

Benguria, Felipe

Working Paper

Firms, jobs, and gender disparities in top incomes: Evidence from Brazil

Upjohn Institute Working Paper, No. 20-338

Provided in Cooperation with:

W. E. Upjohn Institute for Employment Research, Kalamazoo, Mich.

Suggested Citation: Benguria, Felipe (2020) : Firms, jobs, and gender disparities in top incomes: Evidence from Brazil, Upjohn Institute Working Paper, No. 20-338, W.E. Upjohn Institute for Employment Research, Kalamazoo, MI,
<https://doi.org/10.17848/wp20-338>

This Version is available at:

<https://hdl.handle.net/10419/246052>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

12-18-2020

Firms, Jobs, and Gender Disparities in Top Incomes: Evidence from Brazil

Felipe Benguria
University of Kentucky, fbe225@uky.edu

Upjohn Institute working paper ; 20-338

Follow this and additional works at: https://research.upjohn.org/up_workingpapers



Part of the [Labor Economics Commons](#)

Citation

Benguria, Felipe. 2020. "Firms, Jobs, and Gender Disparities in Top Incomes: Evidence from Brazil." Upjohn Institute Working Paper 20-338. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.
<https://doi.org/10.17848/wp20-338>

This title is brought to you by the Upjohn Institute. For more information, please contact repository@upjohn.org.

Firms, Jobs, and Gender Disparities in Top Incomes: Evidence from Brazil

Upjohn Institute Working Paper 20-338

Felipe Benguria
Department of Economics, University of Kentucky
Email: fbe225@uky.edu

December 2020

ABSTRACT

This paper studies the gender disparities among top incomes in Brazil during the period 1994-2013 using administrative data on the universe of formal-sector job spells and detailed information on educational attainment, employers, and occupations performed. Over these two decades, differences in pay and participation between genders have narrowed, yet the process has been slow and women are still severely underrepresented, especially within the very top percentiles of the earnings distribution. The following findings highlight the role of firms and occupations in explaining these patterns. At the start of the period, women in the top percentile of the distribution owe a larger fraction of their earnings to working at high-paying firms than do men, while men's top incomes are in excess of their firms' average pay. In addition, belonging to the top percentile is initially much more persistent for men than for women. Both of these differences have vanished over time. I also document that the increase in the share in participation of women in top percentiles is primarily a within-firm and within-occupation phenomenon, which suggests that the evolution of cultural and institutional elements deserves further examination. Finally, I study the careers of female and male top earners, finding that the path to the top percentiles of the distribution is quite different across genders: Top-earning women work in larger firms from the start of their careers. Top-earning men earn large earnings premia above what their firm average pays throughout their career, and after their mid-30s switch employers at a higher frequency than women.

JEL Classification Codes: E24, G10, J31

Key Words: Top earners, Glass ceiling, Gender wage gap

Acknowledgments: This work was kindly supported by an Early Career Research Grant from the W.E. Upjohn Institute for Employment Research.

Upjohn Institute working papers are meant to stimulate discussion and criticism among the policy research community. Content and opinions are the sole responsibility of the author.

1 Introduction

A vast literature has examined gender disparities in the labor market in terms of pay and participation.¹ A subset of this literature has studied the lack of women among top incomes, a phenomenon known as the *glass ceiling* (Matsa and Miller, 2011; Kunze and Miller, 2017; Gayle, Golan and Miller, 2012; Bertrand, Goldin and Katz, 2010). While much of this work provides insights drawn from specific populations such as corporate leadership, recent work by (Guvenen, Kaplan and Song, 2014) uses administrative data over a 30-year period to provide a comprehensive picture of the participation of women in top incomes in the United States, including differences in transitions into and out of top incomes. At the same time, an influential new body of work has examined the role of firms in explaining patterns of inequality (Card, Heining and Kline, 2013; Song et al., 2018; Alvarez et al., 2018; Bryson et al., 2016) or gender and racial disparities in the labor market (Card, Cardoso and Kline, 2015; Bruns, 2018; Morchio, Moser et al., 2019; Coudin, Maillard and Tô, 2018; Barth, Kerr and Olivetti, 2017; Groshen et al., 1987; Kleven, Landais and Sogaard, 2018; Albrecht et al., 2018; Goldin et al., 2017; Gerard et al., 2018).

This paper studies the role of firms and occupations in accounting for gender differences in participation and pay in top incomes, in the transitions into and out the top percentiles, and in the careers of women and men who eventually become top earners. For this purpose, I rely on two decades of administrative employer-employee data on the universe of formal-sector job spells in Brazil, from 1994 to 2013. Several dimensions of the data are useful for this enterprise. First, the data report both firms and occupations performed, unlike many similar employer-employee data sets. Second, earnings are not top coded, which is a necessary feature to study top incomes. Third, Brazil is an interesting setting because there has been a reduction in gender disparity in the labor market in that country, and an increase in female participation in top income percentiles—yet, as in the United States and other countries, existing disparities are still large.

The fraction of women among the top 1% of the earnings distribution has increased from 14% in 1994 to 23% in 2013. Women’s participation along the earnings distribution follows a puzzling pattern: it decreases monotonically from the lowest levels up to about the 80th percentile and then remains flat. However, from the 97th percentile onward, it decreases dramatically, indicating that there is a special barrier—a *glass ceiling*—operating for top incomes. Are certain firms unwelcoming to women? Or is it certain jobs (occupations) within firms that present a barrier? Answering these questions requires focusing on the roles of firms and occupations in terms of how they relate to gender, which is the goal of this paper.

¹See for instance the recent surveys by Blau and Kahn (2017) and Goldin and Mitchell (2017).

The first part of the paper provides an overview of the gender earnings gap in Brazil and the sources of that gap. It shows that the overall gender wage gap has declined substantially: women earned, on average, 31% less than men at the beginning of the sample, but they earned 26% less in 2013, before controlling for differences in demographics and jobs held. A large part of this pay gap is due to the fact that women tend to work in lower-paying industries, occupations, and firms. Beyond that, using the decomposition introduced by [Card, Cardoso and Kline \(2015\)](#), I document differences in firm wage premiums that contribute to the gender wage gap and establish that bargaining and sorting account for equally important shares of these differences at the end of the period. In the mid-1990s, the bargaining component accounted for a striking two-thirds of these differences in firm wage premiums.

The core of the paper focuses on the role of firms and occupations in accounting for disparities in top incomes. The first key finding is that more female top earners work for high-paying firms than do male top earners. In other words, for these top-earning women, earnings above the average pay in their firms are smaller than for men. This difference is very large at the start of the sample but is substantially lessened by 2013. A second key finding establishes that the increase in the female participation among top earners has been almost entirely a within-firm and within-occupation phenomenon. This means that the increase in female participation is not due to growth in the number or size of firms (or occupations) that hire women top earners. Instead, it is due to increases in the number of female top earners in each firm (or occupation). To put it succinctly, progress in the representation of women in the top percentile of the distribution is not the result of compositional changes in the firm distribution. This points to possible changes in institutional factors or cultural norms that should be studied further.

The next set of results concerns the transitions of men and women into and out of the top earnings percentiles. At first glance, there are no differences across genders in these transition probabilities: the probability of staying in the top 1% has become larger over time for both genders. Next, I document how often individuals move into or out of the top percentile by switching employers or occupations. In other words, I ask, "To what extent does the path into or out of the top of the earnings distribution involve a progression within the firm—or, alternatively, does it require moving across firms?" In this regard, I do find important differences between the genders. During 2012–2013, while 29% of men who moved from the bottom 99% to the top 0.1% switched employers, only 17% of women did so. And while 18% of men switched occupations, only 13% of women did.

