THE BRAZILIAN LABOR REFORMS OF 2017:

HOW DOES THE FLEXIBILIZATION OF EMPLOYMENT PROTECTION LEGISLATION AFFECT WAGES?

By

Glauco Ferreira Bittencourt

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Supervisor: Arieda Muço

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1.

ABSTRACT

The purpose of this thesis is to estimate the effects of the Brazilian labor reforms on the average wage of workers. In November 2017, the biggest legislative package of amendments of employment protection legislation (EPL) was enacted in Brazil. Among many revisions, important legislative changes were implemented, such as the abolition of compulsory union contribution; introduction of intermittent contracts; prevail of individual and collective agreements over state legislation; and introduction of a mutual contract termination agreement with a lower severance payment. These legislative changes are assessed to estimate their effects on average wages of workers by using repeated cross-section data and a difference-in-differences methodology with fixed-effects. The identified control group is composed of civil servants and the treatment group is formed of workers in the private sector. The results suggest that loosening employment protection legislation - at least in the Brazilian context - leads to a decrease of average wages in the labor market.

Keywords: *Flexibilization; Labor Market; Employment Protection Laws; Brazilian Labor Market; EPL; Brazil*

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I would like to express my profound gratitude to the Central European University (CEU) for sponsoring my Master's Program (that otherwise, I would not have been able to afford). From where I come from, I am the exception, not the rule. An exception that was given an opportunity. These opportunities are scarce. Most of my primary and high school classmates did not have the time, money and the chance to seek a better future through education. I did, I got lucky. I am here to prove that this exception needs to be a rule, that opportunities should be equally provided, and to also remind myself that only education can change a future that would be otherwise opaque and oppressed.

I would like to express my gratitude to my partner in life, Alena Stepkina, for the unconditional support througout these last 2 years, as well as my family for the love and emotional aid even with an ocean of *saudades* between us.

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Introduction

The Brazilian *Reformas Trabalhistas* (*Labor Reforms*)[1] of 2017 was the biggest legislative package of changes in the labor market ever announced after the Brazilian re-democratization. The debate about the Labor Reforms dominated the agenda of the congress, public opinion, and the media for almost the whole year of 2017. Strikes were called, protests for and against were organized, and a great sensation of political polarization post-impeachment[2] could be felt.

The reforms were enacted in November of 2017 changing important aspects of employment protection legislation (EPL)[3] and undermining trade unions' power. The reforms were a government response to the high degree of informality and unemployment in the Brazilian labor market, which deteriorate even more in the most recent economic crisis the country faced – and still faces. This is a highly politically sensitive subject and a source of heated debates around the country, as well as a relevant theme for my thesis.

In recent studies, EPL is seen as a policy option to increase/decrease flows of workers in the labor market, fight duality (informal and formal jobs) and respond to an ever-volatile and more dynamic economic outlook. The effects are not well crystalized and there is no clear cut of what is an optimal EPL, depending a lot on the context where it is implemented. In the case of Brazil, the latest EPL reforms have changed over 100

[1] Free translation from Portuguese.
[2] In 2016, the then-President Dilma Roussef from the *Partido dos Trabalhadores* (Worker's Party) was impeached based on a controversial process that generated intense debate in the country (See more in Nunes and Melo 2017).
[3] Employment Protection Legislation (EPL) consists of rules and procedures regarding the contractual relationship between employers and employees. It regulates through a set of legislation the hire and dismissal of workers; sanctions for unfair dismissals; severance payments, probation periods and protection against mass dismissals; unemployment insurance schemes; and conditions and types of contracts (European Commission 2004; Aleksynska and Schmidt 2014)

articles of the legislation concerning the labor market. The main question of this thesis is about the effect that these EPL changes have had on wages. The literature gives relevant hints, but it is still very inconclusive, and I seek to contribute to the field with a fresh analysis of this specific case.

In this thesis, I utilized a high quality and sizeable administrative Brazilian dataset for the period of 2015 to 2018. I also used a difference-in-differences (DID) methodology with time and municipality fixed-effects to observe changes before and after the EPL reforms in Brazil. The results consistently show that salaries of the EPL affected group of treatment had a substantial decrease of almost 6-fold if compared to the controlled group.

The remainder of this thesis is organized as the following. In Chapter 1, I explore and present the relevant literature to form the theoretical foundation of this thesis. Chapter 2 provides institutional information, background and a summary of the main EPL changes introduced in Brazil. Chapter 3 describes and gives an overview of the data used throughout this work. Chapter 4 aims to explain the used methodology and provide a logical rationale to the conceived model and its controls. Chapter 5 presents the results obtained as well as robustness checks. Finally, in Chapter 6 a thorough analysis is made and ways forward for the implicated policy are drawn.

Chapter 1 – Literature Review

The last financial and economic global crisis of 2008 exacerbate macroeconomic distortions such as unemployment, shedding light on to the discussion and attracting research to the theme, especially regarding reforms in the labor markets (Parisi 2017; Krein et al. 2019). The foundation of the arguments for a more flexible labor market, therefore legitimating reforms, is that this is a pre-condition to allow the creation of new jobs and hence reduce unemployment (Mankiw 2011). Some common features found across different countries concerning these supply-side reforms are listed by Krein et al. (2019 p. 226):

> "(1) extensive adoption of atypical contracts with lower standard contract rights; (2) flexibilization of working hours; (3) revision of the rules of remuneration, especially in relation to the (more variable) forms of payment and the minimum wage policy; (4) deregulate occupational safety and health rules; (5) decrease of direct enforcement and compliance of labor legislation by firms; (6) decentralization the definition of norms and redefinition of the role of unions."

Although these EPL changes started to be discussed more fiercely and take shape after the 2008 crisis, the agenda of EPL liberalization gained power and support in Brazil back in the 1990s when the country initiated its insertion in the global market more acutely (Krein et al. 2019). Surprisingly, in the Brazilian case, the scenario post-2008 crisis was a period of great and steady growth, high creation of formal jobs, and low unemployment. A response to this apparent anachronical tale is given by Dix-Carneiro & Kovak (2017), whereby, using Brazilian data and context, they argue that trade liberalization forces large changes in the labor market dynamics and the transition from/to these changes may take several years. A similar view is shared by OECD (2004), which sustains that EPL may decrease firms' ability to adjust to a rapidly changing environment driven by globalization, technological change, and the

subsequent organizational innovation. Jaumotte & Tytell (2008) and Jayadev (2007) find that globalization affects negatively the labor share once it increases and expands the mobility of workers and, most importantly, weakens the bargaining power of workers, especially low-skilled ones. Also, Rodrik (1997) declared that increasing trade liberalization exposes countries to severe fluctuation in real wages and unemployment due to international competition.

Despite the reasons behind a global and intertwined set of policies to undermine EPL are important to be understood, the question remains: does labor market liberalization help to increase employment? What are the effects on wages (the main subject of this thesis)? The literature on job security and EPL provides no definitive answer. The impact and consequences of firing and hiring costs on employment and labor market is a topic of many relevant theoretical and empirical studies. Important contributions have been made to the field and usually conclude that strong EPL policies have an important impact on the level of employment but may also lead to a reduction of labor flow (Garibaldi 1998; Ljungqvist 2002; Mortensen and Pissarides 1994; Bertola 1990).

Authors such as Bentolila et al. (1994), Cahuc & Postel-Vinay (2002), and Boeri & Garibaldi (2019) acknowledge that creative solutions to alleviate severance payments and decrease hiring/firing costs by employers may also create a dual-track market with temporary non-protected jobs and fixed well-protected jobs. Besides, Bertola (2004) explains that risk-averse workers may accept a cut in wages in exchange for job security. In a context where this dual-track market exists and unemployment is high, the worker may accept lower wages in order to have an open-ended contract.

Moreover, Bertola and Bentolila (1990) emphasize that firing costs have a larger effect on the propensity of firms to fire than to hire, thus, increasing average long-run

employment. On the other hand, Leonardi & Pica (2006) suggest that firms tend to transfer the burden of firing costs to workers causing wage reductions, they present some evidence found in the analysis of an EPL reform in Italy in the 90s whereby entry wages were reduced by 6%.

Bentolila et al. (1994) also observed that temporary workers tend to earn less due to flexible legislation and screening process. The human capital investment by employers in this kind of worker is also low due to the *ad hoc* necessity – or simply because it is cheaper. The concept of "human capital" coined by Gary Becker's (1994) explains that schooling and on-work training – besides other types of formal and informal education – are an individual's investment that has a positive correlation to level of wages and better employment; therefore, it can be said that the amount of human capital of each worker is of fundamental importance. In an environment where different types of contracts widen gaps between high-skilled and low-skilled workers, the low-skilled workers tend always to have a more difficulty acquiring qualification as, referring to Adam Smith (1776), they usually need to sell their workforce faster and cheaper once they have not enough savings.

According to Parisi (2017), EPL policies and welfare expenditures have an important role in increasing labor share and bringing about fair re-distributional policies such as, for instance, minimum wage policy. As reported by David Card & Alan Krueger (1993) in their famous empirical experiment to evaluate the increase of minimum wage effect in the labor market, there was no substantial effect found on the employment level.

