Informality, Family, and Taxation: How Joint-Household Behavior Affects the Labor Market

Job Market Paper

Mariana Odio-Zuniga *

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Abstract

How do joint-household behavior and taxation impact the formal-informal labor market composition in developing countries? Using data from the Brazilian Monthly Employment Survey and the formalization policy *SuperSimples* (2007), under a matching difference-in-differences approach, we show that responses to the policy depend on the initial sorting of the household into the labor market sectors. We structurally estimate a household search model with formal and informal sectors to study the labor market dynamics. We exploit the exogenous variation of the policy to evaluate, quantify, and decompose the causal impact for heterogeneous workers into labor-supply and labor-demand channels. We find: (1) The policy positively impacted the formality rate by 14%, mainly explained by higher job-finding rates, where 44% of the inflows correspond to married women with a formally employed spouse; (2) changes in the conditional wage distributions are the policy's most effective mechanism; (3) welfare gains of 4.2% and improvements in inequality of 4% arise especially for informal men; (4) the policy effect is ambiguous when decomposed by gender and marital status; and (5) younger workers respond the most to policy changes, leading to higher formality rates in the long-run. Thus, these results provide new avenues for policymakers to design cost-effective targeted policies and social programs that will improve labor market performance, inequality, welfare, and the aggregate economy.

JEL Classification: D1, H31, J21, J46, O17

Keywords: Informality, Household Behavior, Search Models, Formalization Policies, Labor Market Dynamics, Workers, Developing Countries

*Department of Economics, Washington University in St. Louis. One Brookings Drive, MSC 1208-228-308, St. Louis, MO 63130. Email: m.odioz@wustl.edu. **Latest version available at**: www.modioz.com. I want to thank George-Levi Gayle, Limor Golan, and Alexander Monge-Naranjo for their guidance, valuable advice, and feedback for the development of this paper. I am also grateful to participants at numerous conferences and seminars for helpful comments and discussions. Financial support during part of this research from the Center for Research in Economics and Strategy and the Department of Economics at Washington University in St. Louis is gratefully acknowledged. All errors are my own.

1 Introduction

Developing countries have high informality rates ranging from 30% to 70% of the urban workforce in Latin America (Maloney (2004)). Even after government efforts to reduce the size of the informal sector, these high rates persist over time. As Ulyssea (2020) states, informality is an endogenous outcome from the optimal behavior of workers' and firms' given their characteristics and institutional environment. In this sense, to determine the causes of the persistent high informality rates, we must understand who chooses to work in this sector and the reasons behind this decision. Given that joint labor-supply decisions vary among family structures, studying the household decision-making process regarding labor market choices is crucial to comprehend how they sort into different labor market sectors. To this end, we answer how joint-household behavior and taxation impact the formal-informal labor market composition in developing countries.

We examine the Brazilian economy, a country that has implemented a series of policies to incentivize the formalization of workers and firms throughout the years. In particular, a key policy that has been argued to lead to a significant increase in the formality rates is known as *SuperSimples* (also referred to as "*Simples Nacional*"), effective in July 2007. This policy consists of a tax reform that combines the primary levies and Social Security contributions into one tax rate, resulting in a lower payment than without the program. We focus on the labor market dynamics in this economy to study the two main motivations regarding the allocation of workers in the informal sector: (i) Workers are involuntarily in the informal sector while waiting for a formal job; and (ii) workers voluntarily choose to be part of this sector (Perry et al. (2007)).

This paper contributes to the literature by offering a new structural strategy to evaluate, quantify, and decompose the causal impact of a firm-oriented policy, such as *SuperSimples*, among heterogeneous workers into labor-supply and labor-demand channels while relying only on worker's micro-level data and the exogenous variation introduced by the policy. In addition, our structural estimation opens the door to analyzing the policy impact on transitional dynamics that the empirical causal-inference analysis does not allow, and is of great importance to explain the motivations behind the inflows to the formal sector. Understanding the impact on the formal-informal composition of the labor market due to changes in taxation and the multiple responses at the individual and household level has important implications for policy design. Our results provide new avenues for policymakers to design cost-effective targeted policies for those wanting to formalize and to design welfare programs to protect those who remain informal while improving labor market performance, inequality, and the aggregate economy. To the best of our knowledge, no other paper in the literature has implemented this approach to evaluate and decompose the policy impact of formalization policies.

On the one hand, Albrecht, Navarro and Vroman (2009) and Bosch and Esteban-Pretel (2012) develop a search and matching model to determine the impact of reducing payroll taxes in the formal sector. Meanwhile, Meghir, Narita and Robin (2015) estimate a structural model of search and wage-posting with both sectors to measure the impact at the individual level of increasing punishment for tax evasion. These papers differ from our approach in two dimensions. First, their frameworks are developed for single agents and leave out the endogenous component of joint-household labor market decisions. Second, they measure the impact of interest by changing the policy parameters in their counterfactual experiments. Instead, we take advantage of the exogenous shift of the policy to evaluate the causal impact of labor-demand and -supply mechanisms at the individual and household level, welfare, and the aggregate labor market.

On the other hand, the closest papers to ours that uses an exogenous shift of a policy to evaluate the demand and supply sides are Conti, Ginja and Narita (2018), and Fang and Shephard (2019); however, both are interested in studying the impact of health insurance access. Conti, Ginja and Narita (2018) develops a household search model with both sectors and wage-posting to measure the impact on formality rates and the valuation placed on universal health insurance access in Mexico using the 2002 reform of *Seguro Popular*. Fang and Shephard (2019) under the context of the Patient Protection and Affordable Care Act (ACA) of 2010 evaluates the impact of this policy on firms' insurance offerings and household outcomes in the United States.

Using the Brazilian Monthly Employment Survey (Pesquisa Mensal de Emprego - PME) from March 2002 to December 2015, we first implement a matching difference-in-difference approach to demonstrate that the impact of the policy, *SuperSimples*, on the transition of informal workers to the formal sector depends on how families sort into the labor market sectors. Overall, we find a positive and significant policy impact on the transition rates of single and married women. For married couples, we find the response to the policy is different conditional on the initial sorting of the household in the labor market sectors. In households with only one employed spouse (a worker-searcher household type), the couple sorts across sectors looking for insurance in the formal sector. For example, the policy has a negative impact on married women whose husbands find a job in the formal sector after the policy is introduced. Meanwhile, households with both spouses employed (a joint-employed household type) sort into the same sector. For a household in which both are employed in the informal sector (I-I), the policy positively impacts married women whose husbands switch to the formal sector after the policy, both becoming employed in the formal sector (F-F). Finally, we find empirical evidence of the dependence of the labor-supply decisions for married couples because the correlation between labor market statuses of the spouses is significantly different from zero.

Given the dependence between the impact of the policy and the household sorting into the labor market, we need a framework where we can control for the endogenous sorting of the household into different labor market sectors and the reasoning behind this joint-household behavior. In

addition, the evidence regarding the correlation between labor market statuses of married couples justifies the need to model risk-averse households in our framework. Therefore, we developed a household search model with formal and informal sectors in the labor market, allowing for endogenous household sorting, on-the-job search, and risk aversion. In addition, we embedded in the model a treatment component for policy evaluation purposes. We structurally estimate the model through a multi-step estimation procedure involving the generalized method of moments (GMM) and a non-parametric estimation step for the labor market shocks. Our baseline model is able to rationalize the labor market dynamics seen in the data for singles and married couples.