Finally, I study the careers of women and men who eventually become top earners. I track individuals belonging to the top 1% of the earnings distribution who were aged 44–46 in 2013. I track them over their entire careers, starting in 1994. There are several similarities and two key differences between the careers of these men and women. Both followed a similar path in terms of their earnings throughout the

two decades. However, women typically worked in firms that are, on average, 20% larger. In addition, starting in job holders' mid-30s, the probability that an individual switches employers from one year to the next becomes larger for men than for women. Given the timing of this divergence, it suggests that family reasons could be behind it.

Related Literature. This paper contributes, first, to the literature studying the underrepresentation of women at the top of the earnings distribution. [Guvenen, Kaplan and Song \(2014\)](#) document a broad set of novel facts regarding gender differences among top earners. Using three decades of U.S. Social Security records, they show that the share of women among top earners has increased over time, in part because of a lessening in the probability of women dropping out of the top percentiles. Motivated by the findings in [Guvenen, Kaplan and Song \(2014\)](#), the current paper focuses on the role of firms and occupations in explaining these gender differences. [Bertrand, Goldin and Katz \(2010\)](#) and [Gayle, Golan and Miller \(2012\)](#) study gender disparities in executives' careers. [Kunze and Miller \(2017\)](#) and [Matsa and Miller \(2011\)](#) find that female bosses in Norway and female directors in the United States promote women in lower ranks of firm hierarchies.

Second, this paper adds to a literature that examines the role of firms in accounting for disparities in pay between genders or in other dimensions. [Card, Cardoso and Kline \(2015\)](#) study differences in firm wage premia earned by men and women in Portugal and develop a decomposition that assigns the difference in pay to differences in sorting across firms or to differences in bargaining. [Bruns \(2018\)](#) shows that the widening of differences in wages across firms in Germany has led to an increase in the gender wage gap, given the sorting of women into lower-paying firms. [Barth, Kerr and Olivetti \(2017\)](#) document that the widening of the gender wage gap in the United States has been caused in part by widening differences in careers within establishments and also by increasing differences in job mobility. [Morchio, Moser et al. \(2019\)](#) study the role of firms in accounting for the gender wage gap in Brazil and develop a model to quantify the reasons behind women's sorting into lower-paying firms. [Coudin, Maillard and Tô \(2018\)](#) and [Kleven, Landais and Sogaard \(2018\)](#) study the sources of the penalty in women's earnings observed following parenthood and how this impacts the firms into which women sort.

Finally, [Gerard et al. \(2018\)](#) decompose differences in pay between white and nonwhite workers in Brazil, showing that nonwhite workers are employed in lower-paying firms, which is due both to differences in skill across groups and to preferences toward white individuals at higher-paying firms.² An aspect that sets it apart from this literature is that the current paper focuses on top earners. The paper is

²These papers build upon a broader literature that has studied the role of firms in accounting for changes in earnings inequality ([Card, Heining and Kline, 2013](#); [Song et al., 2018](#); [Alvarez et al., 2018](#); [Bryson et al., 2016](#)).

related to previous works that studied the income and careers of top earners, using administrative data obtained from either social security ([Kopczuk, Saez and Song, 2010](#)) or tax records [Piketty and Saez \(2003\)](#).

Outline The rest of the paper is organized as follows: Section 2 outlines the administrative employer-employee data used. Section 3 provides context on gender disparities in pay and participation in Brazil over the entire earnings distribution. Section 4 focuses on the role of firms and occupations in accounting for the underrepresentation of women among top earners. Section 5 concludes.

2 Data Sources

The analysis is based on an administrative census of formal-sector employment in Brazil: the *Relação Anual de Informações Sociais* (RAIS). This is a longitudinal linked employer-employee data set that contains detailed characteristics of jobs, workers, establishments, and firms.³

These data have several advantages that are useful in studying top income earners and the role of firms and occupations in terms of gender disparities. First, it allows me to track firms and workers over time, spanning a two-decade period. This feature is ideal for studying transitions in and out of top earnings percentiles as well as top earners' careers. A second key feature is that it reports detailed occupational codes. In contrast, linked employer-employee data or social security records from other countries, such as the United States, do not report such information. A third advantage is that the data is not top-coded, which is an essential feature to study top earners. Conversely, one limitation of the data is that by its nature it is restricted to labor income. A second potential limitation is that it is restricted to the formal sector. This concern, however, is less relevant when focusing on top earners.

The data report annual earnings for each job spell. They also report the number of months worked in each year. With this information, I compute average monthly earnings as the ratio of annual earnings over months worked. This is the measure of earnings used throughout the paper. I abstract, then, from differences across genders in terms of the number of months worked in the year.

Sample Selection. I restrict the sample to individuals aged 25 to 54. This cutoff is based on the fact that top earners are likely to attend university and thus enter the labor market later than average. On the other hand, Brazilian workers often retire at a younger age than in other countries. Furthermore, I restrict the sample to workers in the private sector, excluding the government sector and sectors that are largely public, such as health and education. I drop a small number of observations that are missing

³See [Alvarez et al. \(2018\)](#) for a detailed description of these data.

educational attainment or earnings or occupational codes. Finally, consistent with [Guvenen, Kaplan and Song \(2014\)](#), I impose a minimum earnings threshold equal to three times the minimum wage of each year.

3 Context: Gender Disparities in the Brazilian Labor Market

I begin the analysis by providing context on the gender disparities in the formal sector of Brazil's labor market and the evolution of these disparities over the two decades from 1994 to 2013. I start with Mincer-type wage regressions that shed light on the sources of the gender wage gap. I then use the recent decomposition of firm wage premiums by [Card, Cardoso and Kline \(2015\)](#) to separate the firm component of the gender wage gap into bargaining and sorting. Finally, I provide evidence on the participation of women across percentiles of the earnings distribution.

The first exercise consists of estimating Mincer-type regressions of individuals' wages on a dummy variable equal to 1 for female workers and a sequentially increasing set of controls. This equation is estimated separately for each year, and the coefficients on the female dummy variable are plotted in [Figure 1](#):

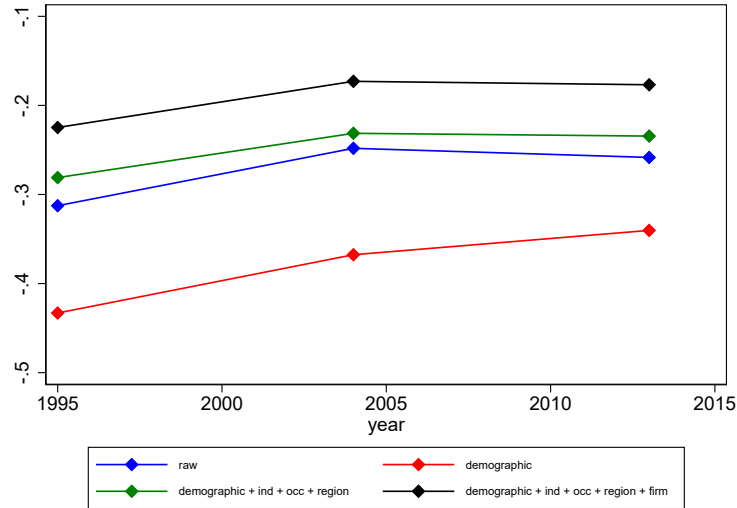
$$w_{it} = \beta_t \cdot \text{Female}_{it} + X_{it} \cdot \gamma_t + \epsilon_{it} \quad (1)$$

Without including any controls (X_{it}), I find a "raw" wage gap which has fallen substantially from 31% in 1995 to 26% in 2013.⁴ Next, I include demographics (age and dummy variables for nine categories of educational attainment), the use of which increases these coefficients to 43% in 1995 and to 34% in 2013, given that women in the formal sector have a somewhat higher educational attainment than men. Next, adding industry, occupation, and region fixed effects reduces the gap to 28% in 1995 and 23% in 2013, indicating that women sort into lower-paying industries and occupations than do men. Finally, adding firm fixed effects further reduces the gap to 22% in 1995 and 18% in 2013, again showing that women also sort into lower-paying firms than men. This residual gender wage gap is not explained, then, by differences in demographics, employers, or occupations.

