational behavior from the firm. Adding to productivity context, Becker (1985 p.33) suggests that "(...)since child care and housework are more effort intensive than leisure and other household activities, married women spend less effort on each hour of market work than married men working the same number of hours". The effects, however, spread way beyond the productivity itself also affecting career choices the "responsibility of married women for child care and housework has major implications for earnings and occupational differences between men and women." (Becker 1985 p.56). Therefore, that branch could explain the wage-gap through productivity and occupational choice.

The second branch, however, is more skeptical about the efficiency of market forces and argue that wages are of customary nature and may be the result of an ideology that devalue women's role in society. Arguably, women's wages would be determined in a customary way and not by market forces (Sharpe 1996). Other authors claim, "(women)

earned a customary wage not one which was generated out of open competition in a sexually neutral labor market” (Rose 1988, p 207).

A number of studies have addressed the wage gap in Brazil, many focusing on the discrimination and customary wage setting. Analyses of the 1980s and 1990s indicate that productive characteristics are not the full explanation for the Brazilian wage gap since women by each decade have become more similar to men with respect to productivity-related characteristics. For example, women have attained equal, or even higher, education compared to men. However, despite more similarity in level of education, the returns to education and experience are still better for men. Consequently, a large part of the gender difference in earnings is unexplained and some argue that it is attributed to active discrimination against women (Barros et al 1995; Leme & Wajnman 2000, Wajnman 2013, Madalozzo, 2010, Kassouf 1998, Giuberti & Menezes-Filho 2005).

Considering this scenario, this paper aims to study the wage gap in Brazil between 2003 and 2013. It aims to investigate the size of the wage gap, its modifying factors, and its underlying cause. More specifically, questions addressed are: How big was the gender wage gap in Brazil at the time of study? How did it change over time? To what extent can the wage gap be understood by differences in characteristics and by unequal treatment, i.e., discrimination? The wage determinants as well as its decomposition between observable and unobservable characteristics will be analyzed in order to provide answers for these questions.

In the analyses, multivariate regressions (OLS) are estimated. The regression models are based on data from the PNADs in 2003, 2008, and 2013. PNAD stands for Pesquisa Nacional por Amostra de Domicílios (National Household Survey). This survey obtains information on demographic and socioeconomic characteristics of the population. Work, income, education and other characteristics of the household are collected. With varying regularity, data regarding migration, fertility and marriage are also investigated.

By analyzing, a more recent time (2003-2013) the study seeks to add to the empirical literature regarding the wage-gap in the Brazilian labor market using the most recent database available. Nonetheless, the aforementioned period is of particular importance due to its political and economic context. Nonetheless, the year of 2003 was the first year that the Worker’s Party have arisen to power in Brazil and was the only ruling party throughout the whole period of study. While presenting an extensive social agenda that even

counts with the creation in 2003 of the Secretariat of Policies for Women, this 10-year period is a good opportunity to study the effects that this continuity have brought to the labor market and consequently the gender wage-gap and its determinants.

2. Theory

In this section, a theoretical framework will be presented. The section is going to be divided into three subsections being the first one related to theories that are related to the individuals' productivity (human capital theories) and the second one to theories that are related to discriminatory behavior. The last subsection will present the hypothesis underlying the present study.

2.1) Human Capital Theory

It is possible to verify that in the last 60 years a wide range of microeconomic level studies regarding wage inequality have arisen. These studies benefit from the development of econometric methods as well as improvements in data collection. Studies of this nature are easily found for countries like the United States, Sweden, United Kingdom and other developed countries from the Western European block.

Becker's (1975) study offers a basic theoretical approach of human capital influence on earnings. The effects of education and on-the-job experience are comprehensively discussed and it is concluded that both variables provide considerable explanation on wage determinants. Adding to the conclusion, the accumulation of both variables by any individual would work similarly to an investment where the returns would occur on the long run. Nonetheless, the effects of post-school investment are also analyzed as well the shape of age-earnings profiles – functions that represents the average earning an individual would get throughout life given the educational level. The conclusions were that the returns from education are better among individuals with higher educational levels and that earnings increase at decreasing rates, tending to stabilize and even slightly decline by the end of the individuals' working life.

These conclusions are similar to the ones proposed by Schultz (1961), whose study made important contributions to the subject while underlining the importance of human capital accumulation in forms of education and on-the-job training and its impacts on earnings' profiles, being steeper for individuals with higher educational levels. Nonetheless, the inclusion of demographic variables as one of the wage determinants appear as an additional factor to be considered when dealing with labor economics. Schultz exemplifies this on the migration pattern from the farms to cities, especially at young ages when individuals have

enough time to break-even the costs of moving by acquiring more on-the-job experience on cities that offer a wider range of job opportunities and more specialized education.

Once individuals have different productivity characteristics – and that productivity characteristics are closely connected to one's educational level - the Human Capital theory argues that it is expected that these differences will be reflected on one's earnings. However, some authors claim that explaining all the differences in terms of human capital accumulation is rather simplistic and new theories were suggested to complement the previous knowledge.

Arrow (1973) conducted a study following a line where a new perspective over education is presented. It is assumed that education contributes in no way to better economic performance but rather, as a screening device. The employer do not know, beforehand, the productivity of each individual, on other words, the information is excessively incomplete. In this case, the selection process would be based on the employers' expectation of productivity. The higher the educational level, the higher the chances of an individual to have a better productivity pattern. The asymmetric information leads employers to use education as a filter.

Stiglitz (1975) also shares the same point of view; however, it is suggested that “screening has productivity returns but tends to increase inequality”. The mechanism behind this statement is that higher levels of education lead to higher returns but these returns happen to be private, on other words, benefit just the owner of the skill, in contrast with social returns that would benefit the whole society. If we bring this concept into a gender perspective, it is possible to infer that if men are being selected due to some subjective higher productivity – in this case, the screening model would not be based purely on the educational level but also on gender – the gender gap will be persistent over time despite the efforts of women.

Even though education and training appear as the most important variables in earnings' determinants, when adding the gender dimension to the earnings inequality framework, a new set of socioeconomic variables must be considered in order to sharpen differences in productivity.

One example of this new dimension brought into discussion can be verified on Hartmann' (1981) study, who suggests that the institution of family is a locus of struggle where production and redistribution takes place. On this scheme, considering a capitalist and

patriarchal society, women are in deep disadvantage since this model benefits households with a male head. This context gives men the possibility to “exercise their patriarchal power over women’s labor” (Hartmann 1981 p. 377).

The exercise of this patriarchal power reflects, for example, in the time spent on housework, which is predominantly made by women. Housework, under these circumstances, appears as a burden since it is energy draining and provides no compensation; heavily impacting on women’s productivity.

Evidences regarding the impact of housework on productivity were already proposed by Mincer & Polachek (1974) who, in addition, found that childbearing and marriage do not work on women’s benefit (in terms of wages, at least). The discussion of this subject brought the conclusion that: “Never-married women spent 90 percent of their years after they left school in the labor market, while married women with children spent less than 50 percent of their time in it” (p. 81).

Considering these impacts, men do not just benefit from having the housework done for them, but also by being able to specialize themselves on the ongoing job which in turn provides higher levels of productivity. This is one of the theories behind the fact that married men, on average, experience a wage-premium when compared to never married men. Another theory that tries to explain this relies on a selection process, where it is argued that men who are successful on the labor market also have some characteristics that are of high importance on the marriage market (Blackburn & Korenman 1994, Goldin 1990, Gray 1997). It is not the idea of this paper, however, to discuss these theories deeply, but it becomes clear that marital status is suggested as a variable with considerable explanatory power when working with gender wage gap.

Nonetheless, the gender wage-gap literature also points to other phenomena that penalize women’s earnings, which is the motherhood penalty. The association between motherhood and lower wages generated several theories that seek to understand the phenomenon.

Childcare, for example, would interrupt women’s experience on-the-job or full-time employment. Consequently, women would suffer with intermittency. Another explanation is that mothers are more willing to accept “mother friendly” jobs that can provide a more flexible schedule in order to cope with parenting. Losses of productivity due to childcare could also be an explanation regarding the lower earnings. Even discriminatory behavior from the firms

– that could assume that women are less productive after becoming mothers – was proposed (Waldfogel 1998, Budig & England 2001).

In the light of the aforementioned theories, it is clear that controlling for maternity is an important step to be taken during the model specification since it has direct effects on women's productivity.

However, not just productivity theories should be considered when studying the earnings of both men and women. Discriminatory behavior itself has already been proposed as one of the major factors behind the wage-gap. That is exactly what makes some authors believe that women's wages are from custom nature. The next section will present some of these theories and its implications on the Human Capital framework.

2.2) Discrimination Theories

As it was already stated, this section is going to present theories related to general discriminatory behavior in the labor market. Even though the theories are not applied to a specific group, they could easily be applied under a gender level perspective.

The systematic study on wage discrimination began with Gary Becker (1957) when analyzing why workers with similar personal characteristics and job attributes were paid differently according to gender, skin color and religion. It was concluded that minority workers must compensate the discriminatory penalty by being more productive. The mechanism behind this compensation would be accepting lower wages for an equivalent productivity. The importance of this study relies on the fact that this was the first time that discrimination effects were being observed in the micro-level.