At the individual and household level, we structurally evaluate the policy effect of *SuperSimples* by quantifying and decomposing the causal impact into labor-supply (income tax and Social Security contributions) and labor-demand (wage distributions and arrival rates) channels conditional on workers' characteristics. This decomposition allowed us to answer what *SuperSimples*' policy impact would have been in the absence of each particular channel. Overall, we find the policy effect is ambiguous when decomposed by gender, marital status, and household structure.

On the one hand, from the labor-supply channels, workers respond the most to changes in income taxes. On the other hand, we find that households with significant policy effects respond to both labor-demand channels; however, the response is stronger to changes in the conditional wage distributions. Workers who are involuntarily in the informal sector and desire to find a formal job are affected the most through this channel. For joint-employed households, the absence of the wage component significantly impacts those with a clear preference for formality and a desire to be an F-F household type. The policy impact for married women is negative when the husband has a formal-non-treated job and positive when the husband has a formal-treated job (representing 73% of the policy effect).

For the aggregate labor market, we quantify the before-after impact of *SuperSimples* in three indicators: formality rate, transition probability from informal to formal, and job-finding rate of formal jobs. The implementation of the MDID was restricted to the policy impact on the transition rate across sectors due to the need of the variable of sector-of-activity to define the treatment group. Our structural model circumvented this issue and opened the door to analyze the policy impact on both inflows into the formal sector. Overall, the policy positively impacted the formality rate by 14%. The majority of this percentage is attributed to households who, after the policy, became F-F. We also find that diverse individuals negatively contributed to the policy impact on the formality rates, that is, individuals who voluntarily chose to be in the informal sector. Most importantly, we find that the increase in the size of the formal sector was mainly explained by higher job-finding rates, where after the policy doubled, 44% of the inflows corresponded to married women with a formally employed spouse and 23% of the inflows corresponded to single women.

SuperSimples positively impacted welfare with overall gains of 4.2%. At the baseline, worker-searcher households and joint-employed households with both members in the informal sector before the policy was introduced, and single men gain the most in welfare, with the latter having the highest welfare gains of 3%. Instead, single women present welfare losses which is consistent with the fact that they favor informality due to non-monetary benefits such as flexible hours. The most important mechanism of the policy is the changes in wage distributions, without which welfare gains decrease 8%. In terms of welfare inequality, we find that, overall, at the baseline, inequality improves 4%, especially for informal men.

Our policy experiment studies the long-run effects of taxation policies on workers' labor market dynamics. To this end, we simulate individual and household labor market careers to construct workers' labor market profiles of formality rates, transition rate across sectors, and job-finding rates. We find an inverse relationship between the time the policy is introduced and the formality rates; if we introduce the policy at the earlier stages of workers' careers, we find steeper changes that converge to higher rates than the baseline case. Our results show that more significant changes in inflows are present in the job-finding rates. Women's labor market profiles are more volatile, and married couples have higher formality rates and steeper changes. Single women favor informality and present the lowest formality rates; regardless of when the policy is introduced, the impact on the formality rate for these women is at most 1.5 percentage points. Single men present a more stable labor market activity.

Finally, lifetime earnings are more dispersed than lifetime welfare; however, both exhibit a negative relationship between inequality and the time the policy was introduced over workers' labor market careers. Significant improvements occur when the policy is introduced before 20 years of workers' experience - ranging from 5% to 35%. Even though the policy improves inequality, we find that married women experienced the highest inequality among all groups.

Related literature. This paper relates to the informal-sector literature, surveyed by Perry et al. (2007) and Ulyssea (2020), which studies the causes and consequences of high informality rates in developing countries and possible policy designs to mitigate the size of the informal sector in these economies. In this area of study, the empirical literature has primarily focused on analyzing the impact of formalization policies through the lens of the firm. For example, for the Brazilian economy, researchers find a positive effect from the differentiated tax system reform, Simples in 1996, leading to higher formality rates of firms in the 2000s conditional on their economic sector (see Berg (2011), Fajnzylber, Maloney and Montes-Rojas (2011), Monteiro and Assunção (2012), and Maurizio (2015)). Similarly, Conceição et al. (2018) analyze the effects of *SuperSimples* in 2007 on the longevity of manufacturing firms and find that firms that opted to be part of the program had a lower chance of mortality. Moreover, Rocha, Ulyssea and Rachter (2018) study the Individual Micro-Entrepreneur Program from 2009 in Brazil and find that once registration costs have been eliminated in the formal sector, lowering the tax burden reduces firm informality.

Instead, scope remains to study the informal sector through the lens of the worker. Fairris and Jonasson (2016) provide evidence for the period 2000-2010 in Brazil, where the decline in the informality rates was due to higher enforcement, rising education levels, increased numbers of workers with spouses in the formal sector, and changes in industry composition. Closely related to our paper is the work of Galiani and Weinschelbaum (2012), who provide empirical evidence that the spouse is more likely to operate in the informal sector if the head of the household is already employed in the formal sector. Meanwhile, Samaniego de la Parra (2017) analyzes the effects of random inspections on informal firms and the responses of the household labor supply in Mexico. She finds the value of a formal job depends on the household labor market composition. Our paper contributes to this strand of the literature by implementing a MDID approach and the *SuperSimples* reform in 2007 to analyze the impact of the policy on the transition of informal workers to the formal sector by different family structures. We find the policy's response depends on the household's initial sorting into the labor market.

Our paper also relates to the stream of theoretical literature modeling labor markets with an informal sector. Albrecht, Navarro and Vroman (2009) extending Mortensen and Pissarides (1994) builds an equilibrium search and matching model with ex-ante worker heterogeneity to determine the effects of labor market policies on the aggregate labor market. A similar theoretical approach is followed by, Bosch and Esteban-Pretel (2012) who studies the impact of government interventions on labor market dynamics, the reallocation of workers across sectors, and the business cycle. Furthermore, Ulyssea (2010) develops a two-sector matching model with separated markets and undirected search to study the role of labor market institutions and regulation of entry on the size of the informal sector and the performance of the labor market. He shows that increasing the enforcement of current labor regulations is very effective in reducing the size of the informal sector but increases unemployment and leads to substantial welfare losses.

In the line of work regarding structural models with endogenous informal sectors, Meghir, Narita and Robin (2015) extend Burdett and Mortensen (1998) and estimate an equilibrium wage-posting model with an informal sector to study the impact of increasing the cost of informality. Using data from Brazil, the authors find that reducing informality by tightening enforcement increases welfare in the economy.[1] Meanwhile, Bobba et al. (2021), in a search and matching model, incorporate a human capital accumulation component after workers enter the labor market in an economy. Using data from Mexico, they find that increasing the payroll tax contribution rate in a formal job or non-contributory benefit led to higher informality and lower human capital. Yet, the

[1]Two innovations are worth noting. First, Ulyssea (2018) estimates an equilibrium model where firms are informal if they are not registered (extensive margin), or they are registered but hire informal workers (intensive margin). The author finds that higher enforcement on the extensive margin leads to a welfare loss, but increasing the costs at the intensive margin most impacts formal firms' low productivity since they suffer an increase in their labor cost. Second, Dix-Carneiro et al. (2021) estimates an equilibrium model of a small open economy to understand how trade affects economic outcomes in the presence of informality. They show that tighter enforcement leads to higher productivity and reduces informality at the expense of employment and welfare. In contrast, they find that trade liberalization increases productivity and aggregate welfare.

results from changing the payroll tax are sensitive to the design of the policy. Our paper, focusing on the worker, contributes to this area of study by analyzing the effect of formalization policies on the labor market composition and labor market dynamics, while controlling for different household structures. However, instead of explicitly modeling the firm side, we take advantage of the exogenous variation of the policy to disentangle and quantify the implicit effects coming through the labor-demand side.