Next, I document changes in the participation of women in the labor market across the earnings distribution. For this purpose, I compute and graph the share of women in each percentile separately for the years 1995, 2005, and 2013. These plots are shown in [Figure 2](#). The figure shows, in each year, a decline in the participation of female workers as one moves up the earnings distribution. In 1995, the female share starts at about 40% in the lowest percentiles, drops to about 20% at the 60th percentile,

⁴In this section, I use % as a symbol for log points.

Figure 1: The Evolution of the Gender Wage Gap

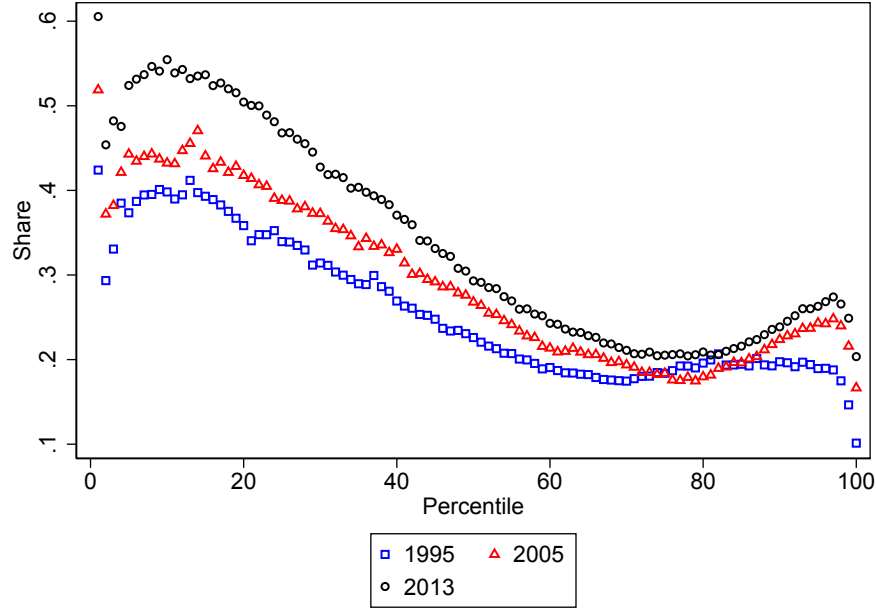


Note: This figure shows the estimated coefficients from Mincer-type regressions of log earnings on a dummy for female workers and 1) no other controls; 2) demographic controls; 3) demographic controls and industry, region, and occupation fixed effects; and 4) all of the above and firm fixed effects. These regressions are estimated separately for each year. Source: Author's calculations.

and then remains fairly flat, until it falls sharply in the top three percentiles. In 2005, the female share starts at about 45% in the lowest percentiles and declines to about 20% at the 80th percentile. It then increases to slightly less than 30% before again falling sharply in the top three percentiles. In 2013, the pattern is similar, but the difference is that there is a large growth in the level of female participation among the lowest percentiles of the earnings distribution and a much smaller increase among the highest percentiles. This pattern clearly leads one to ask, "What is so different at the top percentiles? Are there specific industries, occupations, or firms that are inaccessible to women?" These are the questions I focus on in Section 4.

Differences in Firm Wage Premiums: Bargaining vs. Sorting. To further understand the sources of the gender wage gap in Brazil, I use the [Card, Cardoso and Kline \(2015\)](#) decomposition to determine to what extent the overall gap is due to differences in firm wage premiums, and to what extent these differences in firm wage premiums are due to sorting or bargaining. This decomposition attributes these differences to sorting if men and women receive different pay premiums because they are employed in different firms. The firm premium component of the gap is instead attributed to bargaining to the extent that men and women receive different premia within each given firm. The decomposition is done separately for different subperiods, in order to be able to track differences over time in the importance

Figure 2: Female Participation across the Wage Distribution



Note: This figure shows the share of women in each percentile of the earnings distribution separately for 1995, 2005, and 2013. Source: Author's calculations.

of each component. I adopt the notation in [Card, Cardoso and Kline \(2015\)](#) and refer to $\phi_{J(i,t)}^M$ as the firm wage premium for men and $\phi_{J(i,t)}^F$ as the firm wage premium for women. The wage of each worker can be written as the sum of a worker-specific term α_i , a firm-specific term (a firm wage premium) $\phi_{J(i,t)}^G$, and a vector of covariates X_{it} :⁵

$$w_{it} = \alpha_i + \phi_{J(i,t)}^G + X_{it}'\beta^G + r_{it} \quad (2)$$

Thus, this takes the standard [Abowd, Kramarz and Margolis \(1999\)](#) model of additive worker and firm effects and generalizes it to having gender-specific firm effects. The difference in the average firm wage premia between men and women can be written as follows:

$$E[\phi_{J(i,t)}^M|\text{male}] - E[\phi_{J(i,t)}^F|\text{female}] = (E[\phi_{J(i,t)}^M - \phi_{J(i,t)}^F|\text{male}]) + (E[\phi_{J(i,t)}^F|\text{male}] - E[\phi_{J(i,t)}^F|\text{female}]) \quad (3)$$

In this expression, $(E[\phi_{J(i,t)}^M - \phi_{J(i,t)}^F|\text{male}])$ is the average bargaining power effect and $(E[\phi_{J(i,t)}^F|\text{male}] - E[\phi_{J(i,t)}^F|\text{female}])$ is the average sorting effect.

Table 1 reports the number of worker-year observations and mean (log) earnings in each subperiod in the overall sample in RAIS and in the dual connected set of male and female individuals over which the

⁵The set of covariates includes dummy variables for educational attainment groups interacted with year dummies and with quadratic and cubic age.

estimation is performed. The results of the decomposition in Equation (3) are shown in Table 2. Consistent with the earlier discussion, column 1 shows a declining gender wage gap. Column 4 indicates that in the first subperiod (1994–1998), the difference in firm wage premia across genders contributes about two-thirds of the overall wage gap, while this contribution falls to about one-half in the latter subperiods. Columns 5 through 8 indicate that in the first subperiod, the bargaining component accounts for about two-thirds of the part of the wage gap that is due to differences in firm wage premia. The fraction due to bargaining falls to about one-half in the last subperiod.

Table 3 breaks down these results by educational attainment for the initial (1994–1998) and final (2009–2013) periods. In both periods, the contribution of differences in firms’ pay premiums to the gender wage gap is similar across the different groups of educational attainment. However, among those with high educational attainment, bargaining accounts for a much larger share of these differences in pay premiums than it does among those with lower educational attainment—at least during the initial period. During the final period, this difference disappears.

Summing up, these results point to a very large role of bargaining in explaining the gender wage gap in the Brazilian labor market. While the fraction of the gender wage gap falls over time, it remains a large source of gender disparities. An interesting question arises as to what has driven the decline in the bargaining component of the gender wage gap.