Furthermore, other authors have done enormous contributions to the field highlighting important aspects and effects of loose and stringent EPLs such as Autor, Kerr, and Kugler (2007); Blanchard and Wolfers (1999); Djankov et al. (2003); Nickell et al

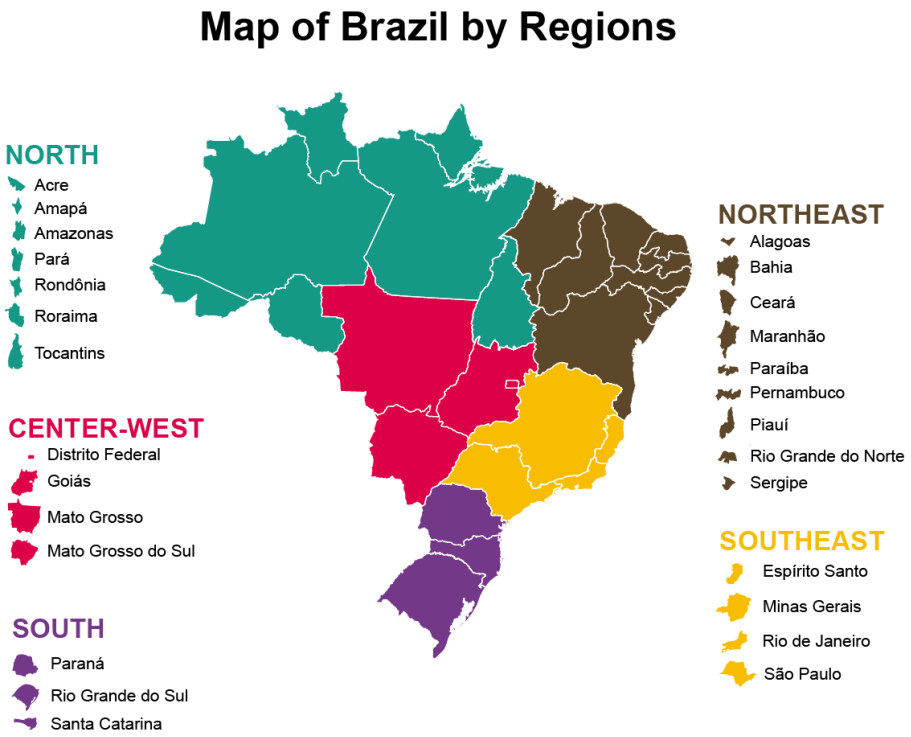
(2001). Even though this thesis has as focus the impact on wages, the previous important studies and field explorations made by the cited authors assisted my research and should not go unmentioned.

Chapter 2 – Institutional Framework & Summary of the 2017 Brazilian Labor Reforms

2.1 Country Context

Brazil is the largest country in South America by size and by population, with over 210 million inhabitants according to the *Instituto Brasileiro de Geografia e Estatistica*[4] (IBGE) (2018). According to the World Bank (2019), Brazil ranks as the 9th largest economy in the world (by GDP). The country has 26 states and 1 Federal District, Brasília, which is the capital of Brazil. Moreover, Brazil is divided into 5 regions: North, Northeast, Center-West, Southeast, and South. The below figure gives a better geographic perspective:

Figure 1. Map of Brazil Divided by Regions and States



Source: map created by me using a graphic software.

[4] Free translation from Portuguese: Brazilian Institute of Geography and Statistics

Despite the recent decade of rapid economic growth and social inclusion, the country has a great uneven distribution of income (Ken Kempner and Ana Loureiro Jurema 2002; Ribeiro, Teixeira, and Ambiel 2019) and a huge disparity of development among its regions. Most of the industrialized states are in the South and Southeast regions of Brazil. The other regions are, in general terms, rural areas and have less dynamic markets in comparison to the thereof regions. Not by surprise, states from the South and Southeast region, especially Rio de Janeiro and São Paulo, have better education, income per capita and life expectancy levels than the ones from the northern, western and central areas of the country (Ken Kempner and Ana Loureiro Jurema 2002).

Moreover, Brazil has one of the highest dropout rates in the entire world, "resulting in an average of 15 years of schooling to produce one high school graduate" (World Bank 2017). This is translated to higher costs per graduate in secondary and higher education, making Brazil spend more than any other country in the region. Also, the number of people holding a higher education diploma in the country is only 15.3% (IBGE 2019a), below its peers in the region Argentina (20.3%)[5] and Colombia (23.4%)[6] (OECD 2019).

In the last few years, Brazil has been under severe economic distress and through one of the worst economic periods since the country's redemocratization[7]. In 2015 and

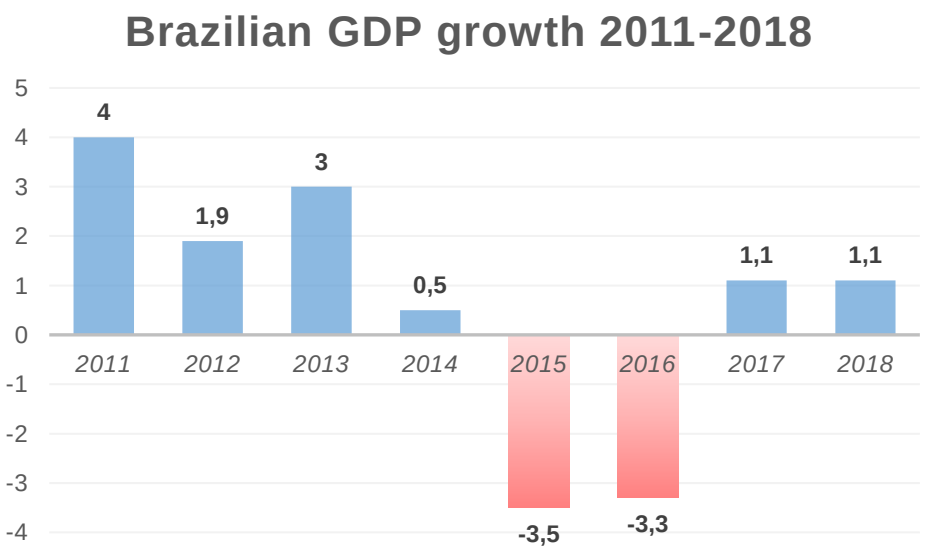
[5] Data extracted from OECD website: https://stats.oecd.org/#. Path: "OECD.Stat Education and Training > Education at a Glance > Educational attainment and outcomes > Educational attainment and labor-force status > Educational attainment of 25-64 year-olds"

[6] Data extracted from OECD website: https://stats.oecd.org/#. Path: "OECD.Stat Education and Training > Education at a Glance > Educational attainment and outcomes > Educational attainment and labor-force status > Educational attainment of 25-64 year-olds"

[7] Historically, Brazil had its democracy interrupted few times. However, the military coup installed in 1964 initiated the longest undemocratic period since the proclamation of the Brazilian Republic. The military dictatorship lasted for over 20 years, ending only in 1985. The period post-1985 and the creation of the current Constitution of 1988 is a period called "*Redemocratização Brasileira*" (Brazilian Redemocratization) (Ituassu 2016).

2016 the GDP growth was negative, respectively -3.5% and -3.3% (*Figure 2*). As of September 2019, 11.8% of the population is unemployed, and 41.4% are informal workers (IBGE 2019b), with a mean monthly income of R$ 2,234 (US$ 535.34)[8] estimated by the IBGE (2019c) for both informal and formal workers. The IBGE (IBGE 2019c) also estimate that the poorer 51% of Brazil has a monthly income per capita of R$ 413 (US$ 98.96)[9] (Mendonça 2019).

Figure 2. Brazilian GDP Growth for the Period Between 2011 and 2018



Source: World Bank (2019b).

2.2 Background

Brazil has experienced a dramatic shift in its economic and social policies since 2016. A set of neoliberal policies and the emergence of a new cycle of individual values and market reforms has taken the agenda of the country. The cycles mentioned by Luiz Carlos Bresser-Pereira (1993) seem truer than ever, as Brazil seems to experience

[8] Exchange rate of 12.11.2019 from www.xe.com .
[9] Exchange rate of 12.11.2019 from www.xe.com .

again a contraction of the State and an alignment with market-oriented reforms, similar to what happened in the 1990s.

After the re-democratization and the first elections, Brazil went through a steady path of neoliberal reforms, especially during Fernando Henrique Cardoso's terms (1995-2002) from *Partido da Social Democracia Brasileira* party (Brazilian Social Democracy Party - PSDB). Cardoso followed a neoliberal manual with tight fiscal austerity, privatization, and market liberalization reforms (Galvão 2014; Braga and Purdy 2019). Privatizations were extensive and their implementation was encouraged through the creation of the *Conselho Nacional de Desestatização* (National Council of Destatization). Besides, a tight fiscal rules-based framework such as the *Tripé Macroeconomico* [10] (Macroeconomic Tripod) oriented the economic policy of the government.

However, very little was touched concerning the labor market liberalization. Cardoso's government sought wholesale labor reforms, this strategy made it easier for trade unions and workers to resist them as everyone was affected, especially the reform and reshape of trade unions and their collective bargaining power (Galvão 2014; Riethof 2002). Nevertheless, some specific changes in the legislation were enacted, such as the introduction of bank of extra hours, limitation of the automatic annual salary indexation - forcing negotiation, and the introduction of bonuses based on individual or collective performance (Riethof 2002). The neoliberal reforms enacted in the 90s in Brazil exacerbate the austerity environment of a country that had been facing economic constraints since the early 1980s. It paved the way for political change and the emergence of Lula and the *Partido dos Trabalhadores* (Worker's Party - PT)'s

[10] The Macroeconomic Tripod is represented by the following economic policies: primary surplus, floating exchange rate and inflation target.

agenda. Lula and the PT defended the agenda against the reduction of the size of the state, in opposition to privatizations and in support for an increment in the social safety net and security for workers (Braga and Purdy 2019). Lula had (and still has) a great reputation among the trade unions and workers, being himself a trade union leader in the 1980s and having led several strikers in São Paulo. Moreover, the PT is a party founded by, among others, many members of trade unions. It gave Lula and PT an immense credibility and almost uncritical support from the trade unions, in particular, the *Central Única dos Trabalhadores* (Unified Worker's Central - CUT), the largest and most important trade union federation of Brazil.