This paper also relates to the literature regarding household labor supply within a framework of a frictional labor market. Guler, Guvenen and Violante (2012) provide a theoretical framework of the joint-search problem of the household in a partial-equilibrium setting and conditions for which the individual and household search problem coincide. Flabbi and Mabli (2018) structurally estimate the partial equilibrium in a household search model with an exogenous distribution of job offers. In addition, this framework has been taken to analyze the household behavior under a context of health insurance firm provision in a partial equilibrium as in Dey and Flinn (2008) and a general equilibrium by Fang and Shephard (2019) for the US. Conti, Ginja and Narita (2018) also develop and estimate an equilibrium household search model with wage-posting in an economy with the informal sector to measure the impact of universal health insurance access on formality rates. Conti, Ginja and Narita (2018) and Fang and Shephard (2019) are the closest to our paper by considering an exogenous policy shift to evaluate the demand and supply sides of the labor market. However, our paper differs in several dimensions. First, we focus on the responses of the household to formalization policies and evaluate the impact on both singles and married couples, as well as on the aggregate labor market. Second, we take advantage of the exogenous variation of the policy to disentangle the causal policy impact of the labor-demand side. Third, we complete our analysis by studying the impact of formalization policies on workers' labor market profiles, welfare, and inequality.

Lastly, a growing body of literature emphasize the importance of modeling both singles and married couples. For developed countries, addressing issues such as the role of the second earner and the business cycle commonly known as the added worker effect (see Ek and Holmlund (2010), Mankart and Oikonomou (2017), Wang (2019), García-Pérez and Rendon (2020), and Birinci (2021)), the marital wage premium (Pilossoph and Wee (2021)), and the optimal household behavior toward government policies becomes relevant. For example, De Nardi, Fella and Paz-Pardo (2021) study the effect of the Universal Credit reform in the UK by different family structures, and Borella, De Nardi and Yang (2019) address the issue of the dependence on marital status in the US regarding taxes and Social Security benefits discouraging women from participating in the labor market. For developing countries, the literature in this area is still scarce but promising for further research.

2 Program Background: SuperSimples

Over time, the Brazilian government designed a series of policies to incentivize firms to formalize, with the aim of decreasing the high informality rates. One of the first efforts from the federal government dates back to December 1996 with Law No. 9317, which created the Integrated System for Payment of Taxes and Contributions by Micro- and Small Enterprise, a simplified tax regime known as *Simples Federal* (hereafter, *Simples*). Eligible micro and small firms[2] were offered a differential tax treatment by unifying five federal taxes and the employer's Social Security contribution in a single monthly rate plus a less cumbersome formalization procedure. Each firm paid a single payment conditional on their annual gross income. Moreover, the firm is still responsible for paying other federal, state, and municipal taxes. However, as Monteiro and Assunção (2012) show, the program's results were not as expected, with just a small impact in terms of the formalization of micro and small firms.

To achieve better outcomes, a major reform to *Simples* was presented to the parliament for the first time in January 2004. By 2006, the Brazilian authorities passed the Complementary Law No. 123, effective in July 2007, when the program reform *Simples Nacional* (hereafter, *SuperSimples*) was introduced. This reform has been claimed to be the key policy that led to a significant increase in the formalization of micro and small firms in this economy. *Simples* and *SuperSimples* share the same goal: encourage micro and small firms to formalize by creating a simplified tax regime whereby they make a single tax payment. Fajnzylber, Maloney and Montes-Rojas (2011) argue that the motivation behind the reductions in direct and indirect taxes through this program was to allow small, unskilled, labor-intensive firms to be more competitive against larger firms for which having high tax burdens is not a problem. Moreover, the new regime's main innovation was integrating the three levels of the government, federal, state, and municipal, where firms file a single simplified annual tax declaration. The differentiated fixed tax rate is proportionally lower than they would have had to pay without the program. Those who were part of the original program were transferred to the new one.

Three main improvements in *SuperSimples* are worth noting. First, the set of taxes and contributions was extended. The new policy unifies the following federal, state, and municipal taxes, and contributions: (1) Corporate Income Tax (IRPJ), (2) Contribution to the Social Integration Program and the Public Service Employee Fund (PIS/PASEP), (3) Social Contribution on Net Profits (CSLL), (4) Contribution for the Financing of Social Security (COFINS) and Employer's Contribution to Pensions and Social Security (INSS or CPP), (5) Industrialized Products Tax (IPI), (6) Operations Regarding Circulation of Goods, Transportation and Communication Services (ICMS), and (7) The Municipal Service Tax (ISS). The first five taxes are shared between both regimes; how-

[2] *Simples* requires a firm to be registered as a legal entity as a micro or small firm. A micro firm is one whose annual gross income is up to R$120,000, whereas for a small firm, it is up to R$720,000.

ever, *SuperSimples* permanently added ICMS and ISS to the program instead of only considering them by agreement with the federal government as done by *Simples*.

Second, besides the firm's annual gross income and legal registration to the national tax authority, the program also determines eligibility by the sector of activity of the firm at the 7-digit industry level. Under the new regime, the tax rates differ according to four sectors of activity: Commerce/Retail, Industry, Rental Services of Goods, and Services.[3] In addition, *SuperSimples* added new eligible activities that were excluded in the original regime. Third, the new system modified the income brackets' bounds: for a micro firm, up to R$240,000; for a small firm, up to R$2,400,000. Also, the portion that has to be paid was redefined. On the one hand, for *Simples*, the monthly rate was determined by the accumulated gross income until the current month. On the other hand, for *SuperSimples*, the taxpayer considers the accumulated gross income of the past 12 months and their economic activity to estimate the rate to be paid from their revenues.

Since then, additional reforms have been made to improve the targeted population's coverage and provide more detail on the policy.[4] For this paper, we focus on the December 2006 reform of *SuperSimples* (effective July 2007) and use as eligibility criteria the sector of activity of the firm for our empirical strategy. In the subsequent reforms, changes in the eligible sector of activity are minimal and do not affect our analysis. We restrict the definition of eligibility to the program due to the available data in the PME, discussed in the following section.