Table 1: DESCRIPTIVE STATISTICS FOR VARIOUS SAMPLES OF EMPLOYEES IN RAIS

	# Worker-year observations		# Workers		Age		Earnings	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Males	Females	Males	Females	Males	Females	Males	Females
1994–1998								
Overall sample	17371.28	49621.89	6339.644	16164.64	34.65	35.76	651.35	877.53
Connected sets	14998.59	38224	5373.549	12815.53	34.69	35.83	695.37	998.72
Dual connected set	14998.59	38224	5367.827	12812.68	34.69	35.83	695.37	998.72
1999–2003								
Overall sample	21500.43	55685.79	7798.717	18191.99	34.95	35.89	623.60	813.12
Connected sets	17819.13	39865.74	6544.846	13739.66	34.91	35.91	669.20	937.68
Dual connected set	17819.13	39865.74	6393.829	13557.21	34.91	35.91	669.20	937.68
2004–2008								
Overall sample	30304.68	70618.66	10588.55	21875.03	34.97	36.01	609.67	797.91
Connected sets	25799.6	52680.18	9086.401	17264.35	34.84	35.95	645.15	898.93
Dual connected set	25799.6	52680.18	8928.68	17096.43	34.84	35.95	645.15	898.93
2009–2013								
Overall sample	44400.63	90493.88	15110.44	27023.37	35.30	36.33	686.48	904.68
Connected sets	39966.71	72546.65	13730.75	22928.17	35.17	36.24	711.85	987.80
Dual connected set	39966.71	72546.65	13489.84	22670.08	35.17	36.24	711.85	987.80

Note: This table reports summary statistics for male and female workers in the overall sample, connected sets, and dual connected sets used in the estimation of the [Card, Cardoso and Kline \(2015\)](#) decomposition. Columns 1 through 4 are in thousands. Columns 7 and 8 are in Brazilian reals of 2000. Source: Author’s calculations.

Table 2: CONTRIBUTION OF FIRM-SPECIFIC PAY PREMIUMS TO THE GENDER WAGE GAP AT DUAL-CONNECTED FIRMS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Gender wage gap	Means of firm premiums			Decompositions of contribution of firm component				
	Male premium among men	Female premium among women	Total contribution of firm components	Sorting		Bargaining		
				Using male effects	Using male effects	Using male distribution	Using female distribution	
1994–1998	0.307	0.419	0.229	0.190	0.069	0.046	0.144	0.121
1999–2003	0.250	0.337	0.203	0.134	0.048	0.037	0.097	0.086
2004–2008	0.222	0.274	0.160	0.114	0.054	0.037	0.078	0.061
2009–2013	0.241	0.234	0.120	0.114	0.059	0.049	0.065	0.055

Note: This table reports the results of the decomposition of firm wage premiums into bargaining and sorting components following [Card, Cardoso and Kline \(2015\)](#). This is estimated on the dual connected set for four different subperiods, as indicated in each row. The first column reports the difference in average log wages between men and women. Columns 2 and 3 report the average estimated firm wage premiums for men and women. Column 4 reports the part of the total gender gap of column 1 that is due to differences in firm wage premiums. Columns 5 through 8 report the results of the decomposition. Source: Author's calculations.

Table 3: CONTRIBUTION OF FIRM-SPECIFIC PAY PREMIUMS TO THE GENDER WAGE GAP AT DUAL-CONNECTED FIRMS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gender wage gap	Means of firm premiums			Decompositions of contribution of firm component			
	Male premium among men	Female premium among women	Total contribution of firm components	Sorting		Bargaining	
				Using male effects	Using male effects	Using male distribution	Using female distribution
1994–1998							
Low educ. att.	0.426	0.328	0.112	0.216	0.102	0.084	0.133
Mid educ. att.	0.460	0.419	0.172	0.248	0.133	0.099	0.148
High educ. att.	0.396	0.593	0.391	0.202	0.068	0.047	0.155
2009–2013							
Low educ. att.	0.329	0.167	0.021	0.145	0.067	0.074	0.071
Mid educ. att.	0.412	0.192	0.035	0.157	0.091	0.085	0.072
High educ. att.	0.271	0.275	0.161	0.114	0.065	0.054	0.059

Note: This table reports the results of the decomposition of firm wage premiums into bargaining and sorting components following [Card, Cardoso and Kline \(2015\)](#). This is estimated on the dual connected set for two different subperiods and for three different groups by educational attainment, as indicated in each row. The first column reports the difference in average log wages between men and women. Columns 2 and 3 report the average estimated firm wage premiums for men and women. Column 4 reports the part of the total gender gap of column 1 that is due to differences in firm wage premiums. Columns 5 through 8 report the results of the decomposition.

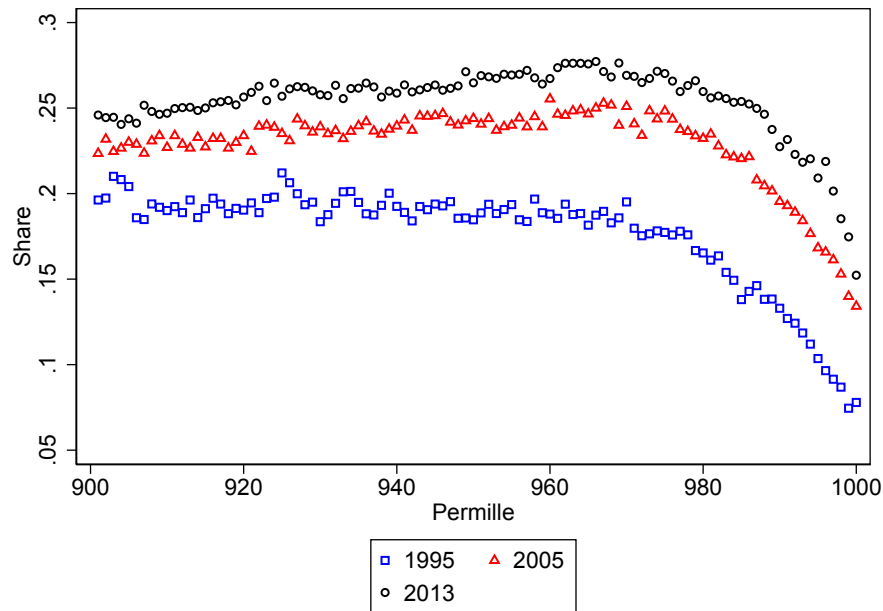
Source: Author's calculations.

4 Firms, Jobs, and Gender Disparities in Top Incomes

At the core of the paper, I focus on gender differences among top earners, and especially on the role of firms and occupations in explaining these differences. In the spirit of [Guvenen, Kaplan and Song \(2014\)](#), I focus not only on static differences in earnings and participation, but also on transitions into and out of the top income percentiles. At the end of this section, I look retrospectively at the careers of female and male top earners.