In 2003, Lula came to power and "his first term was marked by a continuation of the neoliberal macroeconomic policy that unleashed criticism on the part of the social movements, the unions among them" (Galvão 2014, p. 191). Nonetheless, this macroeconomic orthodox policy, implemented in a favorable economic outlook and complemented with important inclusive social policies, did not prevent positive economic and social indicators being registered during Lula's presidential terms. According to the World Bank data (World Bank 2019b), Brazil had an annual growth of 4%, on average, between 2003 and 2012. Besides the very solid economic growth, a sharp decline in unemployment and informal employment, rigid control of inflation, and a real increase in the minimum wage of 53.67% between 2002 and 2010 was observed (Galvão 2014). These results provided wide support for the government among ordinary people, and that was confirmed by Lula's reelection in 2006 and both Dilma's election in 2010 and reelection in 2014. During both Lula's terms, he took advantage of a worldwide expansion (i.e. the super cycle of commodity prices[11]) that

[11] According to Erten and Ocampo (2012 p. 1), the super cycle of commodity prices was

allowed him to take a path between the neoliberal Washington Consensus (Williamson 1990) on the economic plan and radical social reforms demanded by PT (Singer 2012). A "new development model" as Boito Jr. says (2012, p. 69), a developmentalism that is possible within the neoliberal framework, with reforms that were weak enough to not cause conflict. The labor market during Lula's government faced this "new development model" too. Unlike Cardoso, Lula was skillful managing to implement slow and gradual reforms in the legislation. He used his charisma and the economic achievements – for instance, the steady increase of wages in real terms – to convince the trade unions and workers that new measures would guarantee a prosperous future. In contrast to Cardoso's proposals, Lula aimed to loose EPLs targeting young and new people just accessing the market in order to allow a smooth transition, besides introducing tight regulations against one-person firms (Galvão 2014).

Moreover, another crucial point to guarantee support for these measures was the disentanglement of reforms and new regulations involving trade unions from any change in the labor laws (Riethof 2002). The economic agenda of Lula and PT started to get ruined following the end of the supercycle of commodity prices, which led to a considerable increase of public debt and a disastrous contractionary fiscal policy in

"unprecedented in its magnitude and duration. The real prices of energy and metals more than doubled in five years from 2003 to 2008, while the real price of food commodities increased 75%. While in the former case prices reached one of the highest levels in history, in the case of agriculture it was a reversal of the strong downward trends experienced since the 1980s. In this sense, it can be said that there was a boom of mineral, not of agricultural prices. Similar to earlier commodity booms, the recent one came to end when the global economic growth slowed down, diminishing demand pressures on commodity prices. However, commodity prices started to recover surprisingly fast, in such a way that the world economy experienced again high commodity prices in 2010–12, which can be seen as a continuation of the 2004–mid 2008 boom".

In the case of Brazil, commodities such as soy beans, corn and iron ore play a great role in the exports and are responsible for a chunk of the revenue side of the balance of payments. The boom of the super cycle of commodity prices was extremely beneficial to Brazil for these reasons.

the middle of an economic downturn. The austerity measures introduced by then-President, Dilma Rousseff, led to massive journeys of protests throughout the country in 2013 (See more in Braga and Purdy 2019). From that point on, opposition parties and alt-right sectors of the society started a campaign blaming Dilma and the PT for a set of pro-cyclical economic policies in the past that led to the economic collapse of Brazil. In addition, the corruption scandals involving Petrobras and the *Operação Lava-Jato* [12] (Carwash Operation) contributed to weakening the already feeble government. In August 2016, Rousseff was impeached in a very controversial political process, apparently for not being committed enough to the orthodoxy – or for realizing it too late.

Subsequently to Rousseff's impeachment, the then-Vice-President Michel Temer in 2016, in collusion with opposition leaders, became the President. Temer, during his first months in office, prepared a series of priority reforms in the labor market intending to introduce more market flexibilization, deregulation and lowering hiring/firing costs.

2.3 The Brazilian 2017 Labor Reforms

Commonly qualified as neoliberal and repressive by the Left and the trade unions, and as a choice between "rights or jobs" by Jair Messias Bolsonaro in 2018, a then-new elected President of Brazil, the labor reforms were viewed as necessary by the Temer's government and the private sector. The Labor Reforms bill was submitted to the *Câmara dos Deputados* (Lower House)[13] by the then-President Temer on 23rd December 2016. Temer had the majority support from Congress and managed to form

[12] The Carwash Operation is an ongoing criminal investigation of corruption at the state-owned oil company Petrobras, where executives indicated by political parties accepted bribes in return for awarding contracts to construction firms at inflated prices.
[13] Free translation from Portuguese.

a wide coalition through the indication of members from many different parties to strategic positions in the government and in state-owned companies (Feliu 2018).

The bill was approved at the *Câmara dos Deputados* at ease with 296 votes against 177 on 26th April 2017. The *Senado Federal* (Federal Senate)[14] ratified the bill on 11th July 2017 with 50 votes against 26 votes. The President Temer sanctioned the bill as the *Law 13.467 of 2017*[15] on 13th July 2017 being enacted in 120 days later, on 11th November 2017.

The Labor Reforms of 2017 were wholesale and effectively change many aspects of the *Consolidação das Leis do Trabalho*[16] (CLT)[17]. The Reforms altered a total of 54 articles, revoked 9 and created other 43 articles in the CLT (G1 2018). This thesis does not have a pretension to cover every single point of change and/or analyze it, instead, with the help of João Renda Leal Fernandes (2018)[18], I summarize below only the most relevant changes for my analysis and only the major points that influence wages:

[14] Free translation from Portuguese.
[15] Integral content of the *Law 13.467 of 2017* available on: http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2017/lei/l13467.htm
[16] Free translation from Portuguese: Consolidation of the Labor Laws.
[17] The *Consolidação das Leis do Trabalho (CLT)* is the is the set of laws that regulate the individual and collective labor market relations in Brazil. It was created in 1943 under the tenure of President Getúlio Vargas and had implemented some pro-operario changes with the new Constitution of 1988. Carvalho de Azevedo and Tonelli (2014 p. 194) explain that:

> "hiring in accordance with CLT rules is ensured by the employer's signature of the *carteira de trabalho* (employment work record booklet), thus characterizing a formal employment contract. According to the CLT, a formal employment contract establishes rights and duties for both employers and employees. A distinctive feature of this type of hiring is a guarantee of rights that are not normally covered by other types of contracts, such as a 30-day vacation period, thirteenth salary, and an additional bonus of 1/3 of the salary during the vacation period. These rights do not exist in many countries"

In my thesis, I consider formal employment as CLT formal contracts between employees and employers. In other words, all the employees are under CLT regulations. As I will explain further, another category exists for civil servants, they are considered *estatutários* (statutory) and other type of regulations apply in that case.
[18] For detailed reference, see further Renda Leal Fernandes (2018).

- Prevail of individual agreements over state legislation;
- Prevail of collective bargaining agreements and collective agreements over state legislation;
- Collective or multiple dismissals without the homologation of trade unions;
- Collective agreements (entered into between the company and their employees) prevail over the collective bargaining agreements;
- Abolition of mandatory union contributions;
- Introduction of mutual contract termination, whereby it allows the employers to pay a lower penalty for the contract termination and employees to use up to the 80% of their compulsory pension fund account if both parties agree;
- Introduction of intermittent contracts. Paid by hour, day or occasion.

President Temer and the enthusiasts of the reforms' proposal argued that they would create jobs and tackle unemployment and informality. From their viewpoint, only supply-side reforms and market friendliness regulations could resume the country's growth and stop the GDP retraction, which in 2015 and 2016 had a negative growth of 3.5% and 3.3% respectively (World Bank 2019b). The Government announced in October 2017, when the Labor Reforms were about to be enacted, that it would generate 2 million new jobs and would increase formality (UOL / Reuters 2017).

Chapter 3 – Data

3.1 Data Source - *Relação Anual de Informações Sociais* (RAIS)

I used an administrative data that links employee-employer from Brazil called *Relação Anual de Informações Sociais*[19] (RAIS). The former Ministry of Labor - now a secretary inside of the Ministry of Economy – assembles this administrative dataset with yearly data, providing a high-quality census of the Brazilian formal labor market (De Negri et al. 2001; Dix-Carneiro and Kovak 2017). All formally registered firms in Brazil are legally required to report annual information on each worker that the firm employs. If the firm or worker fails to provide it, the firm may be fined, and the worker may lose governmental benefit programs (Doornik, Schoenherr, and Skrastins 2018; Dix-Carneiro and Kovak 2017). There is a great incentive to provide proper information. RAIS includes almost all formally employed workers, meaning those with a signed employment work record booklet. However, RAIS does not count interns, domestic workers, and other minor employment categories, along with those in the informal labor market (including self-employed workers) (Dix-Carneiro and Kovak 2017).

The dataset covers around 50 million formal employees containing relevant information about age, gender, education, wage, tenure, type of employment, hiring date, layoff date, reason for layoff, state, municipality, etc (Doornik, Schoenherr, and Skrastins 2018). I used data from RAIS for the period of 2015–2018. It is also important to highlight that the RAIS database used is the public version, which means that the *CNPJ*[20] (firms national registry identification number) of employers and *CPF*[21] (social

[19] Free translation from Portuguese: Annual Report on Social Information.
[20] CNPJ stands for "*Cadastro Nacional da Pessoa Jurídica*" in Portuguese.
[21] CPF stands for "*Cadastro da Pessoa Física*" in Portuguese.

security number) of employees are not disclosed. These data have been used recently by Dix-Carneiro (2014), Menezes-Filho and Muendler (2011) and Doornik, Schoenherr, and Skrastins (2018).

3.2 Data Overview

RAIS has great geographical representativity and covers the entire formally employed population. I obtained RAIS data from the Brazilian Ministry of Economy for the period of 2015-2018. It contains microdata connecting employee and employer with relevant variables of information about gender, education, occupation, industry sector, race and contractual aspects across all the 26 States of Brazil plus the Federal District of Brasília.

The access to the RAIS database is public[22]. The data is consistent across the year and is available on a yearly basis divided by state. In total, the whole data for the period of 2015-2018 covers 267,293,600 observations. Each observation represents one individual only traceable by year.

Each observation contains the salary received throughout the selected year from January to December. The salary reported by employers in RAIS is gross and englobes the monthly salary, extra hours, gratifications, vacation bonuses, commissions, profit sharing and other components (Ministério da Economia 2019). Besides, other important information such as unpaid leave, suspension, gender, age, and education are included.

The main limitation of RAIS is the lack of information regarding workers not formally employed and self-employed individuals, this is an important factor because, as

[22] Public RAIS Data available on: http://pdet.mte.gov.br/microdados-rais-e-caged

previously mentioned, in the Brazilian context the percentage of informal labor force accounts for 41.4%. Another relevant issue is that I use the public available RAIS dataset which does not contain worker and establishment identifiers, therefore not allowing me to track workers and establishments over time. And last but not least, the data regarding the race of employees from the public sector is missing in RAIS due to the problems in its collection[23].