In the aforementioned study conducted by Becker (1957), discriminatory behavior is established as a "taste" for the employers to discriminate certain groups. This approach is known in the general literature as personal prejudice. Personal prejudice models consider discrimination as an endogenous variable on the employers' decision to hire. It can be summarized as the preference of hiring certain individuals belonging to certain groups regardless productivity levels.

However, personal prejudice models are not the only approach verified in the literature to address the problem of discriminatory behavior. Other approaches consist in statistical prejudice models and imperfect competition.

Arrow (1971), as an example of statistical prejudice models, have suggested that firms have limited information regarding the potential employees. Some employers may choose workers based on certain personal characteristics believing that this provide some evidence regarding the workers' productivity levels given that it is not possible – or either too expensive – to obtain information regarding one's productivity beforehand.

Therefore, it is possible to infer that statistical prejudice models deal with the concept of asymmetric information. Employers would use information regarding group affiliation – education, for example – to infer non-observable characteristics of individuals. This could be extended to gender. It is argued that this would be a rational decision of the employers since the goal is to maximize expected profit and in some cases, the cost of gaining information about the applicants is too big (Phelps, 1972).

The last important consideration regarding discriminatory behavior concerns to imperfect competition models. It is important to mention that these models use the concept of inequality on job opportunities as the backbone for its construction. Piore (1972) proposes the existence of a dual labor market with different opportunities, target public and labor conditions on each of them. These two branches in the labor market were labelled as primary and secondary sector. On the primary sector, one would find the best job opportunities that provide employment and financial stability, lower levels of turnover and high wages. The secondary sector would be the opposite; with lower wages, high instability and high levels of turnover. The idea is that certain people due to some characteristics such as gender or ethnicity would not be able to find positions in the primary sector, but just for the secondary. That would lead to an occupational segregation and inequality among different groups. It is worth mentioning that these models differ from statistical prejudice models because the bias is within the workers, who arguably would look for jobs in the sector in which the probability of being hired is bigger. In statistical prejudice models, as already mentioned, the employer is the one who discriminates. However, one could argue that workers, by expecting discriminatory behavior from the firms, would look for jobs in the secondary sector. Considering these hypothesis, imperfect competition models would be closely connected

with statistical prejudice models differing only on the entity who is going to take the first action (employer of employee).

Therefore, it is important to bear in mind that discrimination in the labor market exists and it could be a plausible explanation behind the gender wage-gap.

With the theoretical foundations established, it is equally important to discuss the hypothesis adopted by this study in order to explore the gender wage-gap in Brazil. They are going to be presented in the next section.

2.3) Hypotheses

Based on the theoretical framework mentioned in the last section, it is assumed that an efficient labor market will pay its individuals according to productivity standards.

If that assessment is true, then the differences in wages must be accounted purely for productivity factors. In other words, no differential in wages is unexplained. They would account for the individual capability of accumulate human capital and be more productive at work.

In the case where a portion of the differential is not explained by productivity characteristics, evidences on discriminatory behavior have to be considered.

In order to test whether or not discrimination in Brazil accounts for a portion in the wage differential, an analysis on previous research as well as an empirical estimation based on OLS models and Oaxaca-Blinder decomposition method is going to be conducted. Both analyses are going to be presented in the following sections being previous research in the next one and the empirical estimations further in this study (section 4 and beyond).

3. Previous Research

The discussion regarding the Brazilian wage-gap is heavily focused on discriminatory theories. In the light of studies done in the 1980's and 1990's, it has been already suggested that the gender wage-gap in Brazil was related in a larger extent to market discrimination rather than solely on individual characteristics since women's educational levels are as big as men's as well as professional experience. Nonetheless, the returns are still better for men (Barros et al 1995; Leme & Wajnman 2000, Madalozzo, 2010, Wajnman 2013).

Barros et al (1995), used wage differentials on 500,000 observations between 1981 and 1989, consisting of men and women from 25 to 50 years of age in urban areas. Discriminatory issues in the Brazilian labor market might be explained as: "(...) if one takes into account gender differences in the occupational structure, educational attainment, and age distribution, the wage gap between gender increases. In other words, the discrimination by gender, as far as wages go, is even more pronounced than what one would find through a simple comparison between male and female wages." (Barros et al 1995, p. 424).

In line with the conclusions of the aforementioned study, Biderman & Stefani (2006) also note the existence of discrimination on Brazilian labor market. The methodology adopted was the use of quantile regressions across the earnings distribution. The idea consisted on disaggregation of the earnings distribution regarding gender and skin color. The conclusions were drawn by the comparison between the disaggregated quantiles.

The first finding was – not surprisingly - that returns to education were heterogeneous among the quantiles being the upper 10% (in the earnings distribution) the most privileged in terms of returns. However, the most interesting conclusion was concerning gender; the causes of wage (and returns) disparity were “mainly accounted by discrimination factors” (Biderman & Stefani 2006, p.5).

Carvalho, Neri and Silva (2006), in line with Biderman and Stefani's study, also combine the effects of gender and ethnicity on the approach to the wage-gap. In this case, however, quantile regressions were not applied. The methodology chosen was the estimation of the wage-gap through OLS models and a further decomposition of the gap was made through the Oaxaca-Blinder procedure. As most of the literature, professional experience and education were the main determinants in the estimation of the earnings equation. Since the authors did not apply any restrictions on the database regarding working individuals, a

Heckman correction model (Heckman 1979) to eliminate the problem of selection bias was made. It was demonstrated that, if the selection bias is not corrected, one might underestimate the effects of discrimination.

Despite these considerations, the study provided results that confirmed discriminatory behavior as the most important component on the explanation behind the gender wage-gap. It was found that more than 170% of the gap between white males and white females was due to discrimination. When comparing white males with black females, the discriminatory component accounted for 97% of the difference.

Both Carvalho, Neri and Silva's and Biderman and Stefani's studies are unique since discrimination in the Brazilian labor market is addressed under both an ethnical and gender perspective, and not separately like most of the studies in that subject.

However, other approaches on this subject like occupation segregation are also considered to explore the gender wage-gap. Even though the existence of discrimination is never discarded, some studies provide a perspective that goes beyond simply the productivity characteristics and consider market composition and gender segregation within different occupations.

Menezes-Filho et al (2007), for example, when analyzing the market composition regarding occupational segregation on the manufacturing sector, suggested that discrimination accounts for as much as personal characteristics when explaining the wage-gap.

In a broader approach towards market composition and occupational segregation, Madalozzo (2010) investigates the connection between these variables and earnings in both formal and informal sectors, finding more evidences of discrimination: "when both have the same characteristics, men are better paid than women" (Madalozzo 2010, p.166).

This issue is also present in studies across sectors. Silva and Kassouf (2000) also conducted an analysis among different sectors finding that the wage gap both in the formal and informal labor market sectors declined over the recent decades but surprisingly the gaps were larger in the formal sector. At least, the gap was reducing more significantly in the formal sector, possibly due to decreasing levels of discrimination as suggested by Salardi (2010) when studying the gender and racial differentials over the late 80's and 90's.

As it is possible to verify in the literature presented, the use of wage differentials as a tool to analyze the wage gap as well the use of models that take into account professional experience, educational level and other socioeconomic variables are the key on understanding the wage gap and its determinants. The methodology that is going to be used in this study is similar to the ones already presented – especially Barros et al (1995), Carvalho, Neri and Silva (2006) and Madalozzo (2010) – and will be further detailed in the next section.

4. Data and Methodology

In this section, a more detailed analysis of the data and the methodology is going to be presented. A discussion regarding the variables selected as well as the first estimates and its implications are also going to be conducted.

4.1) Data

As already stated in the introductory section, this study consists in the PNADs (Pesquisa Nacional por Amostra de Domicílios) for the years 2003, 2008 and 2013.

Since the database in question is obtained through survey, questions regarding the nature of the sampling process may arise. For a more comprehensive approach of the sampling process used on PNAD, Silva et al (2002) is recommended. This article demonstrates - by the use of PNAD 1998 – that not considering strategies of stratification, clustering and weighting on model estimations, will lead to wrong estimates, which in turn, generates interpretation problems (p. 660).

In the light of these considerations, samples not randomly chosen require the use of weights to correct any eventual distortions. The IBGE (*Instituto Brasileiro de Geografia e Estatística* – Brazilian Bureau of Statistics) already provides a weighted version for each PNAD every year. The weights consider the population projection from Brazil concerning gender and years of age. The goal of these projections is to adjust the database from eventual biases during the sampling process. Therefore, all the data used in this study is already considering these weights. For a more detailed explanation on the weights used and its implications, IBGE (2013) is suggested.

With the most general issues being addressed, it is important to underline that each of the PNADs being used have more than 300.000 observations where more than 320 different variables are being analyzed. By keeping the database as is, problems with selection bias may arise.