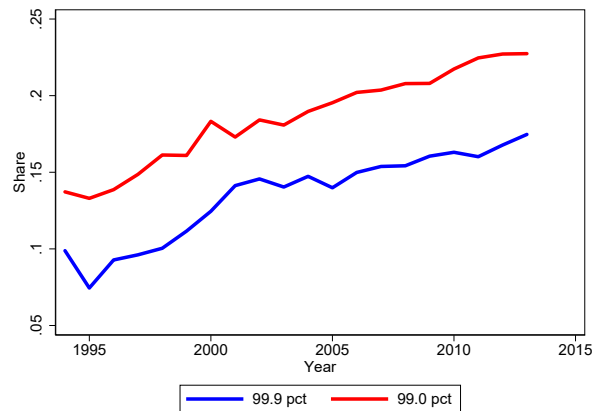
I start by describing the male and female individuals in the top percentile of the earnings distribution. Given the sharp drop in female participation at the very top of the distribution, [Figure 3](#) zooms in on the top 10 percentiles, dividing them into 100 permilles. The same pattern is seen in every year represented in the figure: there is a constant female share up to about the 97th percentile, followed by a steep decline at higher percentiles. In 1995, the participation rate is 20% at the 90th percentile but falls below 10% above the 97th percentile. In 2013, it starts at 25% and falls to about 15%. [Figure 4](#) illustrates the growth in female participation at the 99th and 99.9th percentiles, showing a steady but slow increase in the female share in both, consistent with the previous figure. [Table 4](#) provides descriptive statistics regarding the members of the top percentile in 1995 and 2013. The average age has increased slightly over time, from 39.5 to 40.5 for females, and is slightly higher and constant (42.0) for men. The average monthly earnings in this group are about 5% higher for men than for women in both years. The table also shows the top industries in which employment in the top percentile is concentrated. The main industries are "services to firms" (which includes any firm whose focus is on providing services to other firms, such as consulting, accounting, or some other service) and financial intermediation. The only difference across genders is that female employment appears to be more concentrated in these industries than male employment.

Figure 3: Female Participation at the Top of the Earnings Distribution



Note: This figure shows the share of female workers in each permille within the top decile of the wage distribution in years 1995, 2005, and 2013. Source: Author's calculations.

Figure 4: Female Participation at the Top of the Earnings Distribution



Note: This figure shows the evolution of the share of female workers at the 99.0 and 99.9 percentiles of the earnings distribution. Source: Author's calculations.

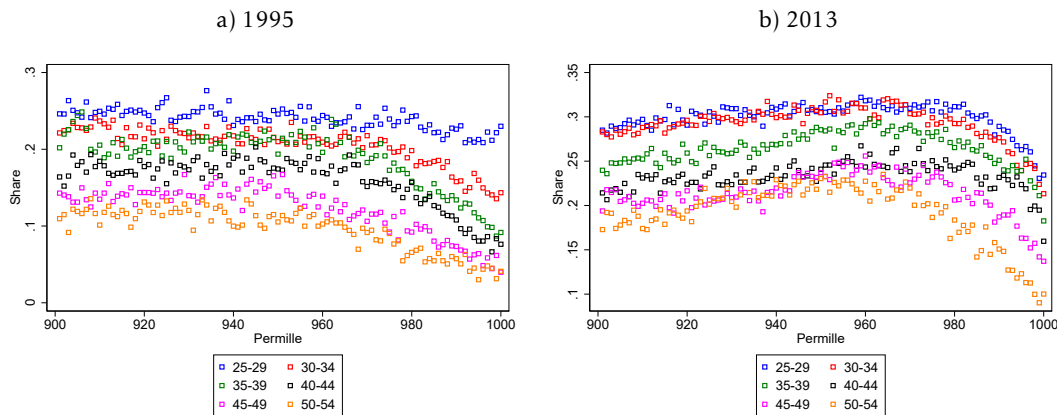
Studying how female participation in the top percentile of the distribution varies by age group can be informative about the evolution of gender disparities over workers' careers. Figure 5 plots female participation in the top percentile within each of six five-year age groups (25–29, 30–34, 35–39, 40–44,

Table 4: DESCRIPTIVE STATISTICS: MALE AND FEMALE TOP EARNERS

	1995	2013
Female		
Age	39.5	40.5
Earnings (monthly)	6,839	8,486
Top industries	Financial intermediation (32.0%) Services to firms (13.3%) Utilities (5.5%)	Services to firms (16.2%) Financial intermediation (14.4%) Commerce (8.8%)
Male		
Age	42.0	41.9
Earnings (monthly)	7,128	9,056
Top industries	Financial intermediation (17.4%) Services to firms (9.4%) Utilities (8.1%)	Services to firms (10.5%) Financial intermediation (9.3%) Commerce (7.5%)

Note: This table reports descriptive statistics on women and men in the top 1% of the earnings distribution in 1995 and 2013. Earnings are reported in Brazilian reais of 2000. Source: Author's calculations.

45–49, 50–54). It shows that both at the start of the sample (in 1995) and two decades later (2013), female participation in the top percentile is significantly higher among younger workers. In 2013, it reaches about 25% among workers aged 25–29 but only about 12% in the 50–54 age group. The gender gap also spreads when moving from the 40–44 to the 45–49 and 50–54 age groups.

Figure 5: Female Participation at the Top of the Earnings Distribution by Age Groups

Note: This figure shows the share of female workers in each permille within the top decile of the wage distribution in 2013 for various age groups. Source: Author's calculations.

Firms and Top Incomes. The first question I ask is, “To what extent are the earnings obtained by men and women in top percentiles a result of working in high-paying firms or, instead, a result of earning much more than the average pay in the firm in which they work?” In other words, to what extent do the characteristics of the firms explain the observed gender disparities? To this end, I do a simple

decomposition, writing each individual's earnings as the sum of the average pay (across all workers) of the firm in which an individual is employed and the deviation from this element.

$$w_{it} = \bar{w}_{it} + (w_{it} - \bar{w}_{it}) \quad (4)$$

I then average each of these components by gender and by permille. Then, I graph each of these components in Figure 6. This figure plots these elements in two years, 1995 and 2013, the first and last in the sample. Panels A and B plot the average of the left-hand side by gender and permille, for which, by construction, there is only a small difference. Panels C and D plot the firm component. A striking difference between men and women emerges from this figure. In 1995, women in the top percentiles receive a much higher firm component than men. This gap is seen across all permilles in the top 10% of the earnings distribution, except at the very top (up to the 995th permille). In contrast, this difference is substantially smaller in 2013. The other side of the coin (shown in Panels E and F) is that in 1995, men's earnings are significantly higher than the average earnings for women in these firms, while this gap is smaller in 2013. In other words, the structure of earnings differs significantly across genders in terms of their source. However, this disparity has been largely reduced over time.

Increasing participation of women among top earners: a within- or between-firm phenomenon? I have already documented that, over time, there has been an important (yet incomplete) increase in the participation of women in the top percentiles of the earnings distribution. This was shown in Figure 2 and in more detail in Figure 3. The share of female individuals in the top 1% increased from about 10% to about 22% over the two decades. Here, I ask whether this is due to firms, on average, having more women among their top earners (a within-firm phenomenon) or to an increase in the relative size of firms that have a higher share of female top earners (a between-firm change).

The results of this decomposition are shown in the top section of Table 5. Over the two-decade period, the increase in the number of women in the top 1% of the income distribution has been primarily a within-firm phenomenon—the within-firm component explains 80% of the total increase in the female share. This has been the case both in the first decade (1994–2003) and, especially, in the second decade (2003–2013), in which the within-firm component accounts for essentially 100% of the change.

Similarly, I also decompose the female share of the top 1% into between- and within-occupation components. For this purpose, I consider two-digit occupations. Over the entire two-decade period, I see that the increase in the female share occurs mostly within occupations; the within-occupation component accounts for 76% of the change. In this case, I see important differences in the first and second decade. During 1994–2003, the within-occupation component accounts for 56% of the increase in the

Table 5: DECOMPOSITION OF THE CHANGE IN THE SHARE OF FEMALES AMONG TOP EARNERS INTO BETWEEN-FIRM AND WITHIN-FIRM COMPONENTS

	Change in share female in top percentile	Between	Within
Firms			
1994–2003	0.05	0.01 (0.24%)	0.04 (0.76%)
2003–2013	0.04	0.00 (0.02%)	0.04 (0.98%)
1994–2013	0.10	0.02 (0.21%)	0.08 (0.79%)
Occupations			
1994–2003	0.07	0.03 (0.44%)	0.04 (0.56%)
2003–2013	0.03	-0.01 (-0.33%)	0.04 (1.33%)
1994–2013	0.10	0.02 (0.24%)	0.07 (0.76%)

Note: This table reports the results of a decomposition of the change in the share of women among individuals in the top 1% of the earnings distribution into within-firm and between-firm components (top panel) or within-occupation and between-occupation components (bottom panel). Source: Author’s calculations.

female share. But in the second period, it accounts for 133%, implying that the between-occupation component actually reduced the female share in the top earnings percentile.