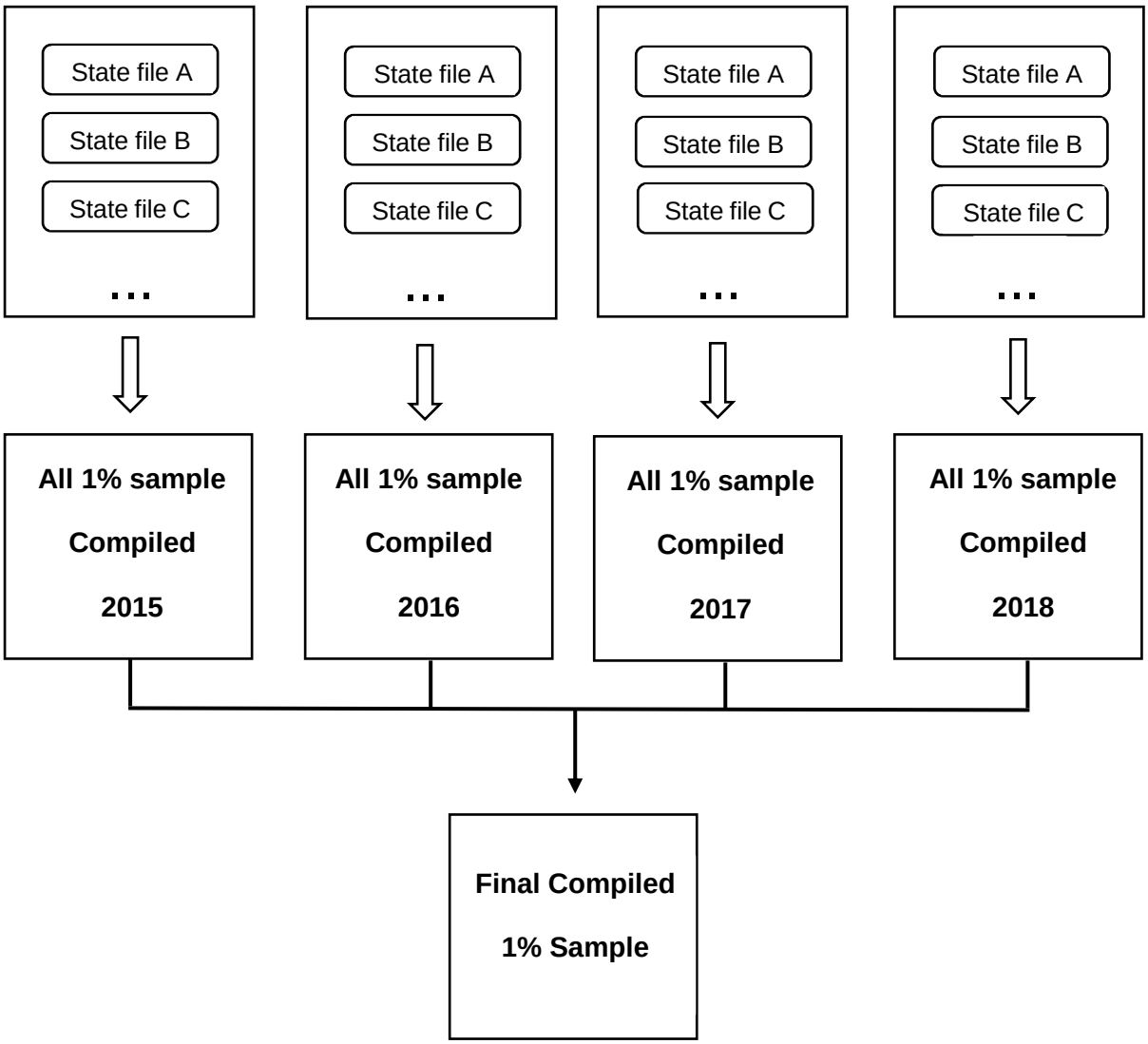
3.5 Sample

I extracted a sample of 1% of the total population. As aforementioned, the total obtained RAIS dataset for the period of 2015-2018 is a great census data with a sizeable representation (267,293,600 observations). The extracted sample of 1% allows for better analysis, saves computational time, and speeds up data manipulation without any quality loss.

In order to extract a representative sample, a methodical process was used. As my dataset is divided in years (2015-2018) with 27 different files (26 states + 1 Federal District, Brasília), the strategy used was to extract a representative random sample of 1% of each state file per year. Once all the samples of 1% per state were extracted, they were then appended in the correspondent year file. Next, all the appended files by years were then appended into a final file containing a comprehensive 1% sample from all data as per the following organigram (*Figure 3*):

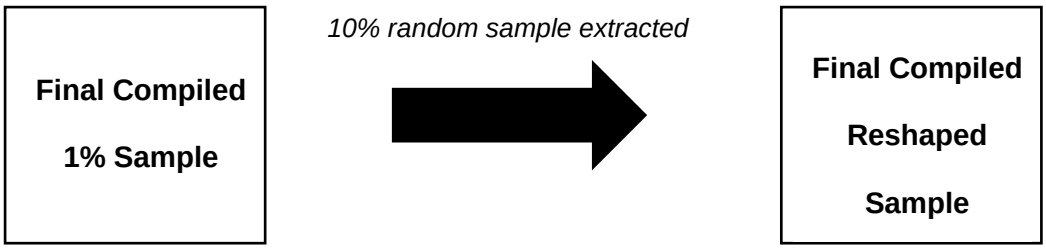
[23] This information was provided to me directly by telephone on 17th October 2019 from the responsible secretary of the Ministry of Economy of Brazil, which discloses RAIS to the public.

Figure 3. Organigram of Sample Extraction



The final compiled sample file has 2,672,936 observations correspondent to individual IDs, each of them carrying information respective to salaries earned from January to December, and it is stored in a wide data set up. Furthermore, a 10% random sample was extracted from the 1% final compiled sample due to the reshaping of my data from wide to long (*Figure 4*). It means multiplying the data 12x, the number of monthly salaries it will be now disclosed in rows, not columns.

Figure 4. Final Sample Extraction for Reshaping Purposes



The main variables used are wage, gender, education, and region. The education variable was separated into 5 different categories as the population is very heterogenous: illiterate; elementary school level; high school level; college level; and Master /Ph.D. level. The descriptive summary data of the final reshaped sample is the following (*Table 1*):

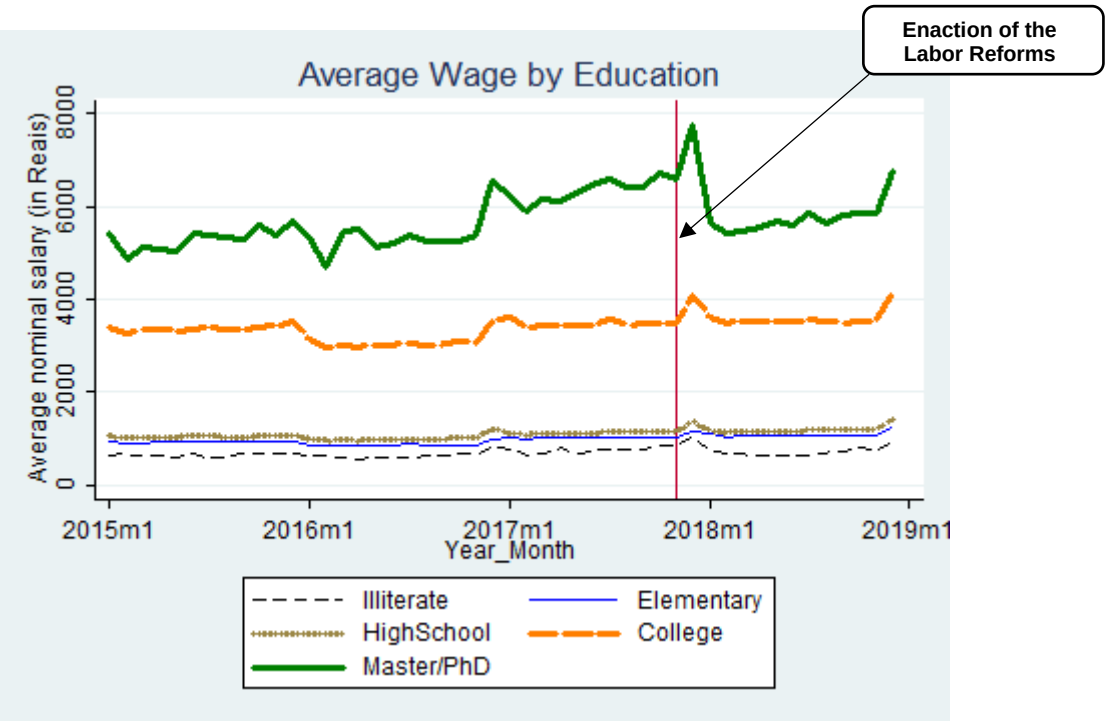
Table 1: Descriptive Summary Data

Wage				
Mean		*Min*		*Max*
R$ 1,704.55		0		R$ 142,855.80
Gender				
		Female (%)		*Male (%)*
		42.47%		57.52%
Education				
Illiterate (%)	*Elementary (%)*	*High School (%)*	*College (%)*	*Master / PhD (%)*
0.35%	20.55%	56.99%	21.32%	0.76%
Region				
South (%)	*Southeast (%)*	*Center-West (%)*	*Northeast (%)*	*North (%)*
18.55%	50.84%	7.75%	17.35%	5.28%

Additionally, according to the data, the education factor impacts greatly on wages - an expected result -, however, the existing gap between high-skilled workers (College and Ph.D./Master groups) and low-skilled workers is extremely big. On average, a worker that only completed high school (56.99% of the registered labor force) earns R$1,409 as of December 2018, almost 3 times less than a worker with college

education (R$4,160) and almost 5 times less than a worker with master/Ph.D. education (R$6,759).

