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I. Motivation

The expansion of domestic workers' rights has been on the forefront of the labor feminist movement in developing countries, where domestic labor continues to be an important occupation for millions of women, particularly for women of color (Bernardino-Costa 2015). As one of the countries with the highest number of domestic helpers (International Labour Office 2013), Brazil is an emblematic example of this occupational distribution and the challenges it poses to promoting social equity. In fact, 93% of the seven million Brazilians who identified as domestic workers in 2009 were women, of whom 61.6% were of color and 38.4% were white.

One of the main goals of the labor feminist movement in the Global South, and thus in Brazil, has been to include domestic labor in the list of occupations that enjoy comprehensive, mainstream labor protections. Domestic helpers were intentionally excluded or only given partial access to the labor rights instituted by the Brazilian government in the late nineteenth century and throughout the twentieth. In fact, the occupation was explicitly exempted from the provisions regarding social security and unionization prescribed by the 1943 *Consolidação das Leis do Trabalho* (CLT), which unified all existent labor laws in the nation. Since then, the movement in support of domestic laborers has scored small victories in the legal sphere, including the eligibility for unemployment insurance and maternity leave (Pinheiro, Gonzalez, and Fontoura 2012).

The most recent and, arguably, the most important victory for domestic workers has been the 2013 Constitutional Amendment Number 72, known in Brazil as *PEC das Domésticas*. The

amendment expanded to domestic workers all thirty-four rights enunciated in the Social Rights Chapter of the Brazilian Constitution, of which they previously enjoyed only nine (Bernardino-Costa 2015).

While newspapers and politicians characterized the 2013 amendment as a success, there was still skepticism amongst domestic workers as to how much their condition would actually change. Because of the high proportion of helpers working informally, the vast majority were neither entitled to government-mandated benefits nor required to comply with labor legislations. In 2013, in fact, approximately 66% of domestic workers did not have a signed “labor card,” which is required for formal employment.

To my knowledge, there has not been any empirical study done to evaluate the impact of the 2013 Constitutional Amendment and the extent to which it benefited (or potentially harmed) domestic workers. This type of research is crucial to inform the success of the labor feminist movement, and it contributes to a larger discussion as to the effectiveness of reform in labor markets plagued by informality. Hence, the question this study hopes to answer is: what was the effect of the *PEC das Domésticas* on domestic workers’ salary in Brazil? This question, while important for Brazilians in particular, also tangentially addresses the universal difference between access and enforcement of rights and the façade of equality promoted when the former is instituted without the latter.

II. Constitutional Amendment Number 72

In April of 2013, the federal legislature and the president of Brazil approved Constitutional Amendment Number 72 (Vilar 2013). The amendment repealed article 7 of the Federal Constitution, which exempted domestic workers from accessing and enforcing labor rights already enjoyed by other urban and rural occupations. Congressman Carlos Bezerra,

author of the original bill, justified the amendment by saying that “there is no ethical reason for [...] this inequity” (Bezerra 2010). As was the intention of the congressman, the amendment included domestic labor in the list of occupations that enjoy comprehensive, mainstream labor protections and rights.

Brazilian law defines domestic workers as “those who provide continuous and non-lucrative services to a person or a household in their residence” (Dos Santos Maciel 2010). The definition includes maids, gardeners, private watchmen, and similar occupations that provide home-based services. Prior to the 2013 amendment, these so-called “domestic workers” were entitled to some, but not all, labor protections enunciated in the constitution, including (Vilar 2013):

1. A monthly salary no lower than the minimum wage
2. The *thirteenth* salary, equivalent to one full monthly salary to be paid in December (in addition to twelfth salary).
3. Maternity and paternity leave
4. Public pension
5. Vacation time
6. Mandatory written notice of the intention to lay off

There was no state variation of the rights granted to domestic workers because all labor laws are encoded directly into the federal constitution and applied to all workers alike. Without regional variation, the 2013 amendment affected all domestic workers by guaranteeing them the following rights (Vilar 2013):

1. Wage protection: an employer cannot withhold pay as punishment. If an employee violates a policy and leaves on bad terms, they are still owed their full paycheck.