3 Data and Empirical Facts

Data Description. The data source used throughout the paper is the Brazilian Monthly Employment Survey (Pesquisa Mensal de Emprego - PME), designed and implemented by the National Statistics Bureau (Instituto Brasileiro de Geografia e Estatistica - IBGE) in the urban areas of the main metropolitan regions in Brazil: Belo Horizonte, Porto Alegre, Recife, Rio de Janeiro, Salvador, and Sao Paulo. The PME's main objective is to provide accurate information on the labor force to evaluate tendencies and labor market dynamics and improve the understanding of the labor market composition. In particular, the survey reports information for individuals such as demographic characteristics and socioeconomic aspects, including labor-force activity, labor-supply

[3]Services are classified into four categories presented in Table C.5. Taxes and contributions by sector of activity are as follows: **Commerce:** IRPJ, CSLL, COFINS, PIS/PASEP, INSS (CPP) and ICMS. **Industry:** IRPJ, CSLL, COFINS, PIS/PASEP, INSS (CPP), ICMS and IPI. **Rental Services of Goods:** IRPJ, CSLL, COFINS, PIS/PASEP, INSS (CPP) and ISS. **Services I:** IRPJ, CSLL, COFINS, PIS/PASEP, INSS (CPP) and ISS. **Services II:** IRPJ, CSLL, COFINS, PIS/PASEP and ISS. **Services III:** IRPJ, CSLL, COFINS, PIS/PASEP and ISS. **Services IV:** IRPJ, CSLL, COFINS, PIS/PASEP and ICMS.

[4]*Simples* was approved in December 1996 (effective in January 1997). *SuperSimples* and its subsequent reforms were approved as follows, with effective dates in parenthesis: December 2006 (July 2007), November 2011 (January 2012), August 2014 (January 2015), October 2016 (January 2018), and May 2018 (August 2018).

measures, occupation and industry information, and employment characteristics such as wages, hours worked, job duration, and sector of activity.

The PME is an unbalanced rotational panel in which monthly interviews with individuals and households are conducted for the first time during four consecutive months. A year later, the households re-enter the sample and are interviewed again for another four consecutive months. Due to a change in the survey's methodology, we use the data starting in March 2002, when the new design was implemented (Instituto Brasileiro de Geografia e Estatística (2007) for details of the methodology and implementation of the survey). The PME allows us to create labor market histories for all individuals in the sample and create a sample for the household where spousal labor market information across time is available, which is essential to study joint labor market dynamics and to perform the empirical analysis and structural estimation of the model.[5]

Definitions. We provide a series of definitions for concepts derived from the available data used throughout the paper. First, regarding the individuals' marital status, a married couple is defined as a pair of spouses who live together and may or may not be legally married; that is, we do not differentiate between couples who are cohabitating and those who are legally married.

Second, individuals can be in three possible work positions: *employee, employer,* and *self-employed*. Instituto Brasileiro de Geografia e Estatística (2007) defines an *employee* as a person who works for an employer, complies with a working schedule, and receives a payment compensation for their work. An *employer* is a person who works for their own business and has at least one employee who receives remuneration for their services. A *self-employed* individual works for themself or with a business partner but does not have remunerated employees.

Third, a job is registered if the worker reports having a worker's card signed by the firm, which entitles workers to be protected by employment laws. Fourth, a Social Security contributor is an employee, employer, or self-employed individual who pays the mandatory social security levy, which can be deducted from the monthly compensation, to the National Institute of Social Security (INSS) or equivalent institution.

Fifth, we must define a formal and informal worker. A *formal worker* is an employee whose job is registered and who possesses a card signed by the firm (*carteira de trabalho*),[6] or is an employer

[5]The microdata are available for public access at the National Statistics Bureau website: `https://www.ibge.gov.br/en/statistics/social/labor/18169-monthly-employment-survey.html?=&t=microdados`. The Department of Economics at PUC-Rio developed DataZoom, which provides a series of packages in Stata to access and process the microdata from the survey and English documentation if needed. To access their resources, refer to `http://www.econ.puc-rio.br/datazoom/english/index.html`.

[6]A formal job is filled if the following hold: (i) The employer records the contract in the Work and Social Security Card (CTPS), including the job position, wage rate, and starting date. The CTPS is the property of the employee as proof of their formal agreement with the employer. (ii) The employer must register the worker at the General Register of Employed and Unemployed (*Cadastro Geral de Empregados e Desempregados* - CGED). (iii) The employee must

or self-employed worker who reports paying Social Security contributions. An *informal worker* is an employee who does not hold a formal labor contract (i.e., the job is not legally registered) or an employer or self-employed worker who reports that they do not pay Social Security contributions. Figure B.1 in Appendix B summarizes these definitions, which arise directly from the survey's questionnaire.

Finally, we measure the formal-informal composition of the labor market with the formality rate. In this paper, we define the formality rate as the proportion of workers in the formal sector relative to all workers in the labor market (i.e., $\frac{F}{F+I}$).

Sample Selection. The sample period comprises the monthly survey waves from March 2002 to December 2015. The sample is composed of individuals between 18 and 65 years of age. In their first interview, these individuals report being either unemployed, working as employees, self-employed, or reported to be an employer.

Furthermore, our empirical approach and estimation requires a series of individuals' characteristics to be available: age, gender, race, number of children, family size, region, education level, marital status, employment status, weekly wage rate and hours worked, occupation, sector of activity, work position, and sector of employment. If any of these variables are missing, we exclude the individual and household from the sample.

We only consider full-time job offers in our model. Therefore, we restrict our sample to employed workers who report working at least 44 hours per week for their primary job.[7] In addition, we exclude from our sample individuals who report working more than 91 hours a week.[8] These observations are assumed to be reporting errors.

We do not model the marriage market; therefore, for married couples we only include spouses who have stable households during the sample period and do not report living in separate households at any point in time. In addition, we only include married couples whose labor market histories are complete. If at least one spouse fails to satisfy these requirements, both spouses are dropped from the sample.

be registered to the Social Integrated Program (*Programa de Integração Social*). (iv) The employer monthly reports the employee's remuneration to the Brazilian Government Severance Indemnity Fund Law and Social Security contributions (*Guia de Recolhimento do Fundo de Garantia por Tempo de Serviço e Informações à Previdência Social*). (v) The employer yearly presents employment information to be registered in the Annual Social Information register (*Relação Anual de Informações Sociais* - RAIS).

[7]Brazilian Federal Constitution restricts a full-time workweek to eight hours a day and 44 hours a week.

[8]On the one hand, a formal worker, by law, must have a minimum rest of 11 hours between the end of a workday and the start of the next one. In addition, they are entitled to one day of rest a week, meaning a workweek lasts at most six days. On the other hand, informal workers do not have working-hours restrictions. We take a conservative approach and allocate 11 hours of personal care and rest as in the formal sector but allow them to work 13 hours 7 days a week, resulting in an upper bound of 91 working hours a week.

As in Meghir, Narita and Robin (2015), to construct consistent labor market job-to-job transitions, we use the survey question regarding current job duration. We also exclude from the sample those who were unemployed in the first interview and inactive in the previous 12 months. Because the PME randomly redraws the sample for each wave and people move away from the areas where the survey is implemented, we experience attrition. Moreover, to minimize the effects of attrition, we follow individuals for up to four months or until their first move to compute their employment transitions. If we observe them in the following four months a year later, we consider them a new household and record their transition within the new spell.

Empirical wage distributions are needed for the estimation of the model. In addition, these distributions are conditional on gender, marital status, sector (formal or informal), treatment group (defined by sector of activity), and, if married, on the spouse's labor market status. All wages are adjusted for inflation to the January 2016 consumer price index. We impose several trimming criteria to the conditional wage distributions: (i) We drop from the sample those individuals who report positive hours worked but a zero weekly wage rate; (ii) we exclude those employed in the formal sector and earning less than the minimum wage; and (iii) we discard wages that lie at the top and bottom 1% of the conditional wage distribution.