Figure 5. Average Wage by Education in Brazil

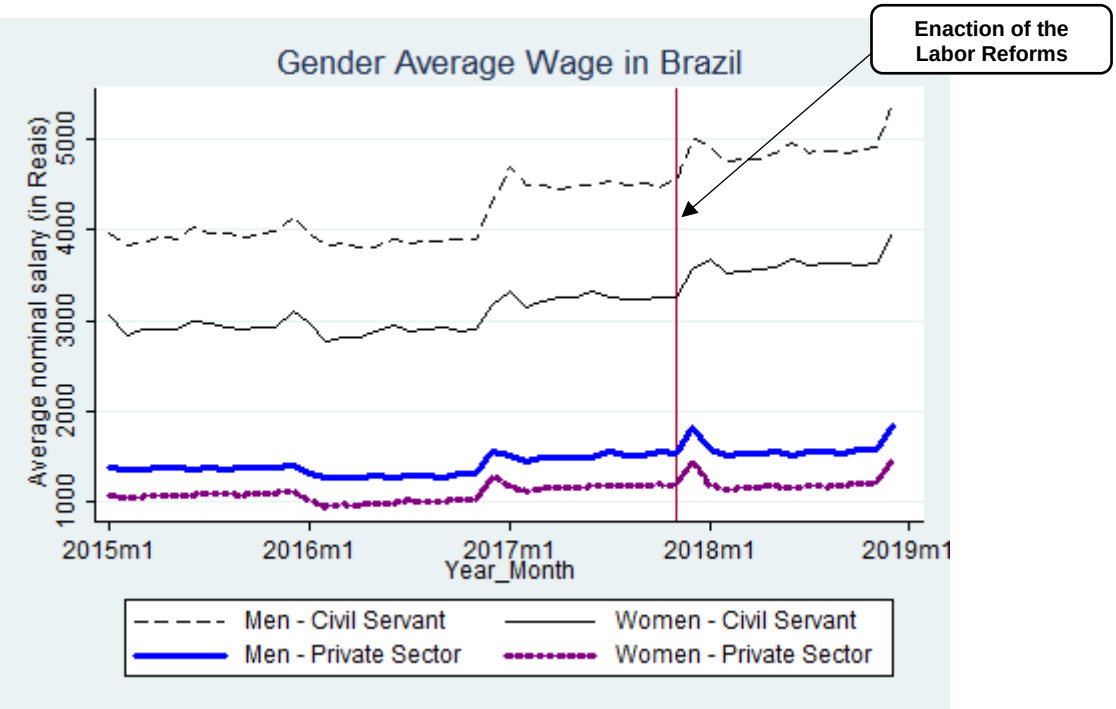


Furthermore, profound gaps also exist in the gender and between public and private sectors in Brazil. The next figure (*Figure 6*) shows a graph where it is possible to observe both gaps at once. What is more surprising is that the gap between gender is on higher the public sector, where, using the average wages provided by the data of December 2018, the women receive 36% less than the men, whereas in the private sector the women receive, on average, 24% less than men. It is certainly a promising area for future research.

Moreover, the discrepancy between civil servants and workers from the private sector is historically big and, in some cases, some careers in the public sector are outside the budgetary control of the executive government (World Bank 2018). On average, a male civil servant gets almost 3-fold more than his counter-party in the private sector,

whereas the gap between a female civil servant and her counter-party in the private sector is 2.7-fold, somewhat smaller but relevant.

Figure 6. Average Wage in Brazil by Gender, Public and Private Sector



Chapter 4 – Methodology

4.1 Empirical Strategy

I examined the RAIS dataset on the employee level during the period 2015–2018. I used a difference-in-differences (DID) estimation and assign employees from the private sector as my treatment group and employees from the public sector as my control group. As mentioned before, in the Brazilian labor market the formal employment is regulated by the CLT rules which govern the private sector relations between employers and employees. However, employees working in the public sector (mostly employed by the state at all levels) are governed by the *Legislação Consolidada do Servidor Público*[24] and classified as *estatutários* (statutory). There is one very important difference between both types of employees though: the *estabilidade* ("job security") component. The *estabilidade* grants the civil servants, after being employed for 3 years (considered a "probation period"), almost full protection against any firing attempt[25], whereas in the private sector governed by the CLT it does not happen.

I compared the change in salaries as an outcome for employees in the private sector and civil servants before and after the implementation of the 2017 EPL Reforms. All the salaries are adjusted with the correspondent yearly inflation levels and calculate as an average salary by month. For instance, the average salary paid in January 2015,

[24] Free translation from Portuguese: Consolidated Legislation of the Civil Servant.

[25] The main differences between workers from the private sector and civil servants are the different pension schemes and job security. Civil servants can only be dismissed in extreme cases, even so "it is virtually impossible to sanction poor performers. De facto civil servants have job security for life. While performance reviews exist, the criteria employed are largely subjective, and civil servants dismissed on performance ground thus can easily get dismissals revoked in the labor courts" (World Bank 2018 p.9).

February 2015 and so on. The goal is to verify the variation of wages and compare it between treatment and control groups as a level.

As one may argue, if this change in the legislation is something slow and well spread around the society, then why a worker from the private sector knowing that detrimental changes are about to happen does not switch to public employment? There is no chance for such a selection bias problem to happen in a scale that may harm my analysis. Civil servants are hired based on a competitive entrance exam (*concurso)*[26] which does not happen often and is prepared based on open positions – which due to the recent recession in Brazil are being contained as a way to control public debt.

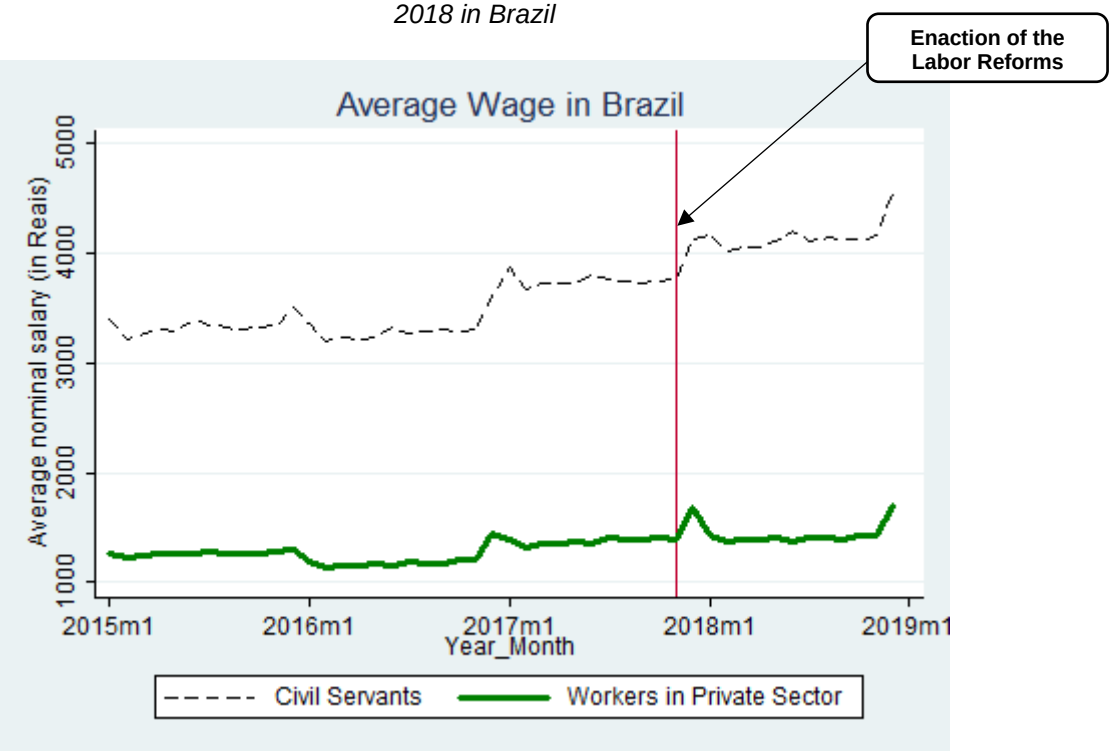
The auto-selection problem can be waived as the employees in the private sector cannot easily migrate to the public sector, as the selection of civil servants may take quite some time and the *concursos* are announced only when there is a need, not at the individual convenience.

The DID methodology comprises the parallel trend assumption (PTA) (Cunningham 2018). The idea of this assumption is that if no intervention happened, both groups would have followed the same pattern of variation and trend. There is no way to objectively and directly verify it once one has no power to forge alternative realities. Nevertheless, looking at pre-intervention trends it is possible to infer relevance to the hypothesis. Furthermore, in this thesis, I used high-frequency data (monthly basis) for a period of 4 years (2015-2018, 48 months) and the result of it can be seen in the next graph (*Figure 7*) for both types of employees.

[26] Aspiring civil servants have to go through a selection process that involves a demanding entrance exam called *concurso* (World Bank 2018). From the application to the final nomination, it may take many months or, sometimes, years.

Confidently, it is possible to affirm that, in this case, the parallel trend assumption holds. The following graph aggregates the average wage of civil servants and workers from the private sector for the period of 2015-2018. Note that there are upward kinks in the data around every month of December, this is due to the payment of bonuses, profit sharing and other benefits around that time.

Figure 7. Average Wage for Civil Servants and Workers from the Private Sector in the Period of 2015-2018 in Brazil



In my main analysis, I focus on the change of average level of salaries between my treatment and control groups to test the new scenario brought by the enactment and implementation of the new legislation. If introducing more flexibility in the labor market together with lower firing costs and decrease of trade union's bargaining power, workers should experience a decrease in their salaries. I estimated the following regression:

$$Average\ Wage = \propto_i + \theta_t + \lambda_r + \beta_1 TypeEmployee + \beta_2 After + \beta_3 D_{irt} + X_{it} + \varepsilon_{irt}$$

Where $TypeEmployee$ is an indicator variable taking the value of 0 if it is a civil servant or 1 if it is an employee from the private sector. $After$ is a dummy variable that takes the value 0 if before November 2017 otherwise 1 for after November 2017. θ_t is the time fixed-effect variable used to capture and normalize the effect of years, similarly with λ_r which captures time-invariant municipality fixed-effects. D_{irt} is the interaction between the two indicator variables ($TypeEmployee$ and $After$). X_{it} is the vector of individual control such as education, age, and gender.