2. 8-hour days and 44-hour weeks for full-time employees: the *normal* schedule for full-time employees cannot exceed eight hours a day and 44 hours a week.
3. Increased overtime pay: any service provided in addition to the *normal* schedule of full-time employees must be compensated by, at least, 50% more than the worker's normal pay rate.
4. Protection against discrimination in hiring and wage levels on the basis of sex, age, race, marital status, and disability status.
5. Protection from termination without just cause
6. Eligibility for unemployment insurance
7. Mandatory contribution to the *Fundo de Garantia do Tempo de Serviço* (FGTS) and the Brazilian Social Security Institute (INSS): employers are required to pay the equivalent of 20% of their domestic worker's salary in taxes and fees. This amount guarantees the worker's enrollment in the public social security system and a possible payoff in the case of a wrongful termination of employment.

During the process of evaluating the amendment bill, the Brazilian Senate heard the testimony of policy consultant Eduardo Modena, who discussed with the legislature the extent of the impact of the bill (Vilar 2013). By stating that some of the rights mentioned in the amendment were already guaranteed by other federal statutes, like the protection against workplace discrimination, Mr. Modena argued that portions of the new policy had symbolic rather than practical implications. Despite his cynicism, he also recognized that the amendment could harm domestic workers if employers passed the burden of the increased labor costs, particularly those associated with the 20% mandatory contribution to FGTS and INSS, to employees by decreasing their wage rate.

Mr. Modena's congressional testimony hinted at the potential economic impact of the constitutional amendment on the demand of domestic workers. The incidence of the newly imposed 20% tax would be shared between worker and employer according to the elasticity of demand and supply of domestic labor. Wage rates for affected workers would decrease, and some of those at the bottom end of the wage distribution (closer to the minimum wage) could lose their jobs. Given the degree of informality in the market for domestic labor, employer could be motivated to substitute formal for informal labor to cut costs. Hence, a reasonable expectation of the effect of the constitutional amendment is an increase in the number of informally employed domestic workers and a corresponding decrease in the number of formally employed ones, as well as a decrease in the wage rate of formal workers.

III. Methodology

This study will use three models to estimate the effect of the *PEC das Domésticas* on domestic workers' salary:

a) *Differences-in-differences (DD) regression*

DD regressions are a useful tool to evaluate policy effects and have been successfully implemented in studies such as Card and Krueger's (1994), which estimated the effect of minimum wage on employment by comparing employment figures in New Jersey and Pennsylvania pre and post April 1, 1992.

My study will use formal and informal domestic workers as treatment and control groups respectively, given that labor regulations only apply to formally employed workers. Since the policy was enacted in April of 2013, the pre- and post-treatment times will include the years before and after 2013. The general regression model to be estimated is:

$$(1) \quad Y_{ist} = \alpha + \gamma_s + \lambda_t + \beta(F_s \cdot d_t) + \delta X_{ist} + \varepsilon_{ist} ,$$

where F_s is a dummy if the observation is in the treatment group; d_t is a post-treatment dummy; X_{ist} includes individual level characteristics (e.g. race, gender, and age); and β is the DD estimate of effect of the policy.

Following the literature of Granger (1969), a DD regression model can lend itself to a test for causality when the sample includes multiple pre- and post- treatment years (Angrist and Pischke 2008). In this context, Granger causality testing means that, if D_{st} (i.e. policy variable of interest) causes Y_{ist} , and not vice versa, leads should be statistically insignificant in the equation:

$$(2) \quad Y_{ist} = \gamma_s + \lambda_t + \sum_{\tau=0}^m \beta_{-\tau} D_{s,t-\tau} + \sum_{\tau=1}^q \beta_{+\tau} D_{s,t+\tau} + \delta X_{ist} + \varepsilon_{ist},$$

where the sums allow for m lags ($\beta_{-1}, \beta_{-2}, \dots, \beta_{-m}$) or post-treatment effects and q leads ($\beta_{+1}, \beta_{+2}, \dots, \beta_{+q}$) or anticipatory effects. Lagged coefficients for the regression of (2) indicate whether the causal effects of the policy grow or fade over time.

The key assumption for any DD estimation is that the outcome in the treatment and control group would follow the same time trend in the absence of the treatment. The parallel trend assumption is untestable, but studies often inspect pre-treatment era growth rates in outcome variables to verify the appropriateness of a comparison group. Three tests will be conducted to evaluate whether formal and informal domestic helpers are suitable treatment and control groups respectively:

- a) A t-Test of the difference in average wage growth rates across formal and informal workers during the pre-treatment era: it should be statistically insignificant if the parallel trends assumption holds.

- b) Redo the DD analysis on pre-event years: lead coefficients should be statistically insignificant.
- c) Compare treatment and control groups along various covariates to evaluate whether they are similar along observable dimensions.