There are two existing reasons that would lead a database to contain selection bias: the case where samples were not randomly chosen by the data collector or the case of self-selection by the individuals. Considering that the first case was already addressed as mentioned in the paragraphs above, the focus for now on will be in the latter case.

Self-selection occurs when questions proposed by the survey can just be answered for certain class of individuals. One example is reported wage. It is just possible for an individual to have reported wage if this individual have a reported job. Therefore, all unemployed individuals will have a reported wage of zero. However, some unemployed individuals are just unemployed due to the cost of opportunity to get a job. To illustrate this situation, it is possible to imagine an individual who is unemployed under the labor market perspective but performs the housework because the cost of hiring someone to look after the house is higher than the wage this individual would get if he/she worked in the labor market. Therefore, from an economic point of view, this individual would have an occupation where the wage would be marginally lower than the cost of paying someone else to do it, even though the reported wage is zero. This phenomenon is usually classified in the literature as “reservation wage”.

In order to address the reservation wage problem, either a Heckman correction procedure should be conducted or a restriction may be applied on the database in order to correct the bias. This study considers, only individuals with a reported primary job¹ in the formal market, older than 18 years of age, non-retired, with positive income and living in urban areas. In that case, the correction procedure proposed by Heckman (1979) is not needed since just working individuals are the subject of this study and no cost of opportunity will be accounted.

Since the general aspects concerning the database were discussed, it is possible to proceed to the next section where an overview of the theoretical model and the variables that are going to be considered in this study will be presented. After concluding the model presentation, a more detailed description of the variables is going to be conducted alongside the first estimations and its interpretations.

4.2) Theoretical Model

In line with the theories aforementioned on section 2, the theoretical model that is going to be used in order to measure the wage differentials is presented as it follows:

$$\text{income} = f(\text{age, tenure on the job, hours of housework, educational level, gender, ethnical group, region of residence, position within the family, family structure})$$

¹ It is not unusual to find people in Brazil with more than one job. On PNAD, the income of all jobs are analyzed individually. For this research, just the income of individuals' primary job (the one which most hours are spent in a week) is going to be consider.

The dependent variable – represented by “income” – is the hourly wage in Brazilian reais (BRL) from each individual’s primary job.

The variables age, tenure on the job, hours of housework and educational level intend to capture the effects of productivity on individuals’ earnings. Other variables as gender, ethnical group, region of residence, position within the family and family structure add to the model as modifying factors on wages’ estimation.

A detailed analysis regarding both theoretical and empirical aspects of the selected variables is going to be conducted throughout this section as well as a detailed description of the variables. A table of summary statistics is presented in the Appendix.

4.2.1) Age

The variable age intends to capture the effect of age itself – and it squared component – on the earnings. The measurement is made in years of age and it was reported for all individuals in the sample.

4.2.2) Tenure on the Job

In order to represent professional experience, this study proposes the variable “Tenure on the Job”. Unfortunately, this variable is not provided directly on the PNADs; being required its construction.

Obtaining this variable requires the use of other two variables that are related with professional experience. The first variable is the number of years on the current job and second one is number of months on the current job (PNAD reports these as two different variables resulting in a composition of years and months at the current job. Ex.: Four years and three months); by summing them both, we reach on the total tenure on the current job, which is going to be presented in months. Therefore, the definition of “tenure on the job” is:

$$ToJ_i = (Years\ in\ the\ current\ job_i) * 12 + Months\ in\ the\ current\ job_i$$

Before proceeding to the next variables, it is interesting to underline the importance of this measurement since some studies consider age as a proxy for experience.

However, once the estimation consists on establishing an equation suitable to both men and women, this proxy may not be the best approach since women may experience periods of labor intermittency – as already discussed on the previous chapters – and the variable age

itself would not be enough to capture this effect. Nonetheless, this effect can be partially captured by the variable “tenure on the job” proposed in this study.

The limitations regarding this variable are acknowledged but, considering the theoretical framework underlying the importance of professional experience on the evolution of earnings and knowing the limitations that can be incurred by using age as proxy, it was considered by the author better to have this variable as it was described rather than not having any.

4.2.3) Hours of Housework

The inclusion of one variable to represent hours spent on housework is based on Hartmann (1981) who clearly suggests that the role of patriarchy on the unequal division of labor within the household is one factor preventing women to achieve higher productivity levels on the labor market. Therefore, this variable intends to capture the loss of productivity that this activity implicate on the individuals performing it. The measurement is made in hours per week.

4.2.4) Educational Level

The variable “educational level” aims to capture the effects of the individuals’ educational level on earnings. The treatment for this variable consists in the division of the educational level within different categories. This approach was preferred over the continuous approach since it is assumed that different years of education does not provide the same return on wages to the individual. Nonetheless, this approach is in line with theories that consider education as a screening device – as already mentioned on section 4.2 – as it can be verified on Arrow (1973) and Stiglitz (1975). The categories follow the pattern below:

- “No education” for individuals with zero years of education;
- 1-4 years of education;
- 5-8 years of education;
- 9-12 years of education;
- 13 or more years of education;

4.2.5) Gender

Captures the effect of gender on earnings. Divided between male and female.

4.2.6) Ethnical Group

The variable “ethnicity” will represent the ethnical group of each individual in the database. In this study, two categories were defined: Majority and minority.

The definition of majority and minority in an ethnical diverse society like Brazil requires the establishment of a number of assumptions and definitions.

First, it is necessary to know how PNAD defines ethnicity. The survey relies on a sentence that requires the respondent to fulfill the following statement: “A cor ou *raça* do(a) é:” (The color or race of the dweller is²:). The possible answers are white, black, yellow, brown or indigenous.

From that, it was defined in this study that the individuals belonging to the white category would be labelled as “majority”. All the other categories were labelled as “minority”.

The reasons underlying the author’s choice are based on a socioeconomic definition where white individuals are representing the ruling class.

To understand the condition in which individuals of white skin color emerged as the ruling class in Brazil, it is necessary to provide a brief history of the immigration and colonization process that Brazil have gone over the last 500 years. The following paragraphs aim to briefly provide the necessary context.

The Portuguese realm claimed the territory known nowadays as Brazil in the year 1500 and by the year of 1532, the first settlement was established in the southeast coast of the newly discovered lands.

The administration of this territory was made through a Captaincy system. A Captaincy would work similarly to an independent territory within the Portuguese Empire with the obligation to pay a previously defined amount of taxes. At the beginning, fifteen Captaincies were defined and each Captaincy had a governor who was directly appointed by the King of Portugal. The governors had – in practice – absolute powers over its own Captaincy and were the responsible to ensure the profitable exploitation of the available resources (Fausto 1994).

² Author’s Translation

Despite the beliefs that a more decentralized power would be the best choice to administrate the overseas territories, in 1549 only two out of fifteen Captaincies were profitable for the Portuguese Crown. In the light of this failure, it was established that all the Captaincies would be under direct supervision of a General Governor – which was also appointed by the King of Portugal – and would represent the direct interests of the king in the colonial administration.

The first Governor appointed was a nobleman named Tomé de Souza. He arrived in the Captaincy of Bahia with a considerable number of settlers – some reports stating that they were more than a thousand – and with Jesuit priests. The responsibilities of Tomé de Souza included not just to provide better conditions on the resources' exploitation but also to convert the native population to Catholicism. To achieve these goals, several bureaucratic position within the public service were created. These position were mainly occupied by other Portuguese noblemen (Fausto 1994).

This system, as it is possible to infer, would ensure that a European – white - elite would be in charge of all colonial affairs. The aforementioned elite, especially in the northeast Captaincies, had an aristocratic and patriarchal mindset as well as well-known interests regarding slavery and its maintenance (Freyre 1933).

Slavery in Brazil consisted in black men and women that were brought from the African west coast. The slave trade became established in the beginning of the XVI century and aimed to provide work force for the sugarcane fields. It was just abolished in 1888. Therefore, for more than 300 years, black men and women had absolute no status as citizens and by the end of the slavery years, it is not surprising that an enormous socioeconomic difference was found among black and white people.

The end of slavery represented a turning point in Brazilian society. Aristocrats who relied in the income provided by their massive lands could not rely on slaves to do the work anymore. In order to find other ways to obtain cheap labor, incentives for an immigration process started to take place in Brazil. During the XIX and XX century, a massive number of immigrants from the Middle East and East Asia arrived in the country and, despite being considered free people “In the nineteenth century some powerful intellectuals and politicians sought ‘pure’ European immigrants who would re-create the Old World in the New” (Lesser 1999, p. 10-11).

Therefore, problems to integrate in the Brazilian society were not exclusive from black people. In reality, all immigrants that were not ethnical white would suffer prejudice and be marginalized in society. These historical reasons are the backbone on the definition of “Majority” and “Minority” proposed earlier in this section.

4.2.7) Region of Residence

The variable “region of residence” was included to capture the effects that different regions may have upon ones’ income. Being Brazil a big and unequal country the living standards within different regions may differ a lot, being the Southeast notably the most industrial and competitive region in the country while the North/Northeast are the regions with lower average income with a prevalence of an agrarian sector in several states. The Federal District, even though located on the Brazilian center-west region, is being treated separately once it has a very peculiar socioeconomic pattern since the high public administration is concentrated within the district. As a result, extremely high levels of average income are found in the Federal District, which may distort the inter-regional analysis if not treated separately.