After imposing these sample restrictions, our sample is reduced to a total of $340,579$ single individuals ($788,019$ individual-year observations) and $329,671$ married-couple households ($1,278,071$ household-year observations).

Formal sector benefits and costs. For the purposes of this paper, we restrict the formal-sector benefits to three components: minimum wage, unemployment insurance, and severance pay. However, these benefits are not an exhaustive list of those specified in the Brazilian Labor Laws to protect workers' rights in the formal sector.[9] Yet, the cost of being entitled to these benefits is the monthly payment of payroll taxes composed of income taxes and Social Security contributions[10].

For the formal-sector benefits, we have the following. Brazil has a federal minimum wage that is increased every year. Formal firms must comply and ensure their workers earn at least the minimum wage regardless of age, gender, sector of activity, or experience. Some states set regional minimum wages, and if higher than the national one, firms must ensure the highest one. We calculate the minimum wage per year for all formal workers and recover the average legal

[9]Some additional benefits from the formal sector are the following: (i) Workers receive overtime at a rate of 150% of the regular wage rate. If working during a holiday,they must be paid double. (ii) Employees receive 30 days of paid annual leave if employed 12 months. (iii) If the worker becomes sick, the employer pays 100% of the regular wage for the first 15 days, beyond which the National Institute of Social Security pays for the leave. (iv) Female employees can enjoy 120 days of paid maternity leave, whereas the child's father is entitled to up to five paid days. The employer must guarantee the pregnant employee job stability from the time they become aware of their pregnancy up to five months after birth. (v) A 13th month salary as a bonus.

[10]The information detailed in this section is taken from the Ministry of Labor for the `minimum wage` and `social security contributions`, the Ministry of Economics for the `personal income tax` and `unemployment insurance`, and the Brazilian Government Severance Fund (FGTS) for `severance pay.`

Table 1: Mean Tax Rates by Time of Policy

	Non-treated		Treated	
	Before	After	Before	After
Personal Income Tax	0.09	0.09	0.09	0.06
Social Security Contributions	0.11	0.11	0.11	0.1
Unemployment Insurance	0.6	0.6	0.6	0.6
Severance Payment	0.0825	0.0825	0.0825	0.0825

minimum wage for the whole sample period to be R$465 per month. In addition, if a formal worker involuntarily loses their job without cause or due to changes in the country's economic situation and is currently unemployed, they can opt for unemployment insurance (UI).[11] This benefit is a temporal financial aid to mitigate the unemployment cost and help while an individual searches for a job. The amount of the benefit is calculated based on the mean income brackets presented in Table C.4. We use the mean income brackets to calculate the corresponding amount of unemployment insurance divided by their monthly income for those who transition from the formal sector to unemployment. Then, we take the mean of these individual proportions over the whole sample period, which returns an average of 60% of the monthly income.

Lastly, employers deposit 8% of the worker's gross compensation every month to the Severance Fund (Fundo De Garantia Por Tempo de Servicio - FGTS), which the Ministry of Labor oversees. The worker's account comprises the employer's monthly deposits, plus monetary corrections and interest rates. Until 2017, the severance funds had a return of 3% per year, 0.25% a month. Therefore, we set the severance-pay rate to 8.25%. The worker is entitled to severance pay when the job is terminated.[12] The rates are reported in Table 1. Because *SuperSimples* does not affect either the unemployment insurance or severance pay, we keep these rates unchanged by treatment and time of the policy.

Furthermore, in exchange for the formal-sector compensations, employers and employees must comply with the mandatory tax payments. In this paper, we include payroll taxes, which we proceed to describe. Employers in the formal sector withhold personal income taxes and Social Security contributions from the worker's gross income. We assign each individual employed in the formal sector the corresponding personal income tax rate according to their gross income and

[11]The unemployment insurance in Brazil is financed by the Workers' Assistance Fund (*Fondo de Amparo al Trabajador – FAT*). Workers must show their last formal contract and the duration of the job position registered in their signed labor card. If they worked at least six months in the previous 36 months, they could receive three to five months of benefits. In particular, if a worker was employed (i) between six and 11 months, they are entitle to three months of payments; (ii) between 12 and 23 months, they receive four months of benefits; (iii) for at least 24 months, they are eligible for five payments.

[12]For every year worked, the FGTS guarantees the worker approximately one month's wage. Withdrawals from the FGTS are restricted to the following causes: involuntary dismissal from the job, retirement, the purchase of a house by the worker, a severe illness, and inactivity of the account for three consecutive years.

brackets established by law during our sample period of 2002 to 2015.[13] Formal workers pay monthly contributions to the National Institute of Social Security (INSS), which entitles them to a pension and health benefits. These contributions are based on the sector of activity and workplace risk. According to the worker's gross income, the Social Security contribution rates range from 8% to 11%, with an upper bound at 11% applied upon the maximum contribution income for those with gross income beyond the specified income bracket.[14] We take the mean controlling by treatment and time of the policy; we report the resulting rates in the first and second row from Table 1.

3.1 Empirical Facts: Labor Market Dynamics in Brazil

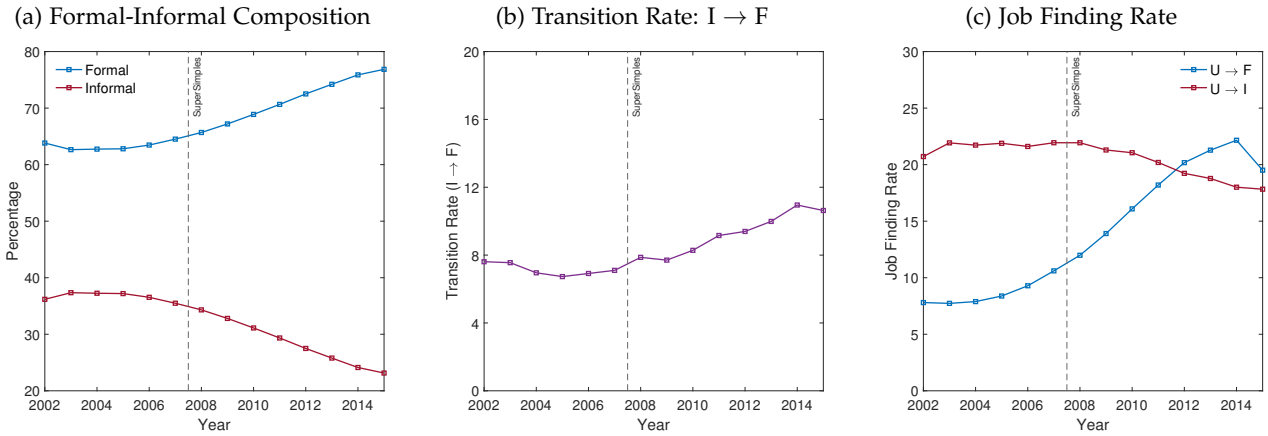
A well-known fact about developing countries is the high informality rates they experienced, ranging from 30% to 70% of the urban force in Latin America (Maloney (2004)). Even after government efforts to implement formalization policies, these high rates persist. The literature presents two motivations behind why workers chose to be part of the informal sector (refer to Maloney (1999), Perry et al. (2007), Gasparini and Tornarolli (2009), and Levy (2010)) On the one hand, workers enter the informal sector involuntarily and favor this option rather than being unemployed while searching for a formal job. On the other hand, workers optimally decide to voluntarily be in the informal sector, because they find some intangible advantage that offsets the formal benefits. Among the multiple reasons behind this argument are flexible hours, training to acquire the necessary experience, independence, or enjoyment of the social protections common at the household level when a spouse is employed in the formal sector. We are interested in this last factor, the interactions within the household regarding their joint labor-supply decisions and sorting across both sectors.