Summing up, these decompositions are useful in understanding the mechanisms behind the increase in the participation of women among earners of top incomes. The fact that the increase in female participation occurs mostly within firms and within occupations leads to the further question of why women are moving up in firms’ earnings distributions within their jobs. It suggests that changes in institutional factors or cultural norms might be an important factor deserving further attention. Alternatively, while educational attainment categories observed in these data are fairly broad, it could be that there are changes in women’s educational attainment in very specific advanced degrees that are common among top earners.

Transitions in and out of the top earning groups. Next, I study the transitions into and out of top percentiles for men and women. Following [Guvenen, Kaplan and Song \(2014\)](#), I assign individuals to one of three groups: those at the top 0.1%, those in the next 0.9%, and those in the bottom 99%. I focus on year-to-year transitions rather than longer time horizons, given the amount of exit from the sample I observe. I compute the share of workers in the top 0.1%, the next 0.9%, or the bottom 99% that are found in each group in the following year, with exiting the sample being considered an additional option. I compute these transition probabilities separately for men and women and tabulate them in Table 6. And I do this exercise for three different time periods: 1994–1995, 2003–2004, and 2012–2013. The first clear pattern drawn from this table is that the probability of those in the top 0.1% remaining there

has increased over time. Initially, this probability was 65% for men and 46% for women, indicating that belonging to the very top income group represented a much more unstable situation for women. However, over two decades, this probability has not only increased for both genders but almost entirely converged, reaching 76% for men and 75% for women. In fact, the entire transition matrix is strikingly similar across genders in 2013. In 1995, in contrast, females in the top 0.1 or next 0.9 percentiles had a higher probability than men not only of moving down the distribution but also of exiting the sample in the following year.

To what extent do firms and occupations play an important role in these transitions? Are moves across employers systematically related to moving into or out of top earnings percentiles? Answering these questions will shed light on the *type* of career progression that leads to attaining these top percentiles—whether it comes by progressing within one’s employer or requires switching employers. Table 7 tabulates the probability of switching firms (in columns 1, 3 and 5) or occupations (in columns 2, 4, and 6) for each of the transitions shown earlier in Table 6. The top panel refers to men. In the initial 1994–1995 period, among workers initially in the top 0.1% of the earnings distribution, 6% that remain in the top 0.1% group switch firms, 11% that drop down to the next 0.9% switch firms, and a much larger fraction (61%) of those who move into the bottom 99% switch firms. For this latter group, the probability of switching employers is even larger in the 2012–2013 period: 89% of those dropping into the bottom 99% switched employers in that period. Switching employers is also common for those moving up the distribution: for those initially in the bottom 99%, a quarter of those who moved to the top 0.1% switched firms in 1994–1995 (and 29% in 2012–2013). (Conversely, this means that a majority moved up the distribution while staying with their employer.) The bottom panel tabulates these probabilities for women. The differences across genders in this regard are small, especially when one looks at transitions in which earners dropped to lower percentiles. Moving up the distribution, women in the second 0.9% enter the top 0.1% by switching employers with the same frequency that men do, but transitions to the top 0.1% from the bottom 99% by switching employers are more likely to occur for men than for women. This is true for all time periods. Finally, the table shows that the probability of workers’ switching occupations as they move into and out of the top 0.1% or the next 0.9% are somewhat lower than the probability of their moving across employers. For instance, between 2012 and 2013, while 29% of men who moved from the bottom 99% to the top 0.1% switched employers, only 18% switched occupations. In the case of women, 17% and 13% who made this transition switched firms or occupations, respectively.

Overall, then, while switching employers or occupations plays an important role in moving into and out of the top income groups, it does not seem to fully account for the large gender differences in

Table 6: TRANSITION PROBABILITIES ACROSS PERCENTILES OF THE EARNINGS DISTRIBUTION

PANEL A: MALES				
	Top 0.1%	Next 0.9%	Bottom 99%	Exit sample
1994–1995				
Top 0.1%	0.65	0.14	0.04	0.17
Next 0.9%	0.04	0.72	0.13	0.11
Bottom 99%	0.00	0.03	0.77	0.20
2003–2004				
Top 0.1%	0.71	0.08	0.04	0.17
Next 0.9%	0.03	0.77	0.09	0.11
Bottom 99%	0.00	0.02	0.81	0.17
2012–2013				
Top 0.1%	0.76	0.10	0.02	0.12
Next 0.9%	0.02	0.77	0.12	0.10
Bottom 99%	0.00	0.02	0.81	0.17

PANEL B: FEMALES				
	Top 0.1%	Next 0.9%	Bottom 99%	Exit sample
1994–1995				
Top 0.1%	0.46	0.19	0.10	0.26
Next 0.9%	0.02	0.71	0.13	0.13
Bottom 99%	0.00	0.02	0.75	0.23
2003–2004				
Top 0.1%	0.63	0.09	0.05	0.22
Next 0.9%	0.02	0.78	0.08	0.12
Bottom 99%	0.00	0.01	0.79	0.20
2012–2013				
Top 0.1%	0.75	0.10	0.02	0.13
Next 0.9%	0.02	0.78	0.09	0.11
Bottom 99%	0.00	0.01	0.78	0.21

Note: This table reports transition probabilities for male and female workers for 1994–1995, 2003–2004, and 2012–2013. Each cell reports the share of workers in one of the categories listed in each row that moved within one year to one of the categories listed in each column. Source: Author’s calculations.

participation in top percentiles.

The Careers of Top Earners. The final goal of this paper is to study gender differences in the careers of individuals who eventually become top earners. The method I use is this: I focus on all individuals in the top 1% in 2013, the final year in the sample, and I track their careers retrospectively for two decades. I further restrict the sample to individuals of comparable age, specifically those aged 44–46 in 2013, whom I have tracked since they were aged 24–26 in 1994.

The results are shown in Figure 7. Panel A plots the mean earnings for each group. Differences in earnings are small throughout the whole period (because I am conditioning on both groups’ becoming top earners). The next figure (Panel B) plots the mean firm size of each group. In both cases, there is

Table 7: TRANSITIONS ACROSS PERCENTILES AND PROBABILITY OF SWITCHING FIRMS OR OCCUPATIONS

PANEL A: MALES

	Top 0.1%		Next 0.9%		Bottom 99%	
	Pr(switch firm)	Pr(switch occ.)	Pr(switch firm)	Pr(switch occ.)	Pr(switch firm)	Pr(switch occ.)
1994–1995						
Top 0.1%	0.06	0.09	0.11	0.14	0.61	0.45
Next 0.9%	0.13	0.15	0.05	0.10	0.29	0.22
Bottom 99%	0.25	0.22	0.20	0.19	0.21	0.18
2003–2004						
Top 0.1%	0.07	0.07	0.38	0.25	0.83	0.51
Next 0.9%	0.16	0.13	0.08	0.09	0.56	0.33
Bottom 99%	0.17	0.13	0.24	0.18	0.19	0.16
2012–2013						
Top 0.1%	0.09	0.11	0.30	0.22	0.89	0.49
Next 0.9%	0.23	0.20	0.11	0.13	0.49	0.26
Bottom 99%	0.29	0.18	0.37	0.24	0.25	0.16