Considering the nature of this variable, categories were created to capture the effects that different regions have upon individuals’ income. The categories are:

- North;
- Northeast;
- Southeast;
- South;
- Central West;
- Federal District.

4.2.8) Position within the Family

“Position within the family” appears as an interesting variable to capture the effect of being the head of the house on ones’ earnings. Since this title is predominantly male, it is useful when analyzing the gender wage-gap. Alongside “Hours of housework” this variable is also based on the theoretical framework on patriarchy and its effects on women (Hartman 1981). Nonetheless, empirical studies conducted on the Brazilian wage-gap also considered this variable on wages’ estimation as it could be seen on Carvalho, Neri and Silva (2006).

As other variables proposed in this study, “Position within the family” is a categorical variable presented as:

- Head of the family;
- Not head of the family.

4.2.9) Family Structure

The variable “family structure” intends to capture the effects of the presence of children in the house. As already discussed on previous sections, the presence of children in the house is one factor affecting individuals’ productivity. It is important to note, however, that the variable provided by the PNAD is considering the presence of sons/daughters at home and not the general presence of kids, being that case part of a different categorization.

The categorization of this variable is presented as it follows:

- No kids at home;
- Kids younger than 14 years of age;
- Kids older than 14 years of age;
- Kids younger and older than 14 years of age.
- Other family structures.

It is important to note that the first category contains individuals who do not have kids living at home anymore as well as childless couples. The second category consider individuals whose all kids are living in the house are younger than 14 years of age. Following the same pattern, the third category considers individuals whose kids living in the house are all older than 14 years of age and the fourth category consider individuals whose kids living in the house are both older and younger than 14 years of age. The last category consider family structures that are not easily defined (couples who live with their grandchildren, for example) since this variable accounts specifically for the presence of sons/daughters but not for the presence of children in the house, as stated before. These observations were kept in the analysis since it consists of almost 9000 individuals and these might provide useful information regarding other variables.

Being “Family Structure” the last variable to be described, this study will proceed with the first estimations of the proposed model alongside a brief explanation of the results and its

implications. For information regarding summary statistics as well as a summarized description of the variables being used, Tables 11 and 12 are provided in the Appendix.

4.3) First estimates and Modifying factors

The first estimates to be presented are going to be focused just on the productivity factors mentioned on section 4.2. The idea is to provide information regarding the effects of productivity – and nothing else – on individuals' wages. Nonetheless, a gender dummy will be added to this model so the effects of productivity get clear for both genders.

It is important to note that all the models are considering robust standards errors so it is possible to have some control for heteroskedasticity. This is valid for all the OLS estimates throughout this study.

The model is presented in the table below:

Table 1 – First OLS Estimates excluding modifying factors

Log hourly wage, BRL	2003	2008	2013
Age	0,014	0,043	0,034
Age, squared	0,000	0,000	0,000
Tenure on the Job	0,002	0,002	0,002
Hours of Housework	-0,001	-0,003	-0,002
Educational Level			
No Education	ref	ref	ref
From 1-4 years	0,197	0,076	-0,051
From 5-8 years	0,408	0,239	0,098
From 9-11 years	0,751	0,532	0,325
From 13+ years	1,626	1,339	1,068
Gender			
Male	ref	ref	ref
Female	-0,255	-0,225	-0,211
Constant	-0,015*	0,090	0,927
Observations	62.628	75.462	78.145
Adjusted R ²	0,459	0,465	0,333
F-test (P > F)	0,000	0,000	0,000

Source: Authors calculations from PNADs (2003, 2008 and 2013)

*Not significant at a 5% level

Since the independent variable (Log of hourly wage) is logged, all the coefficients must be interpreted in terms of percentages. In order to provide an easier analysis, the table below express the results in terms of these percentages concerning the change in one unit in each

of the variables. It is important to note that the Constant was suppressed due to the lack of interpretation power when analyzed under a percentage perspective.

Table 2 - First OLS Estimates excluding modifying factors (percentages)

Log hourly wage, BRL	2003	2008	2013
Age	1,36%	4,35%	3,47%
Age, squared	0,00%	-0,04%	-0,03%
Tenure on the Job	0,19%	0,18%	0,16%
Hours of Housework	-0,13%	-0,35%	-0,24%
Educational Level			
No Education	ref	ref	ref
From 1-4 years	21,82%	7,88%	-4,94%
From 5-8 years	50,44%	27,06%	10,27%
From 9-11 years	111,87%	70,20%	38,38%
From 13+ years	408,43%	281,40%	190,82%
Gender			
Male	ref	ref	ref
Female	-22,51%	-20,14%	-19,06%
Observations	62.628	75.462	78.145
Adjusted R2	0,459	0,465	0,333
F-test (P > F)	0,000	0,000	0,000

Source: See Table 1.

*Not significant at a 5% level

As it can be observed on Table 2 the behavior of the variables follow the theoretical framework. Age has a positive impact on wages and its squared component is negative, pointing that wage increases at decreasing rates and, eventually, reaching a maximum point. This effect is not clear for the year of 2003 due to the small value of the coefficient for age squared.

Tenure on the job has also results according to the theory, pointing that for each additional month on the job, an individual might experience an average increase around 0,2% on the hourly wage. This coefficient was stable in a year over year analysis, suggesting that the returns to experience did not have any significant change.

Surprisingly, the effects of the hours spent on housework during the week have a stronger impact than tenure on the job itself. In the year of 2008, for example, for each additional hour spent weekly on housework, an individual would experience, on average, a decrease of 0,35% on the hourly wage.

Despite the effect of the aforementioned variables, education appeared as the variable with the stronger impact on wages. However, when analyzing year over year, it is possible to verify that the returns are decreasing for all categories.

The reasons for this phenomenon are not the aim of this study; however, the table below might provide some evidence:

Table 3 – Average years of education in Brazilian Labor Market

Year	Mean
2003	10,17
2008	10,84
2013	11,32

Source: See table 1

As it is possible to infer, educational levels in the labor market among the individuals being considered in the sample have increased in more than a year in the last ten years. If professionals that are more skilled are joining the labor market, it is natural that education faces decreasing returns due to the increasing competition.

The last variable to interpret is the gender dummy. Women, on average, are earning around 20% less than men in all the years being considered. This is consistent with the gap when comparing the raw averages provided by the descriptive statistics on table 11 in the Appendix. In percentage terms, the descriptive statistics provide gaps of 29% for 2003, 26% for 2008 and 23% for 2013. Therefore, the behavior of the gender dummy somehow follows the same behavior of the raw averages, with a decreasing trend.

Nonetheless, the magnitude of the estimated coefficient is, at least, interesting if we consider that the model is controlling for productivity factors. That means that the coefficient representing this 20% penalty for women is computing something else that is not being captured by the productivity variables that were added.

Despite that fact, the penalty is diminishing throughout the period. However, a more precise analysis regarding its behavior can only be done after adding the modifying factors proposed on section 4.2. Nonetheless, by adding the modifying factors, the coefficients – especially the gender dummy – will represent better estimates since the model is going to be controlling for additional variables.

The results of the estimates including the modifying factors can be seen on the tables 4 and 5. In order to be consistent with the procedure already adopted, first a model with the numerical estimates will be presented followed by a model with its estimates in percentage terms.

All the productivity factors, despite maintaining the same direction, had their impacts lowered. This is expected since more variables that will capture distinct effects were added to the model.

Good examples are variables like ethnicity and region of residence, which contribute to wages' explanation in a significant way. As expected, individuals belonging to the majority group have an advantage – on average – of around 10% in their incomes when compared to individuals belonging to the minority group. When it comes to region of residence, the Federal District appears as the region that provides the biggest returns to the individuals, heavily influenced by the concentration of the highest public administration workers allocated in the country's capital, Brasília. It is important to highlight that the North region was set as the reference category; therefore, all the returns provided are being compared to the returns that individuals living in the North of Brazil would experience. However, since the goal of this variable is solely to capture the geographical effect existing on wages' composition, a discussion regarding the reasons for the different returns is not going to be made. Nonetheless, bearing in mind that the South and the Southeast regions of Brazil are the most industrialized ones, the results are according to the Brazilian reality.

Position within the family also showed a significant impact with a decreasing trend over the years. Most of the family heads are men and the fact that the coefficients were significant and negative is a sign that this effect were partially being captured by the gender dummy on the first estimates. Despite the diminishing trend, it is clear that patriarchy still has an important role on wages' composition.

The variable Family Structure also provides an interesting explanation and in line with theory. Using individuals with no kids at home (either no kids living at home anymore or childless individuals) as the reference category, shows that the presence of kids will affect the wages negatively, highlighting the loss of productivity that is associated with child raising.