Galiani and Weinschelbaum (2012) provide empirical evidence regarding the sector sorting of household members in Latin American countries. The authors argue that if the household's primary earner is formally employed, the probability of the second-earner household member becoming informal is higher. Hence, formal benefits such as health insurance can be enjoyed at the household level without paying double payroll taxes. In addition, the second-earner might as well serve as a buffer against negative income shocks that the primary earner might experience, the commonly known "added worker effect." Therefore, we are interested in their responses to formalization policies, such as *SuperSimples* (effective 2007), a policy that promotes formalization of firms and indirectly of workers at a low cost. We document the main empirical facts of the Brazilian labor market before and after the policy was implemented. Beyond the formality rate,

[13]Tables C.1 and C.2 in Appendix C.1 present the different tax brackets according to the income level of a formal worker. In January 2009, the tax brackets changed from three to five brackets.

[14]The specific contribution rates for the sample period are presented in Table C.3.

Figure 1: Labor Market Trends: Overall



we are interested in the policy impact on the transitional labor market dynamics;[15] specifically, we focus on the inflows to the formal sector: the transition rate from the informal to the formal sector and the job-finding rate of formal jobs.

Figure 1 shows the formal-informal labor market composition and transition rates for our sample period of 2002 to 2015. Three stylized facts come to light. First, if we only consider employed individuals, we have that the formality rate increased from 63% to 71%; hence, 29% of workers are still in the informal sector (panel (a)). Second, the overall transition rate of informal workers to the formal sector (panel (b)) also presents an increasing trend but represents a change of up to 2 percentage points. On the one hand, this finding is in contrast to Bosch, Goni and Maloney (2007),[16] who using the same dataset, find that what matters the most are the job-to-job transitions to the formal sector and not the job-finding rates; however, they study the time period of 1983 to 2002. On the other hand, Firpo and de Pieri (2018) present labor market trends for the Brazilian economy for our same sample period and empirically show job openings in the formal sector increase. This observation leads to our third and final stylized fact: the job-finding rate of formal jobs increased significantly (panel (c)), to the point that reached the informal-sector job-finding rate, which has historically been higher than the formal sector. In particular, this rate doubled after the policy, from 8% to 16%.

Furthermore, we present in Figure B.4 in Appendix B.2 the decomposition of these indicators by gender and marital status. Regardless of marital status, men present higher formality rates than women, yet we see increasing trends for all individuals. At the household level, we control for the spouse's labor market status. We find that married men and women whose corresponding

[15] A branch of the literature that has study the labor market dynamics of the worker has focused on the impact on unemployment and the role of the informal sector in regards to the business cycle. Refer to Bosch and Maloney (2008), Fiess, Fugazza and Maloney (2010), Alvarez et al. (2018), Bosch and Esteban-Pretel (2012), and Gomes, Iachan and Santos (2020).

[16] An argument also presented by Bosch and Maloney (2008) for Mexico; however, as Fiess, Fugazza and Maloney (2010) states, approaching the informal sector varies according to the institutional and period context. Therefore, we limit our facts to the Brazilian institutional context.

spouses are formally employed have higher formality rates. Before implementing the policy, a married woman with a formal husband had a formality rate of 66% versus 74% after. (for married men, 75% vs. 82%). On the contrary, those married couples with a spouse in the informal sector have the lowest formality rates, yet still increasing trends. In particular, married women before the policy had a formality rate of 46% (in favor of the informal sector). After the policy, this rate increased to 52% (in favor of the formal sector). These households are the ones in which at least one family member is in the formal sector and the other family members enjoy the common benefits (has an insurance role).

The overall trend of the transition rate across sectors showed a small increase after implementing the policy. The second row of Figure B.4 shows single men and married men and women with a formal spouse have the higher transition rates, especially married men from 11% to 14%. In this case, family members are sorting into the same sector and becoming an F-F joint-employed household. Instead, those with informal spouses prefer to remain in the informal sector as well. For married women, we have an almost flat trend (on average, before and after the policy is 4%), and for married men, the transition increases at a slow rate. Similar behavior is exhibited by families with one unemployed spouse (worker-search households).

The third row from Figure B.4 presents the job-finding rates of formal jobs where we find the most significant changes. Singles at least doubled this rate relative to before the policy; that is, single men exit unemployed towards the formal sector at a rate of 20% (compared to 10%) and single women at a rate of 14% (compared to 6%). In the case of married couples, these rates are the highest for those with formally employed spouses (hence, worker-searcher households). In particular, married men were finding jobs at a rate of 30% (instead of 15%), while married women were finding jobs at a rate of 13% (instead of 5%). Note one spouse is initially employed in the sector with the higher wage rates, and the unemployed spouse has a higher outside option; therefore, their reservation wages are higher and they can be pickier while searching and accepting a job offer. With the policy at hand, the hiring costs in formal firms lowered, directly affecting formal wages, which led this type of households to transition to a joint-employment state.

Finally, wages play an important role in these economies because formal and informal wage distributions overlap. Appendices B.3 and B.5 present the empirical accepted wage distribution conditional on the sector, gender, marital status, and spouse's labor market status (if married), which are used later in our estimation. Moreover, as Ulyssea (2010) shows, the formal-informal wage gap has been decreasing over time in Brazil. For our sample period, a rough measure without controlling for observables, we have that the formal-informal wage differential continues to be decreasing, on average going from 0.73 to 0.60 (closer to zero translates to less wage inequality across sectors). If we disaggregate this measure by gender and marital status, we find women have higher wage inequality across sectors regardless of their marital status and the spouse's labor market status.

4 Empirical Strategy: The Impact of SuperSimples

In this section, we follow a quasi-natural experiment approach to evaluate the impact of *SuperSimples* on the transition of workers from the informal to the formal sector. We consider the formalization policy (effective in July 2007) as an exogenous intervention providing a setting to evaluate its impact by comparing the behavior of those affected by the policy relative to a comparison group before and after the policy was implemented. Recall that this tax policy targets those who work in the informal sector and encourage them to transition to formality. The program provides micro, small, and medium firms access to a differentiated tax system that consolidates a series of taxes and Social Security contributions into a single payment with lower and fixed tax rates. Those who complied with the program were able to get the benefits of being part of the formal labor market, for example, health benefits, unemployment insurance, and severance payment. The Matching Difference-in-Differences (MDID) strategy is the most suitable approach for the goal of this paper. It allows us to demonstrate that the impact of the policy on the transition of informal workers to the formal sector depends on how families sort into the labor market sectors.