Chapter 5 – Results

5.1 Empirical Results

In this sub-section, I present the results of my empirical strategy from the simplest DID model to most complex ones with a gradual addition of control to the equation. In *Table 2*, I used a simpler model (namely, *Model 1*), which consists of a simple DID interaction between control and treatment groups and post-treatment effect. In *Table 2*, Column 1 shows the average salary of both groups before the implementation of the reforms and their differences; Column 2 shows the average salary per group after the implementation of the reforms and their differences; finally, column 3 shows the DID coefficients comparing both groups and their respective average wages before and after the reforms.

Table 2. Difference-in-Differences Summary

DID SUMMARY			
	Before *(1)*	*After* *(2)*	***DID*** *(3)*
Control Group (Civil Servants)	R$ 3,447.96	R$ 4,127.08	**R$ 679.12**
Treatment Group (Workers in the private sector)	R$ 1,268.02	R$ 1,438.48	**R$ 170.46**
DID	**R$ 2,179.94**	**R$ 2,688.60**	**R$ 508.66 (treatment effect)**

The above table reports DID interaction coefficients from the regression equation. It consists of a simple DID interaction between control and treatment groups and post-treatment effect and I name Model 1. The columns present level coefficients of pre-treatment, post-treatment, and their differences.

The results presented in *Table 2* estimates that a huge difference already existed before the new reforms implemented in 2017, however, it was accentuated after it. *Model 1* shows that the wages of civil servants, on average, grew by R$ 679.12 whereas the workers in the private sector experienced an increase of only R$ 170.46 in the same period. A difference of almost 4-fold between both groups. Civil servants got, on average, R$ 508.66 more than workers from the private sector. All coefficients are displayed in the level of Brazilian national currency, *Real*[27] (R$) and have statically significance.

Once the difference found in *Model 1* between treatment and control groups cannot be exclusively explained by the EPL reforms, I gradually introduce controls and fixed-effects into my equation. In the main table of regressions (*Table 3*), columns 1 to 4 present the estimation results when a gradual addition of control and fixed-effects is implemented. In the first column, *Model 1* is a simple DID interaction between control and treatment groups and post-treatment effects. The second column presents *Model 2*, where I introduced controls for time and municipality fixed-effects. The third column displays *Model 3*, which besides having controls for time and municipality fixed-effects, also has individual covariates (education, gender, and age) as controls. Finally, the fourth column presents *Model 4*, the most robust model I built, which on the top of municipality fixed-effects, time fixed-effects and all the individual covariates, I also added industry fixed-effects. In total, the dataset contains 666 different categories of industries and 5,256 municipalities. In addition, for *Models 1*, *2* and *3*, standard errors are clustered at the level of the full sample whereas in Model 4 standard errors are clustered at the municipality level.

[27] As of 29.11.2019, the exchange rate of 1 US Dollar = 4.23 Brazilian Real. Source: www.xe.com

Table 3. Main Regression Table

MAIN REGRESSION TABLE

	Model (1)	Model (2)	Model (3)	Model (4)
Private employee (before)	-2,179.95***	-2,447.66***	-1,457.95***	-1,800.96***
	(8.45)	(8.76)	(8.75)	(170.97)
Civil Servant (after)	679.12***	618.19***	608.57***	394.08***
	(16.87)	(18.89)	(17.90)	(51.49)
Worker in the private sector in comparison civil servant (after)	-508.66***	-515.08***	-504.08***	-258.73***
	(17.26)	(17.12)	(16.25)	(60.65)
If gender = Female	X	X	-657.47***	-446.72***
			(3.37)	(27.72)
Municipality Fixed-effects	No	Yes	Yes	Yes
Time Fixed-effects	No	Yes	Yes	Yes
Industry Fixed-effects	No	No	No	Yes
Other individual covariates	No	No	Yes	Yes
Constant	3,447.96***	3,655.71***	756.70***	1,239.46***
	(8.25)	(8.76)	(15.94)	(224.89)
# of Observations	3,113,136	3,113,136	3,113,136	2,340,792
Root MSE	2,897.2	2,839.51	2,678.83	2,457.15

The above table reports DID interaction coefficients from the regression equation. The stars declare the significance level of the coefficient where * 10%, ** 5%, ***1%. I also report the total number of observations used in the estimation and the Root MSE. Note: **Model 1** includes a simple DID interaction between control and treatment groups and post-treatment effect. **Model 2** additionally includes municipality specific fixed-effects and time-specific fixed-effect. **Model 3** includes various individual covariates (gender, age, and education). Finally, **Model 4** in addition to all the fixed-effects added before (time and municipality) and individual covariates (education and age), also includes industry fixed-effects. For Models 1, 2 and 3, standard errors are clustered at the level of the primary sampling unit and reported in brackets, whereas in Model 4 standard errors are clustered at the municipality level.

As it can be observed in the table above (*Table 3*), the coefficients for the post-treatment continuously decrease from the simplest model (1) to the most complex one (4). This is expected, as the controls and multiple fixed-effects augment the capability of isolation of the intervention effect. Therefore, after controlling by individual covariates and all the multiple relevant fixed-effects, the results I was looking for are shown by *Model 4*.

Furthermore, the initial intuition that the Brazilian labor law reforms of 2017 caused a decrease in salaries is suggested by the *Model 4*. As shown in the fourth column of *Table 3*, workers in the private sector (treatment group) receive, on average, R$ 1,800 less than civil servants (control group). After the EPL reforms, the wages of workers from the private sector grew almost 3 times less than the ones of civil servants. To be more specific, on average, the increase of wage of a worker in the private sector after the EPL reforms is R$ 135 whereas in the same period the civil servants have experienced an increase of R$ 394. In other words, workers in the private sector (treatment group) receive, after the reforms, on average, 66% less in comparison to the civil servants (control group). All the coefficients have statistical significance and are displayed in the level of Brazilian national currency, *Real* (R$).

I also regressed the equation with my outcome in the log instead of level (*Brazilian Real*) as its distribution is highly skewed. However, the log regression and its coefficients cannot be interpreted in the usual way given its magnitude (*>2*). The regression is available in *Appendix A* (page 47).

The suggested results are consistent with my expectations of a negative effect on wages (- R$ 258.73). Some of the reasons that led me to expect it are: (i) unions were severely hit by the new reforms; (ii) mass dismissals were facilitated according to new legislation, increasing the flows of workers in the labor market and replacement of inefficient and costly employees; (iii) and implementation of intermittent contracts where salaries are paid “on-demand”.

Moreover, I also regress the equation by gender gradually adding controls. *Table 4* brings the estimation only for males whereas *Table 5* estimates only females. As used in the main regression table (*Table 3*), in column 4 (*Model 4*) the coefficients are

controlled by multi-level fixed-effects (time, municipality, and industry), and individual covariates (education and age).

As *Tables 4* and *Table 5* suggest, females are more impacted by the labor reforms, both proportionally and by absolute numbers. On average, a male worker in the private sector (treatment group) had an increase of R$ 149 after the reforms while a female one, in the same period, had an increase of only R$ 113. A gap of 25% less for women.

Surprisingly, the magnitude of this gap is even bigger in the public sector, where males receive, on average, an increment of R$ 518 whereas females get only R$ 314, after the implementation of the reforms. A gap of 40%. Women also get less than men in absolute terms of comparison before and after the Brazilian Labor Reforms of 2017. All the coefficients have statistical significance and are displayed in the level of Brazilian national currency, *Real* (R$). As mentioned in Chapter 3, this is a potential area for further research and analysis that is, however, beyond the scope of this thesis.

Table 4. Regression Table by Gender (Male)

REGRESSION TABLE BY GENDER (MALE)

	Model (1)	Model (2)	Model (3)	Model (4)
A male worker in the private sector in comparison with a Civil Servant (before)	-2,709.90*** (15.56)	-2,997*** (16.09)	-1,806.47*** (15.57)	-2,052.13*** (15.57)
Male civil Servant (after)	779.09*** (30.89)	721.90*** (33.58)	687.86*** (31.69)	518.88*** (80.06)
A male worker in the private sector in comparison civil servant (after)	-579.82*** (31.34)	-592*** (31.53)	-554.67*** (29.80)	-369.32*** (90.87)
Region Fixed-effects	No	Yes	Yes	Yes
Time Fixed-effects	No	Yes	Yes	Yes
Industry Fixed-effects	No	No	No	Yes
Individual covariates	No	No	Yes	Yes
Constant	4,098.82*** (15.35)	4,329.36*** (16.06)	759.46*** (23.22)	1,330.26*** (266.14)
# of Observations	1,790,868	1,790,868	1,790,868	1,347,744
Root MSE	3,181.5	3,114.06	2,926.92	2,674.11

The above table reports DID interaction coefficients from the regression equation. The stars declare the significance level of the coefficient where * 10%, ** 5%, ***1%. I also report the total number of observations used in the estimation and the Root MSE. Note: **Model 1** includes a simple DID interaction between control and treatment groups and post-treatment effect. **Model 2** additionally includes municipality specific fixed-effects and time-specific fixed-effect. **Model 3** includes various individual covariates (gender, age, and education). Finally, **Model 4** in addition to all the fixed-effects added before (time and municipality) and individual covariates (education and age), also includes industry fixed-effects. For Models 1, 2 and 3, standard errors are clustered at the level of the primary sampling unit and reported in brackets, whereas in Model 4 standard errors are clustered at the municipality level.

Despite the fact of the gaps between genders, the difference between civil servants and workers from the private sector is consistent in all tables and all models, giving robust support to the design and methodology of this thesis. I also regressed the equation by gender with my outcome in *log* terms instead of level (*Brazilian Real*) as it is highly skewed. However, the log regression and its coefficients cannot be interpreted in the usual way given its magnitude (>*2*). The regression by gender with

log outcome is available in *Appendix B* (males) (page 49) and *Appendix C* (females) (page 51).