Table 4 - OLS Estimates with modifying factors

Log hourly wage, BRL	2003	2008	2013
Age	0,012	0,038	0,030
Age, squared	0,000	0,000	0,000
Tenure on the Job	0,002	0,002	0,002
Hours of Housework	-0,002	-0,004	-0,003
Educational Level			
No Education	ref	ref	ref
From 1-4 years	0,146	0,055	-0,054
From 5-8 years	0,341	0,207	0,083
From 9-11 years	0,700	0,505	0,310
From 13+ years	1,529	1,278	1,023
Gender			
Male	ref	ref	ref
Female	-0,181	-0,197	-0,190
Ethnical Group			
Majority	ref	ref	ref
Minority	-0,126	-0,109	-0,107
Region of Residence			
North	ref	ref	ref
Northeast	-0,171	-0,136	-0,159
Southeast	0,091	0,061	0,012*
South	0,062	0,060	0,012*
Central West	-0,022	0,006*	-0,025
Federal District	0,378	0,377	0,293
Position within the family			
Head	ref	ref	ref
Not Head	-0,139	-0,081	-0,066
Family Structure			
No Kids	ref	ref	ref
Kids with 14 y/o or less	0,016	-0,005*	-0,002*
Kids with older than 14 y/o	-0,090	-0,076	-0,086
Kids with more and less than 14 y/o	-0,056	-0,058	-0,061
Other family structure	-0,034	-0,022	-0,015*
Constant	0,231	0,342	1,184
Observations	62.628	75.462	78.145
Adjusted R ²	0,505	0,500	0,358
F-test (P > F)	0,000	0,000	0,000

Source: See Table 1

*Not significant at a 5% level

Table 5 – OLS Estimates with modifying factors (percentages)

Log hourly wage, BRL	2003	2008	2013
Age	1,17%	3,82%	3,03%
Age, squared	0,00%	-0,04%	-0,03%
Tenure on the Job	0,20%	0,18%	0,17%
Hours of Housework	-0,23%	-0,40%	-0,31%
Educational Level			
No Education	ref	ref	ref
From 1-4 years	15,76%	5,62%	-5,26%
From 5-8 years	40,57%	23,03%	8,69%
From 9-11 years	101,29%	65,75%	36,38%
From 13+ years	361,58%	258,84%	178,22%
Gender			
Male	ref	ref	ref
Female	-16,56%	-17,88%	-17,33%
Ethnical Group			
Majority	ref	ref	ref
Minority	-11,81%	-10,37%	-10,14%
Region of Residence			
North	ref	ref	ref
Northeast	-15,74%	-12,71%	-14,67%
Southeast	9,56%	6,34%	1,20%*
South	6,38%	6,18%	1,20%*
Central West	-2,19%	0,60%*	-2,46%
Federal District	45,91%	45,82%	34,08%
Position within the family			
Head	ref	ref	ref
Not Head	-13,00%	-7,77%	-6,35%
Family Structure			
No Kids	ref	ref	ref
Kids with 14 y/o or less	1,61%	-0,49%*	-0,19%*
Kids with older than 14 y/o	-8,56%	-7,33%	-8,24%
Kids with more and less than 14 y/o	-5,47%	-5,68%	-5,96%
Other family structure	-3,38%	-2,16%	-1,48%*
Observations	62.628	75.462	78.145
Adjusted R2	0,505	0,500	0,358
F-test (P > F)	0	0	0

Source: See Table 1

*Not significant at a 5% level

The aforementioned effects on the gender dummy were clear, which now accounts for a penalty around 17% (the first estimates provided a penalty of 20%). It is interesting to note, however, that in the first estimates, the gender dummy showed a declining trend throughout the years and now, after adding the modifying factors, it became more stable and even showing a slightly growing trend. Nonetheless, it is important to note that this variable does not represent the wage-gap itself but just evidence of its existence and trend. Furthermore, it is not possible to infer anything regarding the composition of the wage-gap and whether or not discrimination accounts for part of it by just interpreting the model presented. In order to analyze the gap more precisely and determine its size and composition, it is necessary to evaluate the specific returns that women and men would experience for each of the variables being tested in this study. By finding gender-specific equations and replacing the variables for the averages of each gender it is possible to reach a better estimate regarding the wage-gap. Once this is done, by applying the decomposition method developed by Oaxaca (1973) and Blinder (1973), an analysis regarding the composition of the gap and the existence of discrimination is possible.

The procedure mentioned above will be further clarified in the next section, which aims to highlight the decomposition methodology being used as well as its implications and interpretations.

4.4) Blinder-Oaxaca decomposition method

The theoretical model presented can be written as it follows:

$$\ln w_i = \sum_{j=1}^k \beta_j X_i + \varepsilon_i \quad (1)$$

Where w stands for the individual's wage and the subscript i represents each individual in the sample. β is a parameter while X is the individuals' characteristics (including both the productivity and modifying factors). ε represents the error term in the estimation.

The aforementioned equation represents the earnings function for a general individual, regardless gender. Since the idea of this study is to compare the wage gap between genders and further decompose it on observable and unobservable characteristics, it is necessary to decompose the equation itself using gender as the determinant. The following represent this first decomposition:

$$\ln w_i^m = \sum_{j=1}^k \beta_j^m X_i^m + \varepsilon_i \quad (2)$$

$$\ln w_i^f = \sum_{j=1}^k \beta_j^f X_i^f + \varepsilon_i \quad (3)$$

While m is the superscript representing males, f is the superscript representing females. Once the parameters from both equations are estimated – through ordinary least squares – the Blinder-Oaxaca decomposition can be used to determine the wage differentials and its observable and unobservable components.

The differential is calculated by subtracting (2) from (3):

$$D = \left(\sum_{j=1}^k \beta_j^m X_i^m + \varepsilon_i \right) - \left(\sum_{j=1}^k \beta_j^f X_i^f + \varepsilon_i \right)$$

Denoting $E(X)$ as the expected value of the outcome variable and assuming that $\varepsilon_i = 0$ based on Ordinary Least Squares assumptions, we have:

$$D = E \left(\sum_{j=1}^k \beta_j^m X_i^m \right) - E \left(\sum_{j=1}^k \beta_j^f X_i^f \right)$$

Considering that $E(X\beta) = E(X)'\beta$ where the superscript represents the estimated value:

$$D = E(X^m)'\beta^m - E(X^f)'\beta^f$$

Reorganizing the terms:

$$D = E[(X^m) - (X^f)]'\beta^m + E(X^f)'\beta^m - E(X^f)'\beta^f \quad (4)$$

The equation (4) is the decomposition among the explained and the unexplained part of the differential. While the first term $E[(X^m) - (X^f)]'\beta^m$ represents the difference in the characteristics, the second term $E(X^f)'\beta^m - E(X^f)'\beta^f$ represents the differences in the endowments. The idea is to estimate the earnings women would receive if they had the same characteristics as men do and the earnings that women would receive if they had the

same returns as men do. The first term would account for observable differences since they do account for the characteristics; the second term account for non-observable characteristics, which is usually attributed to discrimination since the component relies in the difference in the returns.

Before proceeding to the results of the decomposition, one observation is important when dealing with the categorical variables during the procedure.

Considering that ethnicity, years of education, region of residence and other variables in the model are categorical variables – on other words, dummy - the simple Blinder-Oaxaca decomposition is not enough to provide the results that are being pursued by this study since this procedure is sensitive to the variable left out – the reference variable for each dummy. This issue leads to a specification problem since the reference category may vary according to one's wish to study a specific effect.

In order to solve this problem, Yun (2003) have proposed a normalization process to deal with the different possibilities while determining the reference category for each dummy. The idea is to estimate all possible combinations of reference groups and take the average of the estimates for each case in order to build the average effect.

The result is equivalent of “finding average estimates of constant and dummy variables in wage equations with varying reference groups and then using the average estimates to calculate Blinder-Oaxaca decomposition equation” (Yun 2003, p. 2-3).

Once the normalization procedure is taken into account, the results can be properly discussed in the next section, where they are also presented.

5. Results

By following the methodology described in the last section, it is possible to reach a range of outputs that provide valuable information for the purposes of this study. These outputs are: gender-specific regressions, adjusted average wages and adjusted wage-gap with its decomposition. Therefore, in this section, all these components are going to be presented alongside a discussion regarding the results found.

5.1) Gender-specific Regressions

The Gender-specific regressions are nothing more than the output of the equations (2) and (3) that were presented on section 4.4. The importance of these estimates relies on the fact that they provide the specific returns for each variable according to gender. Differently than the first estimates or even from the estimates with the modifying factors, these equations allow this study to verify if men and women are experiencing differences in their returns for the same variables, which is the backbone of the decomposition method and the first step for a better understanding of the gender discrepancies found in the labor market.

In order to provide an easy interpretation of the results, just the output in percentage terms is going to be displayed in this section (Table 6). The numerical estimates can be found in the Appendix on table 13.

As it is possible to observe on Table 6, men have better returns than women in a range of variables. Educational Level is the most notable one with men having consistently better returns for all categories in all the years that are being analyzed. Once knowing that education is one of the most important productivity factors and has a central role on the Human Capital theory, finding considerable differences in returns is worrisome.

Nonetheless, when considering age, despite the year of 2003 when the returns are virtually the same for both genders, men have also consistent better returns in the subsequent years for an additional year of age.