One advantage of using DD estimations is that they can also facilitate regressors other than switched-on/switched-off dummy variables like d_t . This approach was used by Card (1992), who also estimated the effect of minimum wage on employment. The author recognized that the federal minimum wage is a variable with differing "treatment intensity" across states and over time given the varying fraction of affected workers per U.S. state. An analogous estimation technique will be used in my study by regressing the equation:

$$(3) \quad Y_{ist} = \gamma_s + \lambda_t + \beta(AW_s \cdot d_t) + \delta X_{ist} + \varepsilon_{ist} ,$$

where AW_s measures the baseline (pre-treatment) proportion of each state's domestic labor force that is formally employed and therefore subjected to the constitutional amendment. $AW_s \cdot d_t$ is an interaction term similar to $F_s \cdot d_t$ in (1); however, unlike in (1), the interaction term in (3) takes a different value for each observation in the dataset. Hence, the interpretation of β and its average must be done carefully and in context.

A potential shortcoming in regressing equations (1-3) is that formality status may be directly affected by the treatment. In fact, the labor legislation may (and most likely did) induce inter-sector migration: by increasing the labor cost of formally employing domestic helpers, the constitutional amendment may have encouraged employers not to renew labor contracts and instead to continue to employ informally. Hence, the group of workers in the treatment sector before and after the policy implementation may not be identical. Another potential pitfall is that

formality status is endogenous, given that workers are not randomly assigned to the formal and informal sectors.

b) IV regression

The issues of group assignment can be addressed using instrumental variables (IV) methods combined with the DD estimator. These methods have been used in studies like Waldinger's (2010), in which the author used the dismissal of scientists in Nazi Germany as an exogenous shock to faculty quality in an attempt to estimate the effect of faculty quality on Ph.D. student outcomes in Germany. In the case of domestic workers, a potential IV is the number of labor inspections conducted by the Ministry of Labor per city or region in Brazil, which is likely uncorrelated with the outcome variable wages and yet affects the probability that a worker will choose to work formally or informally. The equation to be regressed will mimic (1) with inspections as an instrument for F_s .

c) Propensity Score Matching

The last estimation model to assess the effect of the 2013 policy on domestic workers' salary is a propensity score matching (PSM), which is particularly useful to address the concern that the discrepancy in the observed outcome between treatment and control groups may depend on characteristics that affected whether or not an observation received the treatment instead of due to the effect of the treatment itself. The propensity score theorem states that:

...if potential outcomes are independent of treatment status conditional on a multivariate covariate vector, X_i , then potential outcomes are independent of treatment status conditional on a scalar function of covariates, the propensity score, defined as $p(X_i) \equiv E[D_i|X_i]$ (Angrist and Pischke 2008).

PSM builds on the propensity score theorem and attempts to mimic randomization by creating a sample of units that received the treatment (e.g. formal workers) that is comparable on all observed covariates to a sample of units that did not receive the treatment (e.g. informal

workers). In practice, the estimation of PSM happens in two stages: (i) $p(\text{Formal}_i)$, or the probability that an observation will be treated given its observed covariates, is estimated using a parametric model like a Logit or Probit; and (ii) estimates of the effect of the treatment are obtained by matching each treated observation to controls with the same or similar $p(\text{Formal}_i)$, like it was done by Dehejia and Wahba (1999).

Two post-matching tests will be conducted to ensure the significance of the PSM model, namely:

1. The *balancing test*, which uses t-Tests to evaluate the significance of the differences in covariate means between treated and non-treated observations. For individuals with the same propensity scores post-PSM, the assignment to treatment should be “random” and not depend on covariates; hence, no significant differences should be found between covariate means (Caliendo and Kopeinig 2005).
2. The *common support test*, which checks the region of common support between treatment and comparison group. Simply put, the common support region is defined as the range of overlap between propensity scores in the control and treatment groups. The literature suggests several ways to conduct the comparison, including (i) a visual analysis of the density distribution of the propensity score in both groups, (ii) comparing the minima and maxima of the propensity score in both groups, and (iii) estimating the density distribution in both groups (Caliendo and Kopeinig 2005).

IV. Data

The data used is from the 2011-2015 National Household Survey (*Pesquisa Nacional por Amostra de Domicílios – PNAD*), which is an annual, cross-sectional survey representative of the entire Brazilian population that contains detailed information on socio-demographic

characteristics and labor market outcomes at an individual and household level (Brazilian Institute of Geography and Statistics 2017). The sample of individuals is restricted to those who were either formally or informally employed as domestic workers at the period of the survey and who were between 18 and 65 years old. Table 1 presents some basic descriptive statistics by year and formality status from the sample used.