Table 5. Regression Figures by Gender (Female)

REGRESSION FIGURES BY GENDER (FEMALE)

	Model (1)	Model (2)	Model (3)	Model (4)
Female worker in the private sector in comparison with a Civil Servant (before)	-1,932.18*** (9.35)	-2,282.81*** (10.25)	-1,373.09*** (10.19)	-1,764.49*** (169.98)
Female civil Servant (after)	582.87*** (18.60)	549.94*** (21.89)	554.15*** (20.95)	314.36*** (47.72)
Female worker in the private sector in comparison civil servant (after)	-452.72*** (19.11)	-486.75*** (19.57)	-491.86*** (18.79)	-200.87*** (54.83)
Region Fixed-effects	No	Yes	Yes	Yes
Time Fixed-effects	No	Yes	Yes	Yes
Industry Fixed-effects	No	No	No	Yes
Individual covariates	No	No	Yes	Yes
Constant	3,018.78*** (9.07)	3,284.91*** (10.20)	689.37*** (26.17)	1,141*** (235.12)
# of Observations	1,322,268	1,322,268	1,322,268	993,048
Root MSE	2,431.4	2,367.76	2,247.27	2,073.02

The above table reports DID interaction coefficients from the regression equation. The stars declare the significance level of the coefficient where * 10%, ** 5%, ***1%. I also report the total number of observations used in the estimation and the Root MSE. Note: **Model 1** includes a simple DID interaction between control and treatment groups and post-treatment effect. **Model 2** additionally includes municipality specific fixed-effects and time-specific fixed-effect. **Model 3** includes various individual covariates (gender, age, and education). Finally, **Model 4** in addition to all the fixed-effects added before (time and municipality) and individual covariates (education and age), also includes industry fixed-effects. For Models 1, 2 and 3, standard errors are clustered at the level of the primary sampling unit and reported in brackets, whereas in Model 4 standard errors are clustered at the municipality level.

Further, I also decided to run regressions by the level of education (illiterate, elementary, high school, college and master/Ph.D.) in order to observe further aspects (*Table* 6). As expected, the increase in post-labor reforms is gradually higher by the level of education, i.e. the higher your education, the higher your salary. Nonetheless,

the difference between the control group and treatment group is higher among workers with high school and college level. This is another promising topic for further research. All results but the coefficients for illiterate people are statistically significant and are displayed in the level of Brazilian national currency, *Real* (R$).

Table 6. Regression Table by Education

REGRESSION FIGURES BY EDUCATION

	Illiterate	Elementary	High School	College	Master / Ph.D
Worker in the private sector in comparison with a Civil Servant (before)	-703.99*** (64.75)	-1,044.61*** (13.11)	-1,486.59*** (8.66)	-1,289.54*** (18.89)	-2,376.87*** (137.76)
Civil Servant (after)	-21.34 (436.43)	174.59*** (25.21)	480.86*** (17.78)	716.84*** (41.59)	1,450.51*** (281.46)
Worker in the private sector in comparison civil servant (after)	210.10 (474.50)	-117.24*** (24.47)	-374.09*** (17.32)	-563.76*** (31.92)	-944.56*** (203.66)
If gender = Female	-288.81*** (27.61)	-391.64*** (3.24)	-374*** (2.21)	-1,450.87*** (13.14)	-1,324.41*** (98.80)
Municipality Fixed-effects	Yes	Yes	Yes	Yes	Yes
Time Fixed-effects	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes	Yes
Constant	1,147.45 (84.07)	1,471.36*** (13.91)	1,753.21*** (9.68)	802.40*** (35.53)	1,998.90*** (279.65)
# of Observations	11,052	639,948	1,774,296	663,936	23,904
Root MSE	714.19	1,206.97	1,495.93	4,762.54	6,433.67

The above table reports DID interaction coefficients from the regression equation by education levels. Standard errors are clustered at the municipality level and reported in brackets. The stars declare the significance level of the coefficient where * 10%, ** 5%, ***1%. I also report the total number of observations used in the estimation and the Root MSE. Note: The Model includes a simple DID interaction between control and treatment groups and post-treatment effect. In addition, time fixed-effects, municipality fixed-effects, industry fixed-effects, and individual covariates (gender and age) are also included.

5.2 Robustness Checks

In this subsection, I test whether the sample extracted from the RAIS census data is representative or not. In order to do that, I extracted a new sample with a different seed number following the organigram of *Figure 3* and the further sampling pictured in *Figure 4*. The summary data from the new extracted sample for comparison is described below (*Table* 7):

Table 7. New Sample Descriptive Summary Data

Wage					
Mean		*Min*			*Max*
R$ 1,494.48		0			R$ 137,959.64
Gender					
		Female (%)			*Male (%)*
		42.43%			57.57%
Education					
Illiterate (%)	*Elementary (%)*	*High School (%)*		*College (%)*	*Master / PhD (%)*
0.37%	21.09%	56.83%		20.98%	0.73%
Region					
South (%)	*Southeast (%)*	*Center-West (%)*	*Northeast (%)*		*North (%)*
18.49%	51.01%	7.76%	17.43%		5.30%

As shown in *Table 7*, the figures are consistent in the new sample in comparison to the sample used for the main analysis of this thesis. Next, I ran a DID interaction between control and treatment groups and post-treatment effect using the regression equation. Instead of introducing gradually the controls, I decided to regress using the multi-level fixed effects Model 4 directly. Standard errors are clustered at the municipality level and reported in brackets. The results are presented in the next table (*Table 8*):

Table 8. Robustness Check Regression Table

ROBUSTNESS CHECK REGRESSION	
	Model (4)
Private employee (before)	-1,783.16***
	(153.99)
Civil Servant (after)	468.89***
	(41.23)
Worker in the private sector in comparison civil servant (after)	-343.08***
	(48.26)
If gender = Female	-424.20***
	(32.41)
Municipality Fixed-effects	Yes
Time Fixed-effects	Yes
Industry Fixed-effects	Yes
Other individual covariates	Yes
Constant	1,224.86***
	(184.13)
# of Observations	3,172,596
Root MSE	2,355.89

The above table reports DID interaction coefficients from the regression equation. The stars declare the significance level of the coefficient where * 10%, ** 5%, ***1%. I also report the total number of observations used in the estimation and the Root MSE. Note: **Model 4** includes a DID interaction between control and treatment groups and post-treatment effect, including municipality specific fixed-effects, time-specific fixed-effect, industry fixed-effects and individual covariates (age, education, and gender). Standard errors are clustered at the municipality level and reported in brackets.

The results of the robustness check match the ones found in the primary analysis, reinforcing the consistency and credibility of the findings. All the coefficients have statistical significance and are displayed in the level of Brazilian national currency, *Real* (R$). Nonetheless, as seen in the subsection before, the *log* regression and its

coefficients cannot be interpreted in the usual way given its magnitude (*>2*). The respective regression for robustness check is available in *Appendix D* (page 53).

5.3 Potential Limitations

As mentioned in Chapter 3, the data utilized is a repeated cross-section of individuals and firms across the years. The data is non-identifiable, it means, I cannot follow firms nor individuals overtime. In order to solve this problem, I used municipality fixed-effects combined with industry-fixed effects. Also, given the size of the sample used (over 3 million observations), it is possible to balance my confidence in the results to levels that suggest that this thesis may have, to some extent, external validity.

Furthermore, even with the limitation of a repeated cross-section data of individuals and firms, the PTA for treatment and control group seem convincing (*Figure 7*). It led me to opt for a DID approach even though the data limitation may raise questions. Also, the fact that individuals from both control and treatment groups cannot easily change from one group to another gives me the confidence to acknowledge the limitation but also consider the model robust enough. As aforementioned (*footnote 26*), aspiring civil servants have to attend a demanding selection process that involves entrance exams and other tests that may take many months and, sometimes, years from the moment of application to nomination.

Lastly, the fact that the data only covers the formal employment (around 41.4% of are informally employed, as mentioned before) do not allow me to estimate the Brazilian labor market as a whole.

Chapter 6 – Analysis & Discussion

6.1 Discussion

What happens to wages after the loosening of EPL in the Brazilian labor market? I found enough evidence to the fundamental question of this thesis to conclude that, on average, the wages of the treated group tend to decrease or, at best, be prevented to increase as much as it should.

The finding goes along with part of the literature on EPL. It is possible to imply that liberalization and flexibilization of EPL affects the workflow in the labor market, which may lead to the dismissal of non-performing workers and a decrease in employment levels (Young 2003). Besides, the cut of compulsory contributions to the unions may undermine their bargaining power and agency, which may lead to a decrease in salaries (Parisi 2017).

Clearly, the outcome of these EPL changes did not result in employment increase as promised back then. The supply-side assumption that reducing regulation, hiring/firing costs and union's power would increase employment and a more dynamic labor market did not stand. The current unemployment rate in Brazil, as of September 2019, is 11.8% (12.5 million people) (G1 2019), in November 2017, when the new EPL reforms were implemented the unemployment rate was 11.6% (G1 2019). The number of new jobs promised with the reforms was more than 2 million, the practical results after 2 years is 961 thousand jobs (G1 2019). The efficiency of these reforms may be questioned in the light of these figures, but this is not the main point of this thesis; rather, it is to study the effect it had on wages which are reported with evidence.

The results found in this thesis are robust and lead to infer external validity to the findings given the sizeable data analyzed. In addition, it is pivotal to mention that there is ample room for extrapolation of the scope of this work and further analysis of many other important points and questions superficially observed.

6.2 Ways Forward

This thesis does not have the ambition to argue for a change in the labor reforms implemented in Brazil in 2017. There were more than 100 changes in the legislation (G1 2018) and possibly no major additional supplements to the legislation will be discussed in Congress in the next few years[28]. However, the evidence presented in this thesis may suggest (1) an income policy more strongly engaged in closing the gap between the public sector and private sector; (2) an income policy of increase of the minimum salary higher than inflation levels to allow redistribution and more disposable income to boost consumption to bring back economic growth; (3) the possibility of inclusion of gradual job security protective policies to increase employment level and increase the level of salaries over time.

[28] These reforms demand a great political capital as they need to pass through several analysis, commissions and voting sessions in the Lower House and Federal Senate. Also, these are not popular measures and require negotiations and interest allocation among various parties which may take time and prevent their formulation.