Tenure on the job also shows a slightly advantage to men, especially on years 2003 and 2008. On other words, men are having better returns for each additional month on the job. This implicates that the market somehow values the experience that men accumulate “better” than the experience accumulated by women.

Table 6 – OLS estimates with modifying factors sorted by gender (percentages)

	2003		2008		2013	
	Male	Female	Male	Female	Male	Female
Log hourly wage, BRL						
Age	1,12%	1,14%	4,29%	3,19%	3,38%	2,61%
Age, squared	0,00%	0,00%	-0,04%	0,30%	-0,03%	-0,03%
Tenure on the Job	0,21%	0,18%	0,19%	0,17%	0,16%	0,17%
Hours of Housework	-0,27%	-0,23%	-0,46%	-0,38%	-0,18%	-0,35%
Educational Level						
No Education	ref	ref	ref	ref	ref	ref
From 1-4 years	17,72%	9,89%	7,72%	-0,26%*	-2,88%*	-10,41%
From 5-8 years	47,14%	26,72%	28,55%	11,13%	13,17%	-0,21%*
From 9-11 years	106,68%	86,14%	71,76%	50,47%	42,24%	24,34%
From 13+ years	404,28%	307,74%	289,33%	215,07%	193,30%	151,69%
Ethnical Group						
Majority	ref	ref	ref	ref	ref	ref
Minority	-11,73%	-11,46%	-9,60%	-10,97%	-10,63%	-9,45%
Region of Residence						
North	ref	ref	ref	ref	ref	ref
Northeast	-15,99%	-15,83%	-12,72%	-12,93%	-15,54%	-13,56%
Southeast	10,98%	6,40%	9,45%	1,35%*	2,95%	-1,44%*
South	8,44%	3,02%	166,51%	0,38%*	2,91%	-10,84%*
Central West	0,82%*	-7,14%	81,75%	-50,02%	1,53%*	-7,40%
Federal District	41,65%	10,93%	46,12%	43,61%	34,92%	32,33%
Position within the family						
Head	ref	ref	ref	ref	ref	ref
Not Head	-18,61%	-7,01%	-9,93%	-4,65%	-8,28%	-2,97%
Family Structure						
No Kids	ref	ref	ref	ref	ref	ref
Kids with 14 y/o or less	2,00%*	1,22%*	-0,58%*	-0,29%*	0,05%*	-0,55%*
Kids with older than 14 y/o	-3,39%	-10,50%	-4,91%	-8,86%	-7,02%	-8,26%
Kids with more and less than 14 y/o	-2,99%	-6,72%	-4,67%	-6,28%	-4,07%	-7,23%
Other family structure	1,97%*	-5,17%	-0,67%*	-2,22%*	-1,04%*	-1,30%*
Observations	35.319	27.309	42.780	32.682	42.764	35.381
Adjusted R2	0,508	0,504	0,495	0,508	0,347	0,369
F-test (P > F)	0,000	0,000	0,000	0,000	0,000	0,000

Source: See Table 1

*Not significant at a 5% level

Moving to the modifying factors, is it also clear that the returns are different under a gender perspective but it is not clear whether or not men or women are the most penalized by the differences in returns since each variable shows an specific behavior. For this assessment, each variable must be analyzed separately. The following paragraphs provide this analysis.

When analyzing ethnical group, for example, men have better returns in the most developed regions (Southeast and South), including the Federal District. Considering that these regions are the ones with the biggest income per capita and that women are historically underrepresented on high-income activities, it is possible to infer that part of this effect is being capture by these variables.

However, the variable representing the position within the household shows a penalty that is bigger for men. Here, it is possible to bring the role of patriarchy proposed by Hartmann (1981) as one explanation behind the differences observed. Since it is expected that men occupy the position of the head of the house, men not performing this role can be penalized in terms of wages more than women, who are expected to accept a secondary position within the household. Therefore, the fact that the penalty for women in this variable is smaller than the men's penalty is not surprising.

The patriarchal mindset might also be the reason behind the bigger penalty women suffer when observing the variable that represents family structure. Women show consistently lower returns in comparison to men when kids are living in the house. It is expected that women take more responsibility when it comes to childcare which in turn, can generate fewer working hours and an increase in the hours spent doing housework thus, generating a bigger impact on women's ability to earn more money once this activity requires a certain amount of dedication that might impact one's productivity.

Therefore, when analyzing productivity factors alongside the modifying factors (socioeconomic and demographic) women are generally facing lower returns in almost all the aspects being considered in this study. This, naturally, influences the average wage an individual would receive. These estimates are going to be analyzed in the next section.

5.2) Adjusted Average Wages

The adjusted average wages can be obtained by simply imputing the gender averages on its specific equation. Since the equation accounts for gender-specific returns, these estimates provide a more precise way to measure the average wages both genders would get. The table below provides these estimates:

Table 7 – Log of Adjusted average wage (BRL)

Gender	2003	2008	2013
Male	1,23	1,66	2,17
Female	1,14	1,57	2,06

Source: See Table 1

As it was expected, the average wage men get is consistently superior to the women's averages, following the pattern of the descriptive statistics. However, the differences between the adjusted wages are smaller when compared to the descriptive statistics' averages.

While the raw averages provide gaps of 29%, 26% and 23% for 2003, 2008 and 2013 respectively, the adjusted gap show differences around 7,5%, 6% and 5% for each respective year. The trend, however, is the same: women are closing the gap.

It is important to reinforce that the difference in the gap scale is because the descriptive statistics provide nothing more than an average among the individuals in the sample. The numbers provided in this section are according to the gender-specific characteristics and take into account the returns that each gender has for each productivity, socioeconomic and demographic components proposed in this study.

Though it is possible to verify that women are closing the gap, the composition of the gap is not clear by just analyzing these numbers. Is the existent gap result from differences in characteristics or is it result of discriminatory behavior? The next section aims to provide evidence to answer these questions.

5.3) Gap Decomposition

The decomposition analysis consists on the results that equation (4) – presented on section 4.4 – provides. As already mentioned, the decomposition method aims to separate the part of the gap that is due observable characteristics (all productivity and modifying factors being considered in the model) and unobservable characteristics (usually attributed to discrimination).

However, it is necessary to be cautious when interpreting the estimates for unobservable characteristics because not only the effects of discrimination are going to be captured, but also everything that was left out the equation will contribute to this estimate. Nonetheless,

the effect of bad proxies or identification problems are also going to be accounted on that component. But, since the variables being used rely on the theoretical framework and the model follows the basic literature on the subject, it is possible to consider that the estimates regarding unexplained characteristics majorly accounts for discrimination.

That said, the results of the decomposition are presented on the table below:

Table 8 – Log of Adjusted average wage (BRL) and gap decomposition

Gender	2003	2008	2013
Male	1,23	1,66	2,17
Female	1,14	1,57	2,06
Gap	0,09	0,09	0,10
Explained	-0,09	-0,10	-0,09
Unexplained	0,18	0,20	0,19

Source: See Table 1

It is possible to verify that the gap did not change in absolute terms, but it has changed in relative terms if we consider that wages are growing over time, which means, as already concluded on last section, that women are closing the gap proportionately.

When analyzing the decomposition, however, it gets clear that more than 100% of the gap is not explained regardless the year being considered. These results are in line with Carvalho, Neri & Silva (2006) as well as Barros et al (1995). Since these studies provided information regarding previous years, the conclusion is that discrimination against women is an old and persisting factor behind the gap that is not being properly addressed.

For 2003, unexplained factors accounted for 207% of the gap and that proportion remained roughly the same for 2008 (208%). The only major difference happened in 2013, where discrimination accounted “only” for 186% of the gap.

Even though a significant number, it is hard to point what elements are the ones explaining discrimination. It can vary from a belief that women are not as productive as men to other subjective approaches that are hard to define.

What can be assessed, however, is if there is any belief that women are not as productive as men, this belief is proved wrong in the light of the results aforementioned. The fact that

the explained component is negative shows that the individual productive characteristics are partially offsetting the effects of discrimination.

In order to understand the mechanics, it is necessary to bear in mind how the decomposition method is constructed and what it aims. It is possible to summarize that on two basic questions:

- How much women would earn if they had the same productive characteristics as men?
- How much women would earn if they had the same returns as men?

While the second question is exactly the effect of discrimination, the first one is the effect of the observable characteristics.

In order to find an answer for the first question, the procedure that the decomposition method relies on is to replace men's averages on women's returns. That would represent a woman with the same productive characteristics as men, but earning as a woman. These are the results offsetting the discrimination impact. On other words, women that have male's productive averages would be earning less than an average woman.

Therefore, in a discrimination-free World where wages would be defined exclusively by productive characteristics, women would be in a better condition than men. This assessment gets easier to verify when analyzing years of education and tenure on the job separately:

Table 9 – Years of study sorted by gender

Gender	2003	2008	2013
Male	9,55	10,25	10,73
Female	10,98	11,62	12,03

Source: See Table 1

As it is possible to observe, women have consistently more years of study than men. By knowing the impact that education has on wages, it is easy to perceive that a woman that has men's education averages will be a woman below the average in terms of education; thus, being penalized on their earnings. Adding to this, since women have lower returns to education than men, a lower educational level has a huge impact on women's earnings. However, if women had the same returns as men, they would be in better shape since the

additional years of education would work in their favor and would be better praised in terms of wages.