PANEL B: FEMALES

	Top 0.1%		Next 0.9%		Bottom 99%	
	Pr(switch firm)	Pr(switch occ.)	Pr(switch firm)	Pr(switch occ.)	Pr(switch firm)	Pr(switch occ.)
1994–1995						
Top 0.1%	0.05	0.08	0.06	0.11	0.57	0.42
Next 0.9%	0.14	0.16	0.04	0.09	0.24	0.23
Bottom 99%	0.18	0.18	0.16	0.20	0.14	0.15
2003–2004						
Top 0.1%	0.09	0.09	0.43	0.30	0.83	0.58
Next 0.9%	0.17	0.13	0.07	0.11	0.52	0.39
Bottom 99%	0.12	0.12	0.20	0.20	0.15	0.14
2012–2013						
Top 0.1%	0.09	0.12	0.30	0.24	0.86	0.53
Next 0.9%	0.21	0.20	0.10	0.14	0.43	0.29
Bottom 99%	0.17	0.13	0.31	0.26	0.20	0.15

Note: Each cell reports the share of workers in one of the categories listed in each row moving within one year to one of the categories listed in each column that also switch firms or occupations (the ratio between all movers and movers who in addition switch firms or occupations). Source: Author's calculations.

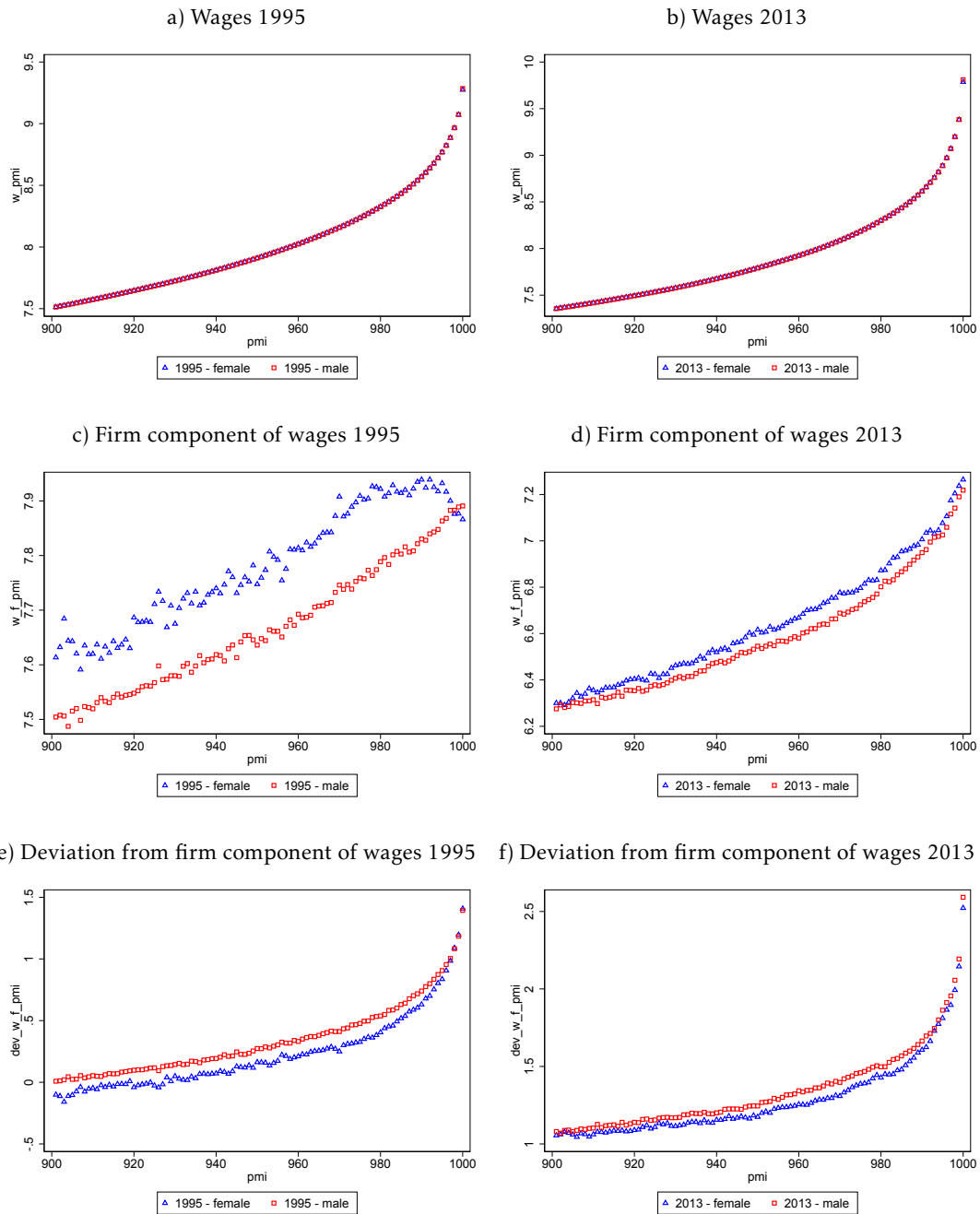
an initial decline in firm size from age 25 to 30, followed by a continuous increase later on. Women work at larger firms (about 20% larger) through the entire period. Panel C plots the probability of switching employers from one year to the next. This figure shows that men and women are, at least initially, equally likely to switch employers, but that the probability is somewhat larger for men after their mid-30s. One can speculate that having children might be a factor in this difference. Finally, Panel D plots the income percentile to which 2013 top earners belong in each year of their careers. Men and women follow a very similar path, in that they start at about the 85th percentile and end up in the top percentile in 2013. Summing up, while women and men who eventually become top earners follow similar careers, the main difference observed is that women systematically work at larger firms.

5 Conclusions

This paper has described the gender disparities in participation in top income percentiles in Brazil during the two-decade period of 1994–2003. It has focused on the role played by firms and occupations in explaining these differences, and through these means it has uncovered systematic differences between the genders. Over this period of time, the Brazilian labor market has seen a slow but constant increase in the share of women in the top 1% and the top 0.1% of the earnings distribution. This change has been primarily a within-firm phenomenon, which suggests that institutional or cultural elements might have played a role and deserve to be inspected further.