4.1 Choice of the Outcome and Treatment Variables

SuperSimples seeks to promote the formalization at a low cost for firms and indirectly of workers; hence, we focus on the impact of the program on the proportion of informal workers leaving this sector and entering the formal sector. The outcome variable corresponds to the monthly transition to the formal sector in t_1 conditional on the individual being part of the informal sector in t_0.[17] For individual i and period (month) t, we denote the outcome variable as Y_{it}. Later, we condition this outcome variable by how the family initially sorts into the labor market.

As we explained in section 2, firms must meet a series of criteria to be eligible for the program. However, the PME only provides information specific to the worker, and we are limited to the available variables in the survey to define the treatment group. For this reason, we choose the *sector of activity* where the worker is currently employed as the criterion to determine the treatment variable.[18] Given the restriction that individuals must be employed to define the treatment group, we cannot empirically study the impact of the policy on the job-finding rates. However, the data show that after the policy, the transition from unemployment to the formal sector is significantly higher than before July 2007, an important inflow to consider when analyzing the formal sector's size. Thus, even though we abstract on using unemployed individuals in our empirical approach, we overcome this limitation when we undergo the structural policy analysis.

[17]For example, for the transition from March-2002 to April-2002, March would be t_0 and April t_1.

[18]Table C.6 in Appendix C.2 provides the division of activities by treatment group; selection done using the *Complementary Law No. 123* for the 2007 *SuperSimples* tax reform. There was no rule to include the sector of activities eligible to the program, which plays in our favor since provides the randomness we require from a natural experiment.

We proceed to define the treatment variable. Denote this variable as D_{it}, which equals 1 if the individual works in a sector of activity from the treatment group and 0 if employed in a non-treated activity. Note the non-treated and treated pools vary only if the worker changes their sector of activity over time.

SuperSimples became effective in July 2007; however, the discussion of this reform started in the parliament in 2004. This timeline raises the concern of firms and workers anticipating the implementation of the program. To control for this possible anticipation of the reform, we leave out observations within six months before and after the reform was implemented. Therefore, we denote the time of policy for individual i with T and let $T = 0$ from April 2002 to December 2006 and $T = 1$ from January 2008 to December 2015 (hereafter, we refer to $T = 0$ as "*before*" or B, and to $T = 1$ as "*after*" or A).

Having these variables defined, we can focus on our goal of measuring the impact of formalization policies on the transition probability from the informal to formal sector among the treated by family structure.

4.2 Implementation of the Matching Difference-in-Differences

As presented in Blundell and Dias (2009), we use *SuperSimples* as a naturally occurring event that creates an exogenous variation in our outcome variable, resulting in a "policy" shift for the treated group. We compare the difference in average behavior before and after the policy between treated and non-treated groups, that is, the excess outcome change for the treated versus the non-treated. Blundell et al. (2004) points out that an important issue is whether the impact of the policy is heterogeneous with respect to observable characteristics (which we denote as X_{it}). In this case, to correctly estimate the policy's average impact, the comparison group must exist, meaning treatment and control groups must be comparable. In Appendices C.3 and C.4, we provide a series of balancing tests regarding treatment and time of policy. We include demographic characteristics, employment and education characteristics, and spouses' characteristics (if married) in the observables. For most of the observables in the tables, we find the difference across groups is statistically significant. Therefore, we need an additional step to be able to provide reliable conclusions regarding the impact of *SuperSimples* on our outcome variable.

To implement the MDID method proposed by Heckman, Ichimura and Todd (1997), we construct a set of weights, denoted by ω_{ij}, to balance a series of features of the data at the same time. First, treated and non-treated will have the same distribution of unobservables and observables. Second, both groups are placed in a common environment by assuming common support. Then, we can remove systematic differences in the evaluation outcome between treated and non-treated.

Given the nature of the panel of the PME, we build the MDID estimator described in Blundell and Dias (2009),

$$\hat{\alpha}^{MDID} = \frac{1}{N_1} \sum_{i \in D_1} \left[(Y_{iA} - Y_{iB}) - \sum_{j \in D_0} \omega_{ij} (Y_{jA} - Y_{jB}) \right], \tag{1}$$

where ω_{ij} are the weights that need to be estimated, N_1 (N_0) is the total number of individuals in the treated (non-treated) group, and D_1 (D_0) is the set of treated (non-treated) groups. Subscripts B and A refer to $T_i = 0$ and $T_i = 1$, respectively.

To construct the relevant weights, ω_{ij}, we estimate the propensity score parametrically through a logit specification with the observables from the balancing test. Using the estimated propensity scores, we implement a kernel-matching method. We construct a neighborhood for each treated observation using a kernel-weighted average over multiple individuals in the non-treated group. A positive weight is assigned to all observations within the neighborhood, and 0 otherwise. We follow the same procedure for the time of the policy. Then, we have the necessary elements to construct a matched sample. Figure B.2 in Appendix B.1 shows the two propensity-score distributions for the whole sample pre and post the kernel-matching procedure, where we impose the common-support assumption and keep only those observations on the overlapped region after the matching process.

Furthermore, we implement the MDID by running the following two regressions on the sample of treated and non-treated observations. First, we consider the model for men and women, controlling for marital status. Let $Y_{it} \equiv P(IF_{it} = 1 | ms_{it})$; then,

$$Y_{it} = \beta + \alpha_1 T_t + \alpha_2 D_{it} + \alpha_3 T_t \times D_{it} + \alpha_4 \boldsymbol{X}_{it} + \gamma_{it} + u_{it}, \tag{2}$$

where ms_{it}, T_t, and D_{it} are dummies that correspond to the marital status, time of policy, and the treatment group, respectively. $\boldsymbol{X}_{it}$ is a vector of characteristics of the individual (demographics, employment, and education) to correct for differences in observables, and γ_{it} corresponds to an individual fixed-effect regarding the sector of activity. The main coefficient of interest corresponds to α_3, which provides the policy effect of *SuperSimples* on the transition probability from the informal to formal sector for each subsample of interest.

We run a second specification for married individuals, aiming to analyze the different responses to *SuperSimples* conditional on the initial sorting of the household into the labor market sectors. In this specification, we interact the policy effect with the labor status of the spouse in periods t_0 and t_1. Let $Y_{it}^H \equiv P(IF_{it} = 1 | ms_{it} = 1)$; then,

$$Y_{it}^H = \beta + \alpha_1 T_t + \alpha_2 D_{it} + \alpha_3 T_t \times D_{it} + \alpha_4 \boldsymbol{X}_{it} + \alpha_5 L_{it}^{SP} + \alpha_6 T_t \times D_{it} \times L_{it}^{SP} + \gamma_{it} + u_{it}, \tag{3}$$

Table 2: Matching Difference-in-Differences: Policy-Effect Coefficient

	All Singles	Single Women	Single Men	All Married	Married Women	Married Men
Policy Impact	0.0045	0.0077*	0.0033	0.0042*	0.0087**	-0.0009
Mean Pr(I→F)	0.077	0.0727	0.0803	0.133	0.11	0.146

Notes: Baseline case: Non-treated group. "Policy Impact" equals $T_t \times D_{it}$. "Mean Pr(I $\rightarrow$ F)" equals $\bar{Y}$.

where L_{it}^{SP} denotes a categorical variable with the labor market status (unemployed, formal, or informal) at t_0 and t_1. The vector $\boldsymbol{X}_{it}$ in this specification also includes characteristics of the spouse (education, employment, and income). The main coefficient of interest corresponds to α_6, which provides the policy effect of *SuperSimples* on the transition probability from the informal to formal sector for married individuals conditional on their spouse's behavior in the labor market. Finally, for both specifications, standard errors are clustered by region.