Table 1.
Domestic Workers, Descriptive Statistics

	Formal					Informal				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Male (%)	0.12 (0.32)	0.13 (0.34)	0.10 (0.31)	0.12 (0.33)	0.12 (0.33)	0.06 (0.23)	0.05 (0.22)	0.06 (0.23)	0.06 (0.23)	0.06 (0.24)
Age (yrs)	41.11 (10.08)	41.62 (10.06)	41.73 (10.05)	42.61 (10.08)	42.86 (10.17)	39.23 (11.55)	40.02 (11.61)	40.42 (11.52)	41.26 (11.65)	41.56 (11.66)
Schooling (yrs)	7.61 (3.76)	7.78 (3.67)	7.95 (3.66)	7.88 (3.72)	8.14 (3.71)	7.10 (3.91)	7.31 (3.74)	7.44 (3.81)	7.43 (3.79)	7.66 (3.78)
Unionized (%)	0.02 (0.16)	0.03 (0.17)	0.03 (0.16)	0.03 (0.15)	0.04 (0.20)	0.02 (0.16)	0.02 (0.15)	0.03 (0.16)	0.03 (0.17)	0.04 (0.19)
Log-wages (mth)	6.74 (0.30)	6.86 (0.28)	6.84 (0.30)	6.89 (0.31)	6.85 (0.30)	6.12 (0.71)	6.23 (0.70)	6.21 (0.73)	6.28 (0.72)	6.25 (0.71)
Weekly Hours	42.69 (11.32)	43.34 (11.10)	41.55 (10.88)	41.42 (10.49)	40.85 (10.65)	32.81 (15.78)	33.06 (15.78)	31.18 (15.20)	30.41 (15.28)	29.00 (14.76)
N =	3,533	3,406	3,608	3,511	3,464	7,787	7,665	7,268	7,427	7,048

Source: Author's calculations from 2011-2015 PNAD

Table 1 reveals some basic regularities that are already well established in the literature of informality: there is a larger share of women among informal workers, informal workers are on average less educated than their formal counterparts, and formal workers have higher wages on average (Barros and Ulyseia 2010). For the purpose of this research, I follow the bulk of the literature and define “formally employed” as all salaried workers with a “labor card” (*carteira de trabalho*) signed by their employer. Per Brazilian law, an employee with a signed labor card is

entitled to social security benefits, such as severance payments, pensions, and unemployment insurance, while her employer is obliged to pay social security contributions and payroll taxes (Haanwinckel and Soares 2016).

Table 1 also reveals preliminary employment patterns displayed by the data. Between 2011 and 2015, total employment of domestic workers fell steadily. The decrease is attributed in greater part to a fall in the number of informally employed workers: between 2011 and 2015, total employment of formal domestic workers fell by approximately two percent while total employment of informal domestic workers fell by a greater nine percent. As a greater proportion of informal workers left the market, the overall formality rate increased by two percent—an outcome contrary to that predicted by policy consultant Eduardo Modena in his analysis of labor market outcomes following the constitutional amendment. While statistically significant, the increase in overall formality rate is slight given the magnitude of the number of informally employed domestic workers.

Table 2.
Formality Rates

	Total Employment		Domestic Workers	
	N =	Formal (%)	N =	Formal (%)
2011	83,063	0.723 (0.448)	11,549	0.312 (0.463)
2012	85,413	0.728 (0.445)	11,254	0.308 (0.462)
2013	85,543	0.740 (0.439)	11,057	0.332 (0.471)
2014	86,768	0.737 (0.440)	11,049	0.320 (0.467)
2015	79,891	0.740 (0.439)	10,566	0.330 (0.470)

Source: Author's calculations from 2011-2015 PNAD

To be better understood, however, the employment patterns of the domestic labor market must to analyzed against the employment shifts occurring in all industries in Brazil. Table 2

reveals that, for the same period between 2011 and 2015, the formality rate of the overall economy also increased by two percent. Hence, the variation in the fraction of formal and informal domestic workers cannot be attributed in its entirety to the 2013 constitutional amendment given that other sectors of the Brazilian economy that were unaffected by the policy displayed a similar change.