When analyzing tenure on the job, the results are similar to the ones observed on education:

Table 10 – Tenure on the job sorted by gender (months)

Gender	2003	2008	2013
Male	75,68	74,36	74,22
Female	79,67	77,54	72,61

Source: See Table 1

Except for 2013, women showed a considerable higher tenure on the job when compared to men. Once on-the-job experience is one important component on human capital accumulation as well as an important variable to determine wages, it gets clear that women with men’s tenure on the job averages will also be penalized in most of the period being considered. Nonetheless, since women have lower returns to experience than men, a scenario where a woman have the same experience as a men would result in double penalty (lower average and less returns).

Therefore, it gets clear that the productive characteristics are not the factors behind the gap. In fact, it is exactly the opposite; women’s productive characteristics are avoiding the gap to be even bigger since it is offsetting the effects of discrimination. If the gap is closing throughout the years, it is possible to say that this is more connected to women’s achievements rather than good policies addressing properly the long discriminatory behavior verified on the Brazilian labor market.

6. Conclusion and Final Remarks

Questions regarding the size of the wage-gap and its nature alongside its determinants were discussed on the paper through a range of empirical models as well as previous researches.

The existence of the gap was already a fact but its behavior throughout most recent decades was still unclear. Nonetheless, the existence of discrimination was acknowledged and, despite its existence and comprehensive work to understand it, very little was done in Brazil in order to address this issue.

Nonetheless, this study aimed to add up to the existing literature about the gender wage-gap in Brazilian society by bringing this discussion to more recent years using the most up-to-date database available.

OLS regressions were estimated to capture the differences in returns that both genders had in regard to productivity, demographic and socioeconomic factors. These estimations provided the adjusted average wage of each gender and, by having these estimates; it was possible to make inferences regarding the gender wage-gap. To understand the composition of the gap, the Oaxaca-Blinder decomposition method was used to provide better insights about the role of discrimination on wages' composition.

The conclusion is that nowadays it is still possible to verify a gender pay-gap around 5% to 7% in the formal labor market. The trend, even though decreasing, is not result of decreasing discrimination per se; which - as this study suggests - still accounts for more than twice the gap itself. In reality, the proportional reduction of the gap is due to over-qualification of women when compared to men. By having more on-the-job experience and more years of education – on average – women are being able to close the gap regardless any effort from government or society to generate better working conditions.

Being these the conclusions of this study, it is worth pointing that policy-makers in Brazil should start considering gender equality policies as part of their agenda in a more comprehensive way. The creation of the Secretariat of Policies for Women in 2003, even though an interesting initiative which provided women more legal tools to stand against domestic and other abuses, did very little regarding the problems that women still have to face in the labor market. Most of the social policies in this period were focused on ethnical and socioeconomic inequalities. These were successful on decreasing the inequality levels

in Brazil and empowering minorities in a broad way. Therefore, the next steps on policy formulation should target more precisely a group of interest and, by considering the long and old problem of discrimination in the labor market; it is time to focus some effort on women and their struggle for equal pay in a labor market free of discrimination.

7. Bibliography

Arrow, K. (1971). "Theory of Discrimination". Paper presented at Conference on Discrimination in Labor Markets, Woodrow Wilson School & Conference Office of Princeton University, New Jersey, October 1971.

Arrow, K. (1973). "Higher Education as a Filter". *Journal of Public Economics*, Vol 2, Issue 3, pp. 193-216. North-Hollands Publishing Company

Barros, R. P. & Ramos, L. & Santos, E. (1995). "Gender differences in Brazilian labor markets" in "Investment in women's capital", pp. 380-425. The University of Chicago Press

Becker, G. (1957). "The economics of discrimination". Chicago, 1957.

Becker, G. (1975). "Human capital: a theoretical and empirical analysis, with special reference to education". National Bureau of Economic Research

Becker, G. (1985). "Human Capital, Effort, and the Sexual Division of Labor". *Journal Of Labor Economics*, Vol 3, No. 1. The University of Chicago Press.

Blackburn, M. & Korenman S. (1994). "The Declining Marital-Status Earnings Differential". *Journal of Population Economics*, vol. 7, pp. 247-270

Blau, F. & Kahn, L. (2007). "The Gender Pay Gap: Have Women Gone as Far as They can?" *Academy of Management Perspectives*, 7-23.

Blinder A.S. (1973). "Wage Discrimination: Reduced Form and Structural Estimates". *Journal of Human Resources*, vol. 8, no. 4, pp. 436-455

Budig, M. & England P. (2001). "The Wage Penalty For Motherhood", *American Sociological Review*, vol. 66, no. 2, pp. 204-225

Carvalho, A. & Neto, M. & Silva, D. (2006). "Diferenciais de salário por raça e gênero: Aplicação dos procedimentos de Oaxaca e Heckman em pesquisas amostrais complexas". *Ensaio Econômicos*, No 638. Paper Presented at XV Encontro de Estudos Populacionais, ABEP, September 2006.

England, P. (1982). "The Failure of Human Capital Theory to Explain Occupational Sex Segregation". *The Journal of Human Resources*, Vol 17, No 3, pp. 358-370. University of Wisconsin Press.

Fausto, B. (1994). "História do Brasil." EDUSP.

Freyre, G. (1933). "Casa-grande & senzala – formação da família brasileira sob o regime da economia patriarcal." Global Editora (2003).

Giuberti, A. & Menezes-Filho, N. (2005). "Discriminação de rendimentos por gênero: Uma comparação entre o Brasil e os Estados Unidos". *Economia Aplicada*, Vol 9, No 3, pp. 369–383.

Goldin, C. & Sokoloff, K. (1984). "The Relative Productivity hypothesis of industrialization: the American case, 1820 to 1850". *Quarterly Journal Of Economics* 99, no. 3: 461-487.

Goldin, C. (1990). "Understanding the gender gap: An economic history of American women". Oxford University Press.

Goldin, C. (2006). "The Quiet Revolution That Transformed Women's Employment, Education, and Family". *American Economic Review*, Vol 96, No 2, 1-21.

Gray, J. (1997). "The Fall in Men's Return to Marriage: Declining Productivity Effects or Changing Selection?" *The Journal of Human Resources*, Vol 32, No 3, pp. 482-503. University of Wisconsin Press.

Gupta, S. & Ash, M. (2008). "Whose money, whose time? A nonparametric approach to modeling time spent on housework in the United States." *Feminist Economics* 14, 93–120.

Hartmann, H. (1981). "The Family as the Locus of Gender Class, and Political Struggle: The Example of Housework", *The University of Chicago Press*, Vol 6, No 3, pp 366-394.

Heckman, J. (1979). "Sample Selection Bias as a Specification Error." *Econometrica*, 1979.

Hersch, J., & Stratton, L. (1994). "Housework, Wages, and the Division of Housework Time for Employed Spouses". *The American Economic Review*, (2). 120.

Instituto Brasileiro de Geografia e Estatística (IBGE). (2013). "Projeções da População: Brasil e Unidades da Federação". *Série de Relatórios Metodológicos*.

- Kassouf, A. (1998). "Wage gender discrimination and segmentation in the Brazilian labor market". *Economia Aplicada*, Vol 2, No 2, pp. 243-269.
- Korenman, S. & Neumark, D. (1992). "Marriage, Motherhood, and Wages". *The Journal of Human Resources*, Vol 27, No 2 (Spring 1992). University of Wisconsin Press.
- Leme, M.C. & Wajnman, S. (2000). "Diferenciais de rendimentos por gênero" in "Microeconomia e Sociedade no Brasil", FGV/EPGE, pp. 79-114.
- Lesser, J. (1999). "Immigrants, minorities and the struggle for ethnicity in Brazil." Duke University Press.
- Lundberg, S. (2008). "Gender and household decision-making" in "Frontiers in the Economics of Gender", Routledge 2008, pp. 116-130.
- Madalozzo, R. (2010). "Occupational Segregation and the Gender Wage Gap In Brazil: An Empirical Analysis". *Economia Aplicada*, Vol 14, No 2, pp. 147-168.
- Menezes-Filho, N. & Muendler, M. A. & Ramey, G. (2007). "The structure of worker compensation in Brazil, with a comparison to France and the United States". *The Review of Economics and Statistics*, Vol 90, No 2, pp 324-346. MIT Press.
- Mincer, J. (1958). "Investment in Human Capital and Personal Income Distribution". *Journal of Political Economy*, Vol 66, No 4, pp. 281-302. The University of Chicago Press.
- Mincer, J. (1974). "Schooling, experience, and earnings". NBER New York.
- Mincer, J. and Polachek, S. (1974). "Family Investments in Human Capital: Earnings of Women". *Journal of Political Economy*, vol. 82, no. 2, pp. 76-107.
- Oaxaca, R. (1973). "Male-female Wage Differentials in Urban Labor Markets". *International Economic Review*, vol. 14, pp. 693-709
- Phelps, E. (1972). "The Statistical Theory of Racism and Sexism". *The American Economic Review*, Vol 62, No 4, pp. 659-661. American Economic Association.
- Piore, M. (1972). "Notes for a Theory of Labor Market Stratification". Working Paper, Department of Economics, No 95. Massachusetts Institute of Technology