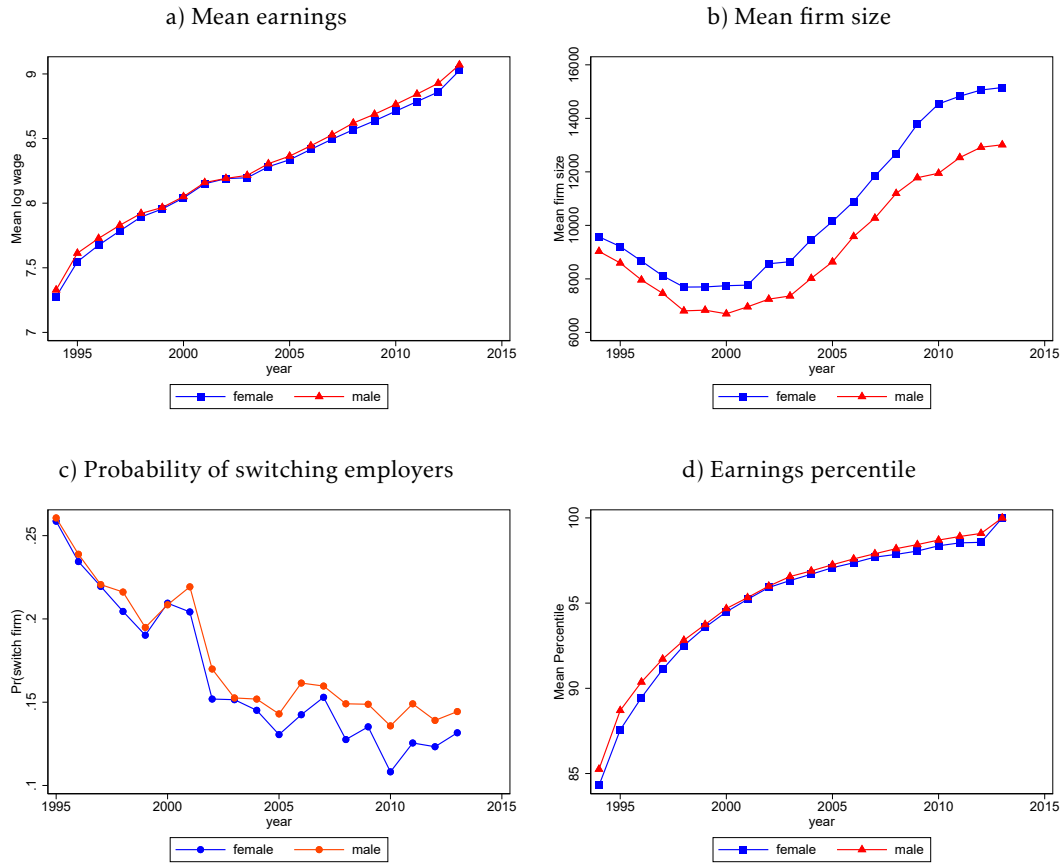
I also document a key difference between male and female top earners, in that women work in larger and higher-paying firms than men, on average, but that men earn more than women in these firms. This important difference between men and women has been shrinking over time. Transitions in and out of the top percentiles are fairly similar across genders, and there are also similarities in the frequency through which these transitions are mediated by switching employers or occupations. Finally, I document that the career trajectories of women and men who eventually become top earners are fairly similar, although women tend to work in larger firms throughout their careers, and men, starting in their mid-30s, tend to switch employers more often than do women.

Figure 6: Firms and Gender Differences among Top Incomes



Note: Panels a) and b) plot the mean log wage for males and females in each permille within the top decile of the wage distribution in 1995 and 2013. Panels c) and d) plot the mean of the firm component of male and female workers' log wages in each permille within the top decile of the wage distribution in 1995 and 2013. Panels e) and f) plot the deviation from the mean of the firm component of male and female workers' log wages in each permille within the top decile of the wage distribution in 1995 and 2013. Source: Author's calculations.

Figure 7: Careers of Male and Female Top Earners



Note: This figure plots the trajectories of different outcomes of individuals aged 45 and belonging to the top 1% of the earnings distribution in 2013. All outcomes are conditional on being employed. Panel a) plots the mean earnings by year and gender. Panel b) plots the mean employer size by year and gender. Panel c) plots the probability of switching employers by year and gender. Panel d) plots the mean percentile in the earnings distribution by year and gender. Source: Author's calculations.

6 References

- Abowd, John M, Francis Kramarz, and David N Margolis.** 1999. "High wage workers and high wage firms." *Econometrica*, 67(2): 251–333.
- Albrecht, James, Mary Ann Bronson, Peter Skogman Thoursie, and Susan Vroman.** 2018. "The career dynamics of high-skilled women and men: Evidence from Sweden." *European Economic Review*, 105: 83–102.
- Alvarez, Jorge, Felipe Benguria, Niklas Engbom, and Christian Moser.** 2018. "Firms and the decline in earnings inequality in Brazil." *American Economic Journal: Macroeconomics*, 10(1): 149–89.
- Barth, Erling, Sari Pekkala Kerr, and Claudia Olivetti.** 2017. "The dynamics of gender earnings differentials: Evidence from establishment data."
- Bertrand, Marianne, Claudia Goldin, and Lawrence F Katz.** 2010. "Dynamics of the gender gap for young professionals in the financial and corporate sectors." *American Economic Journal: Applied Economics*, 2(3): 228–55.
- Blau, Francine D, and Lawrence M Kahn.** 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature*, 55(3): 789–865.
- Bruns, Benjamin.** 2018. "Changes in Workplace Heterogeneity and How They Widen the Gender Wage Gap." *American Economic Journal: Applied Economics*, *Forthcoming*.
- Bryson, AJ, RB Freeman, E Barth, and JC Davis.** 2016. "It's Where You Work: Increases in Earnings Dispersion Across Establishments and Individuals in the US." *Journal of Labor Economics*, 34(S2): S57–S97.
- Card, David, Ana Rute Cardoso, and Patrick Kline.** 2015. "Bargaining, sorting, and the gender wage gap: Quantifying the impact of firms on the relative pay of women." *The Quarterly Journal of Economics*, 131(2): 633–686.
- Card, David, Jörg Heining, and Patrick Kline.** 2013. "Workplace heterogeneity and the rise of West German wage inequality." *The Quarterly journal of economics*, 128(3): 967–1015.
- Coudin, Elise, Sophie Maillard, and Maxime Tô.** 2018. "Family, firms and the gender wage gap in France."

- Gayle, George-Levi, Limor Golan, and Robert A Miller.** 2012. "Gender differences in executive compensation and job mobility." *Journal of Labor Economics*, 30(4): 829–872.
- Gerard, Francois, Lorenzo Lagos, Edson Severnini, and David Card.** 2018. "Assortative matching or exclusionary hiring? the impact of firm policies on racial wage differences in brazil." *NBER Working Paper*.
- Goldin, Claudia, and Joshua Mitchell.** 2017. "The new life cycle of women's employment: Disappearing humps, sagging middles, expanding tops." *Journal of Economic Perspectives*, 31(1): 161–82.
- Goldin, Claudia, Sari Pekkala Kerr, Claudia Olivetti, and Erling Barth.** 2017. "The expanding gender earnings gap: Evidence from the LEHD-2000 Census." *American Economic Review*, 107(5): 110–14.
- Groshen, Erica L, et al.** 1987. *The structure of the female/male wage differential: Is it who you are, what you do, or where you work?* Vol. 44, Federal Reserve Bank of Cleveland.
- Guvenen, Fatih, Greg Kaplan, and Jae Song.** 2014. "The glass ceiling and the paper floor: Gender differences among top earners, 1981-2012."
- Kleven, Henrik, Camille Landaïs, and Jakob Egholt Sogaard.** 2018. "Children and gender inequality: Evidence from Denmark."
- Kopczuk, Wojciech, Emmanuel Saez, and Jae Song.** 2010. "Earnings inequality and mobility in the United States: evidence from social security data since 1937." *The Quarterly Journal of Economics*, 125(1): 91–128.
- Kunze, Astrid, and Amalia R Miller.** 2017. "Women helping women? Evidence from private sector data on workplace hierarchies." *Review of Economics and Statistics*, 99(5): 769–775.
- Matsa, David A, and Amalia R Miller.** 2011. "Chipping away at the glass ceiling: Gender spillovers in corporate leadership." *American Economic Review*, 101(3): 635–39.
- Morchio, Iacopo, Christian Moser, et al.** 2019. "The Gender Gap: Micro Sources and Macro Consequences." Vol. 143, Society for Economic Dynamics.
- Piketty, Thomas, and Emmanuel Saez.** 2003. "Income inequality in the United States, 1913–1998." *The Quarterly journal of economics*, 118(1): 1–41.
- Song, Jae, David J Price, Fatih Guvenen, Nicholas Bloom, and Till Von Wachter.** 2018. "Firming up inequality." *The Quarterly Journal of Economics*, 134(1): 1–50.