Table 3.
Domestic Workers' Monthly Real Wage Distribution

	Formal					Informal				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
10 th Pct.	6.56	6.66	6.66	6.69	6.67	5.21	5.24	5.15	5.40	5.30
Median	6.64	6.71	6.69	6.79	6.68	6.26	6.39	6.36	6.40	6.40
90 th Pct.	7.17	7.32	7.23	7.35	7.31	6.88	6.91	7.05	7.09	7.09
Mean	6.74	6.86	6.84	6.89	6.85	6.12	6.23	6.21	6.28	6.25
SD	0.30	0.28	0.30	0.31	0.30	0.71	0.70	0.73	0.72	0.71
N=	3,533	3,406	3,608	3,511	3,464	7,742	7,637	7,244	7,393	7,028

Source: Author's calculations from 2011-2015 PNAD

Table 3 reports information on the wage distribution of domestic workers between 2011 and 2015, which sheds light onto the disparate growth pay rates between the formal and informal sectors. While the number of informally employed domestic workers decreased, their real monthly median wage increased by 14% and mean wage increased by a similar 13%. On the other hand, formally employed domestic workers experienced a smaller increase in pay: 4% in median wage and 9% in mean wage. A decrease in total employment and an increase in wage rates suggest that the determinants of the supply of domestic workers changed throughout the period in question. Lastly, a real wage increase following the amendment, particularly for formally employed domestic workers, runs counter to the early predictions of the outcomes of the 2013 policy, which expected a decrease in pay as employers passed the burden of the newly imposed tax onto their workers.

Growth rates of domestic workers' salaries were similar to those of other low-skilled, female-dominated professions that were unaffected by the constitutional amendment. For the purpose of comparison, Table 4 reports summary statistics for three groups:

1. Group 1: domestic workers (e.g. house maids)
2. Group 2: urban, non-unionized service workers in social services (e.g. daycare workers)
3. Group 3: urban, non-unionized service workers in the accommodation industry (e.g. hotel maids).

Table 4.
Domestic Workers' Mean Monthly Real Wages Relative to Similar Groups

Group	Formal														
	2011			2012			2013			2014			2015		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Male (%)	0.16	0.26	0.38	0.13	0.27	0.38	0.10	0.24	0.38	0.12	0.28	0.37	0.12	0.21	0.379
Age (yrs)	41.11	39.45	33.61	41.62	40.31	34.71	41.43	40.49	34.86	42.61	40.31	34.45	42.86	40.22	35.30
Schooling (yrs)	7.61	8.93	9.24	7.78	9.14	9.36	7.95	9.53	9.39	7.88	9.49	9.40	8.14	9.68	9.59
Log-wages	6.74	6.76	6.83	6.86	6.88	6.92	6.84	6.87	6.94	6.89	6.91	6.95	6.85	6.89	6.92
N =	3,533	501	2,150	3,406	557	1,995	3,608	609	2,096	3,511	661	2,258	3,464	646	2,036
Group	Informal														
	2011			2012			2013			2014			2015		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Male (%)	0.06	0.17	0.36	0.05	0.10	0.35	0.06	0.17	0.34	0.06	0.14	0.36	0.06	0.21	0.36
Age (yrs)	39.23	35.98	32.48	40.02	38.68	32.85	40.42	36.90	33.35	41.26	36.86	33.32	41.56	35.37	33.42
Schooling (yrs)	7.10	9.33	8.91	7.31	9.48	8.90	7.44	9.73	9.04	7.43	9.71	9.19	7.66	10.66	9.36
Log-wages	6.12	6.43	6.48	6.23	6.49	6.54	6.21	6.60	6.55	6.28	6.51	6.58	6.25	6.54	6.56
N =	7,787	90	1,066	7,665	93	1,081	7,268	100	1,070	7,427	108	1,087	7,048	109	1,106

Source: Author's calculations from PNAD 2011-2015

Between 2011 and 2015, average annual growth rate of real wages for formally employed workers in groups 1, 2, and 3 were 2.75%, 3.25%, and 2.25% respectively. Growth was strongest between 2011 and 2012 as well as between 2013 and 2014 for all groups. This degree of

similarity with occupations unaffected by the treatment could imply that the policy did not have a strong and easily-discernible impact on the affected group.

V. Contribution

The market for domestic helpers has been a popular topic of study amongst labor research institutes like the United Nation's International Labor Office, and it is most often examined through the lens of international labor migration. Labor regulations that intervene in the allocation of benefits—as opposed to those that affect income, like the minimum wage—are usually cited and discussed qualitatively but are rarely the subject of an empirical study. My research is an exercise on quantifying the impact of labor policy that increases the costs associated with employing domestic workers. Because the context of the treatment is one of high rates of informality in the market, this study will also shed light upon the literature of the expansion of rights with or without a corresponding strengthening of an enforcement mechanism.

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