- Polachek, S. (1975). "Discontinuous Labor Force Participation and Its Effects on Women's Market Earnings." In "Sex, Discrimination, and the Division of Labor", New York: Columbia University Press, 197, pp. 90-122.
- Rose, S. (1988). "Gender Antagonism and Class Conflict: Exclusionary Strategies of Male Trade Unionists in Nineteenth-Century Britain". *Social History*, Vol 13, No 2, Gender and Employment (1988), pp 191-208. Taylor & Francis Ltd,.
- Salardi, P. (2010). "An analysis of pay and occupational differences by gender and race in Brazil – 1987 to 2006". Department of Economics University of Sussex
- Schultz, T. (1961). "Investment in Human Capital". *The American Economic Review*, Vol 51, No 1, pp. 1-17. American Economic Association.
- Sharpe, P. (1996). "Adapting to capitalism: working women in the English economy, 1700-1850". Basingstoke: Macmillan. New York, St. Martin's Press.
- Silva, N. & Kassouf, A. (2000). "Mercados de trabalho formal e informal: Uma análise da discriminação e da segmentação". *Nova Economia*, Vol 10, No 1 pp. 41–77.
- Silva, P. & Pessoa, D. & Lila, M. (2002). "Análise estatística de dados da PNAD: incorporando a estrutura do plano amostral". *Ciência & Saúde Coletiva*, vol. 7, pp. 659-670.
- Stefani, P. & Biderman, C. (2006). "Returns to Education and Wage Differentials in Brazil: A Quantile Approach." *Economics Bulletin*, Vol. 9, No. 1 pp. 1–6.
- Stiglitz, J. (1975). "The Theory of 'Screening', Education, and the Distribution of Income". *American Economic Review*, Vol 65, No 3, p 283. American Economic Association.
- Wajnman, S. (2013). "Gender roles in family and earnings differences in Brazil". Paper presented at XXVII IUSSP International Population Conference; Busan, August 2013.
- Waldfogel, J. (1998). "Understanding the "Family Gap" in Pay for Women with Children". *The Journal of Economic Perspectives*, Vol 12, No. 1 (Winter 1998), pp. 137-156. American Economic Association.
- Yun, M. (2003). "A Simple Solution to the Identification Problem in Detailed Wage Decompositions". IZA Discussion Paper Series, no. 836.

8. Appendix

Table 11 – Summary Statistics

Variables	2003		2008		2013	
	Male	Female	Male	Female	Male	Female
Earnings (BRL)	851,29 (1.100,95)	660,61 (793,48)	1.259,65 (1.662,59)	1.001,80 (1.244,3)	1.897,76 (2.252,49)	1.543,66 (1.775,73)
Age (years)	34,85 (20,12)	35,26 (18,65)	35,23 (11,06)	35,50 (10,74)	36,10 (11,40)	36,05 (10,90)
Tenure on the Job (months)	75,68 (84,71)	79,67 (84,85)	74,36 (88,92)	77,54 (89,28)	74,22 (89,69)	72,61 (87,07)
Hours of Housework (hours/week)	4,83 (7,28)	16,67 (12,82)	4,30 (6,59)	14,61 (12,04)	4,71 (7,18)	15,07 (12,33)
Educational Level, groups						
No Education	4,4%	2,5%	3,6%	1,9%	3,7%	2,0%
From 1-4 years	15,8%	10,8%	11,4%	7,3%	8,4%	4,8%
From 5-8 years	26,4%	17,3%	23,0%	14,5%	20,8%	13,6%
From 9-11 years	40,4%	45,3%	46,2%	47,9%	48,2%	47,3%
From 13+ years	13,0%	24,1%	15,8%	28,4%	19,0%	32,2%
Ethnical Group						
Majority	52,3%	57,5%	47,2%	53,2%	51,6%	57,5%
Minority	47,7%	42,5%	52,8%	46,8%	48,4%	42,5%
Region of Residence						
North	10,5%	9,9%	10,7%	9,8%	12,7%	11,8%
Northeast	23,2%	23,0%	23,8%	23,3%	22,4%	20,7%
Southeast	35,7%	35,5%	36,2%	35,6%	34,7%	35,1%
South	18,5%	19,5%	16,8%	18,8%	18,0%	20,2%
Central West	8,1%	7,8%	8,6%	8,1%	8,8%	8,2%
Federal District	3,9%	4,3%	3,8%	4,3%	3,4%	4,0%
Position within the family						
Head	66,7%	23,1%	58,3%	28,4%	55,2%	30,8%
Not Head	33,3%	76,9%	41,7%	71,6%	44,8%	69,2%
Family Structure						
No Kids	11,8%	11,6%	13,9%	12,8%	16,5%	15,1%
Kids with 14 y/o or less	33,9%	29,4%	29,6%	27,0%	26,5%	25,5%
Kids with older than 14 y/o	30,1%	36,3%	33,5%	38,2%	33,1%	37,7%
Kids with more and less than 14 y/o	14,2%	13,3%	12,3%	12,4%	11,3%	11,4%
Other family structure	10,0%	9,5%	10,7%	9,6%	12,6%	10,2%
Observations	35.319	27.309	42.780	32.682	42.764	35.381

Source: See Table 1

Table 12 – Variables’ Description

Variable	Type	Description
Wage	Continuous	Hourly wage (BRL)
Age	Continuous	Individual's age (years)
Tenure on the Job	Continuous	Tenure on the job (months)
Hours of Housework	Continuous	Hours spent on housework (hours/week)
Educational Level	Dummy	Educational level (years of study)
No Education		
From 1-4 years		
From 5-8 years		
From 9-11 years		
From 13+ years		
Gender	Dummy	Gender
Male		
Female		
Ethnical Group	Dummy	Ethnical Group
Majority		
Minority		
Region of Residence	Dummy	Region of Residence
North		
Northeast		
Southeast		
South		
Central West		
Federal District		
Position within the family	Dummy	Position within the family
Head		
Not Head		
Family Structure	Dummy	Family Structure regarding kids*
Couple - No Kids		
Kids with 14 y/o or less		
Kids with older than 14 y/o		
Kids with more and less than 14 y/o		
Other family structure		

Source: See Table 1

Table 13 - Returns with modifying factors sorted by gender.

	2003		2008		2013	
	Male	Female	Male	Female	Male	Female
Log hourly wage, BRL						
Age	0,011	0,011	0,042	0,031	0,033	0,026
Age, squared	0,000	0,000	0,000	0,003	0,000	0,000
Tenure on the Job	0,002	0,002	0,002	0,002	0,002	0,002
Hours of Housework	-0,003	-0,002	-0,005	-0,004	-0,002	-0,004
Educational Level						
No Education	ref	ref	ref	ref	ref	ref
From 1-4 years	0,163	0,094	0,074	-0,003	-0,029*	-0,110
From 5-8 years	0,386	0,237	0,251	0,105	0,124	-0,002
From 9-11 years	0,726	0,621	0,541	0,409	0,352	0,218
From 13+ years	1,618	1,405	1,359	1,148	1,076	0,923
Ethnical Group						
Majority	ref	ref	ref	ref	ref	ref
Minority	-0,125	-0,122	-0,101	-0,116	-0,112	-0,099
Region of Residence						
North	ref	ref	ref	ref	ref	ref
Northeast	-0,174	-0,172	-0,136	-0,138	-0,169	-0,146
Southeast	0,104	0,062	0,090	0,013	0,029	-0,015
South	0,081	0,030	0,980	0,004	0,029	-0,115
Central West	0,008*	-0,074	0,597	-0,694	0,015*	-0,077
Federal District	0,348	0,104	0,379	0,362	0,300	0,280
Position within the family						
Head	ref	ref	ref	ref	ref	ref
Not Head	-0,206	-0,073	-0,105	-0,048	-0,086	-0,030
Family Structure						
No Kids	ref	ref	ref	ref	ref	ref
Kids with 14 y/o or less	0,019*	0,012*	-0,005*	-0,003	0,000*	-0,006
Kids with older than 14 y/o	-0,034	-0,111	-0,050	-0,093	-0,073	-0,086
Kids with more and less than 14 y/o	-0,030	-0,070	-0,048	-0,065	-0,042	-0,075
Other family structure	0,019*	-0,053	-0,006*	-0,022	-0,010*	-0,013
Constant	0,188	0,145	0,184	0,393	1,050	1,182
Observations	35.319	27.309	42.780	32.682	42.764	35.381
Adjusted R ²	0,508	0,504	0,495	0,508	0,347	0,369
F-test (P > F)	0,000	0,000	0,000	0,000	0,000	0,000

Source: See Table 1

*Not significant at a 5% level