Conclusion

This thesis investigated the effects of the recent EPL reforms in Brazil and their effects on wages. The results suggest that the flexibilization of EPL affected negatively the average level of wages in Brazil. On average, workers from the private sector (treatment group) experienced an increase in wages almost 3 times lower than civil servants (control group) after the EPL changes.

A few reasons can explain that: (1) civil servants have a more bargaining power in some sectors such as the judiciary, where civil servants negotiate collective agreements with equal salary's adjustment rates to all, from supreme court judges to administrative employees; (2) the creation of intermittent contracts and lack of trade union power to mobilize these workers; (3) employers are not obliged to seek collective bargaining agreements with unions; (4) dismissals are made easier and cheaper with a possible increase in the flow of workers in the market under lower salaries given the current unemployment level.

Furthermore, the Brazilian labor reforms of 2017 did not succeed in increasing the employment level nor reducing the level of informality in the labor market (G1 2019). This thesis sheds light on the subject and demonstrates the promising possibility of exploiting it in future research adding relevant questions, such as employment level, discrimination (gender-specific) and the duality between informal and formal labor market.

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Appendices

Appendix A: Main Regression Figures in *log*

The table below contains the outcome coefficients in *log* resulting from the DID equation with gradual addition of fixed-effects and individual covariates, as explained before.

REGRESSION FIGURES IN *LOG*

Log	Model (1)	Model (2)	Model (3)	Model (4)
Private employee (before)	-2.56*** (.0054)	-2.76*** (.0055)	-2.06*** (.0060)	-1.88*** (.1606)
Civil Servant (after)	.1683*** (.0088)	.3876*** (.0129)	.3916*** (.0128)	.1409*** (.0373)
Worker in the private sector in comparison civil servant (after)	-.0899*** (.0100)	-.1087*** (.0098)	-.1132*** (.0097)	.1735*** (.0364)
If gender = Female	X	X	-.2304*** (.0039)	-.1604*** (.0148)
Municipality Fixed-effects	No	Yes	Yes	Yes
Time Fixed-effects	No	Yes	Yes	Yes
Industry Fixed-effects	No	No	No	Yes
Other individual covariates	No	No	Yes	Yes
Constant	7.04*** (.0048)	7.39*** (.0057)	4.65*** (.0343)	4.98*** (.1567)
# of Observations	3,113,136	3,113,136	3,113,136	2,340,792
Root MSE	3.4124	3.3722	3.3203	3.2416

The above table reports DID interaction coefficients from the regression equation in log terms. The stars declare the significance level of the coefficient where * 10%, ** 5%, ***1%. I also report the total number of observations used in the estimation and the Root MSE. Note: **Model 1** includes a simple DID interaction between control and treatment groups and post treatment effect. **Model 2** additionally includes municipality specific fixed-effects and time specific fixed-effect. **Model 3** includes various individual covariates (gender, age and education). Finally, **Model 4** in addition to all the fixed-effects added before (time and municipality) and individual covariates (education and age), also includes industry fixed-effects. For Models 1, 2 and 3, standard errors are clustered at the level of the primary sampling unit and reported in brackets, whereas in Model 4 standard errors are clustered at the municipality level.

Strangely, Model 4 flips the post-treatment effect of workers in the private sector to a positive outcome as shown in column 4. Multicollinearity is probably the cause of it, once if variables are positively correlated, then the coefficients will be negatively correlated, leading to a wrong sign on one of the coefficients. Reversal of coefficients (magnitude or direction) are examples of Simpson's Paradox, Lord's Paradox and Suppression Effects in multi-level fixed-effect regressions (see further, Arah 2008).

Appendix B: Main Regression Figures by Gender (male) in *log*

The table below contains the outcome coefficients in *log* resulting from the DID equation with gradual addition of fixed-effects and individual covariates, as explained before. However, this regression takes into consideration only males.

REGRESSION TABLE BY GENDER (MALE) IN *LOG*

Log	Model (1)	Model (2)	Model (3)	Model (4)
Male worker in the private sector in comparison with a Civil Servant (before)	-2.66*** (.0084)	-2.88*** (.0085)	-2.22*** (.0089)	-1.90*** (.1766)
Male civil Servant (after)	.1967*** (.0139)	.3993*** (.0188)	.3975*** (.0186)	.1913*** (.0451)
Male worker in the private sector in comparison civil servant (after)	-.1013*** (.0152)	-.1273*** (.0150)	-.1253*** (.0149)	.1007** (.0452)
Region Fixed-effects	No	Yes	Yes	Yes
Time Fixed-effects	No	Yes	Yes	Yes
Industry Fixed-effects	No	No	No	Yes
Individual covariates	No	No	Yes	Yes
Constant	7.18*** (.0077)	7.53*** (.0087)	4.76*** (.0394)	4.95*** (.1793)
# of Observations	1,790,868	1,790,868	1,790,868	1,347,744
Root MSE	3.4976	3.4424	3.3924	3.2978

The above table reports DID interaction coefficients from the regression equation in log terms. The stars declare the significance level of the coefficient where * 10%, ** 5%, ***1%. I also report the total number of observations used in the estimation and the Root MSE. Note: **Model 1** includes a simple DID interaction between control and treatment groups and post-treatment effect. **Model 2** additionally includes municipality specific fixed-effects and time specific fixed-effect. **Model 3** includes various individual covariates (gender, age and education). Finally, **Model 4** in addition to all the fixed-effects added before (time and municipality) and individual covariates (education and age), also includes industry fixed-effects. For Models 1, 2 and 3, standard errors are clustered at the level of the primary sampling unit and reported in brackets, whereas in Model 4 standard errors are clustered at the municipality level.

Strangely, Model 4 flips the post-treatment effect of workers in the private sector to a positive outcome as shown in column 4. Multicollinearity is probably the cause of it, once if variables are positively correlated, then the coefficients will be negatively correlated, leading to a wrong sign on one of the coefficients. Reversal of coefficients (magnitude or direction) are examples of Simpson's Paradox, Lord's Paradox and Suppression Effects in multi-level fixed-effect regressions (see further, Arah 2008).

Appendix C: Main Regression Figures by Gender (female) in *log*

The table below contains the outcome coefficients in *log* resulting from the DID equation with gradual addition of fixed-effects and individual covariates, as explained before. However, this regression takes into consideration only females.

REGRESSION TABLE BY GENDER (FEMALE) IN *LOG*

Log	Model (1)	Model (2)	Model (3)	Model (4)
Female worker in the private sector in comparison with a Civil Servant (before)	-2.52*** (.0072)	-2.75*** (.0076)	-1.96*** (.0084)	-1.89*** (.1653)
Female Civil Servant (after)	.1426*** (.0114)	.3966*** (.0181)	.4033*** (.0180)	.1185*** (.0449)
Female worker in the private sector in comparison civil servant (after)	-.0886*** (.0135)	-.1109*** (.0134)	-.1191*** (.0133)	.2265*** (.0465)
Region Fixed-effects	No	Yes	Yes	Yes
Time Fixed-effects	No	Yes	Yes	Yes
Industry Fixed-effects	No	No	No	Yes
Individual covariates	No	No	Yes	Yes
Constant	6.95*** (.0061)	7.34*** (.0077)	4.55*** (.0769)	4.96*** (.2530)
# of Observations	1,322,268	1,322,268	1,322,268	993,048
Root MSE	3.2921	3.2395	3.1872	3.1178

The above table reports DID interaction coefficients from the regression equation in log terms. The stars declare the significance level of the coefficient where * 10%, ** 5%, ***1%. I also report the total number of observations used in the estimation and the Root MSE. Note: **Model 1** includes a simple DID interaction between control and treatment groups and post-treatment effect. **Model 2** additionally includes municipality specific fixed-effects and time specific fixed-effect. **Model 3** includes various individual covariates (gender, age and education). Finally, **Model 4** in addition to all the fixed-effects added before (time and municipality) and individual covariates (education and age), also includes industry fixed-effects. For Models 1, 2 and 3, standard errors are clustered at the level of the primary sampling unit and reported in brackets, whereas in Model 4 standard errors are clustered at the municipality level.

Strangely, Model 4 flips the post-treatment effect of workers in the private sector to a positive outcome as shown in column 4. Multicollinearity is probably the cause of it, once if variables are positively correlated, then the coefficients will be negatively correlated, leading to a wrong sign on one of the coefficients. Reversal of coefficients (magnitude or direction) are examples of Simpson's Paradox, Lord's Paradox and Suppression Effects in multi-level fixed-effect regressions (see further, Arah 2008).

Appendix D: Robustness Check Regression in *log*

The table below contains the outcome coefficients in *log* resulting from the robustness check of the DID equation with multi-level fixed-effects and additional individual covariates, as explained before.

ROBUSTNESS CHECK REGRESSION	
	Model (4)
Private employee (before)	-1.78*** (.1319)
Civil Servant (after)	.2027*** (.0356)
Worker in the private sector in comparison civil servant (after)	.1033*** (.0348)
If gender = Female	-.1406*** (.0119)
Municipality Fixed-effects	Yes
Time Fixed-effects	Yes
Industry Fixed-effects	Yes
Other individual covariates	Yes
Constant	4.52*** (.1514)
# of Observations	3,172,596
Root MSE	3.2458

The above table reports DID interaction coefficients from the regression equation in log terms. The stars declare the significance level of the coefficient where * 10%, ** 5%, ***1%. I also report the total number of observations used in the estimation and the Root MSE. Note: **Model 4** includes a DID interaction between control and treatment groups and post-treatment effect, including municipality specific fixed-effects, time specific fixed-effect, industry fixed-effects and individual covariates (age, education and gender). Standard errors are clustered at the municipality level and reported in brackets.

Strangely, Model 4 flips the post-treatment effect of workers in the private sector to a positive outcome as shown in column 4. Multicollinearity is probably the cause of it, once if variables are positively correlated, then the coefficients will be negatively correlated, leading to a wrong sign on one of the coefficients. Reversal of coefficients (magnitude or direction) are examples of Simpson's Paradox, Lord's Paradox and Suppression Effects in multi-level fixed-effect regressions (see further, Arah 2008).