4.3 Empirical Results

This section presents the impact of *SuperSimples* on the transition probability of informal workers to the formal sector. We demonstrate that a dependence exists between the responses of a household to the introduction of the policy and their initial sorting into the labor market sectors. The results in the following subsections correspond to the MDID specifications in (2) and (3).[19]

4.3.1 Impact of SuperSimples among Singles

Table C.11 presents the main estimates of the impact of *SuperSimples* on single individuals, which we summarize in Table 2. In this case, the comparison group is those who are non-treated. Because the main goal of *SuperSimples* is to promote the formalization of informal workers and firms, we would expect a positive impact of the policy for those who are in the informal sector.

Overall, for all singles, the policy impact is not statistically significant. Considering that the policy might affect men and women differently, we find that for single women, the policy had a positive effect on their transition from the informal to the formal sector, which is statistically significant at 10%. Single women who work in a sector of activity eligible for *SuperSimples* have a higher probability of switching to the formal sector than those who are part of a non-treated activity. However, the contribution represents a change of 10 % (or 0.77 percentage points) of the transition to the formal sector with respect to the data mean for this subsample (7.27%). Finally, for single men, the policy effect is not statistically significant.

[19] All estimates are presented in Tables C.11 - C.13 in Appendix C.5 for four different models that vary on the observables characteristics that are included. This section discusses the results of specification 4 (fourth column), which includes all controls (demographic, human capital, and spouse's characteristics) and fixed effects for the sector of activity.

Table 3: Matching Difference-in-Differences:
Potential Household Status According to Direction of Policy Impact

	Potential Household Status						
	Married Men				Married Women		
(+)	F-U	F-F	F-I	(+)	U-F	F-F	I-F
(-)	I-U	I-F	I-I	(-)	U-I	F-I	I-I
I-U	-0.0239***	-0.0250***	0.1826***	U-I	-0.0128***	-0.0244**	0.0421**
I-F	0.0709***	baseline	-0.0065	F-I	0.0132	baseline	-0.0252***
I-I	-0.0009	0.3181***	-0.0826***	I-I	-0.0301**	0.2234***	-0.0672***

Note: Baseline case: Individual with a spouse in the formal sector for both periods. Clustered standard errors in parentheses. $***p < 0.01, **p < 0.05, *p < 0.1$. Notation: F = Formal, I = Informal, and U = Unemployed. The first letter in each pair of the household member's labor market status corresponds to the husband, and the second letter to the wife.

4.3.2 Impact of SuperSimples among Married

Table 2 also shows the estimates of the policy impact for married individuals without controlling for household structure. The comparison group remains as those who are non-treated.

For all married individuals, *SuperSimples* has a positive impact (statistically significant at 10%), which represents an impact on the mean transition (13.3%) of this subsample of just 3.2% (or 0.42 percentage points). If we control by gender, we find the change in mobility is driven by the behavior exhibited by married women with a statistically significant coefficient at 5%. For married women, we find the effect of the policy contributes 8% (0.87 percentage points) to their mean transition to the formal sector (11%). Married men do not exhibit a statistically significant policy impact.

So far, we found the introduction of *SuperSimples* resulted in a positive impact for both single and married women. However, different household structures might respond differently to the policy. To disentangle these responses, we run the MDID using specification (3). For this specification, we choose individuals whose spouses remain in the formal sector in both periods as the comparison group. The relevant coefficient in this specification is α_6, for which we measure the policy impact for different household structures.

For notation ease, for married couples, we present their joint labor market status as a pair and assume the first letter is for the husband and the second for the wife; for example, I-U translates to the husband being employed in the informal sector and the wife being unemployed. We find evidence of the dependence between the responses to the policy and the household's initial sorting in the labor market sectors. We illustrate this dependence in Table 3 by presenting the potential household status after the introduction of the policy. Each cell of the matrix presents the policy-

impact coefficient of the MDID by household labor market states. Each row on the left side (I-U, I-F, I-I for married men and U-I, F-I, I-I for married women) shows the initial sorting of the household into the labor market in t_0. The top rows show the potential outcome in t_1 according to the direction of the policy effect: positive (+) or negative (-). We use the term "worker-searcher" household when only one spouse is employed and the term "joint-employed" household if both spouses are employed.

Recall that the outcome of interest is the transition of informal workers to the formal sector; hence, the initial labor market status of the married men or women is being employed in the informal sector. Therefore, three possible household sorting cases exist in the labor market: informal-unemployed (I-U), informal-formal (I-F), and informal-informal (I-I). According to these initial household structures, we find mixed impacts of the policy; that is, the MDID coefficient might be positive or negative.

For households with only one employed spouse (worker-searcher household), the couple sorts across sectors seeking insurance in the formal sector.[20] For example, the policy has a negative impact (a coefficient of -0.0244) on married women whose husbands find a job in the formal sector after the policy; this impact represents a decline of 31% of their mean transition to the formal sector (8%). However, the policy has a positive impact (a coefficient of 0.0421), representing an increase of 30% of their mean transition to the formal sector (14%). Married men mirror the same policy impacts. In either case, the potential household status is a joint-employed state but across sectors, that is, I-F or F-I.

For households with both spouses employed (a joint-employed household), the couple sort into the same sector after the policy is introduced. For example, for a household in which both are employed in the informal sector (I-I), the policy has a positive impact when both spouses sort into the formal sector (F-F) after the policy. For married women and men, the impact on the mean transition (33% and 49%, respectively) to the formal sector represents an increase of 66% and 64% after the policy. If the switch is not done jointly, the policy impact is negative, and the household remains I-I. Intuitively, those households in which both spouses are in the informal sector and switch after the policy is introduced have a taste for formality and are involuntarily in the informal sector awaiting a formal job offer to come their way.

Lastly, the policy negatively affects married women who initially are in a household sorted across sectors becoming a I-I household. This finding suggests they place a high value on the benefits from the informal sector and might find a job in this sector that offsets the formal ben-

[20] A household is said to seek insurance in the formal sector when one spouse works in the formal sector, and the other spouse is unemployed or employed in the informal sector. This behavior allows the household members to take advantage of the formal-sector benefits by collecting unemployment insurance, severance payment, Social Security, and health insurance that they otherwise would not have (see Perry et al. (2007) and Galiani and Weinschelbaum (2012)).

efits; that is, they voluntarily choose to be in the informal sector.[21] Note that in some cases, the household is negatively impacted by the policy, suggesting scope remains for improvement of the policy design.

Given the dependence between the spouses' labor-supply decisions, we perform a specification test for the correlation value equal to 0. If this correlation is positive, households behave as risk-averse agents. Denote L_1 and L_2 as the labor market decision of the husband and wife, and $corr(L_1, L_2)$, the correlation between these two variables. In this case, the null hypotheses is $H_0 : corr(L_1, L_2) = 0$ (alternative, $H_1 : corr(L_1, L_2) \neq 0$). From the data, we calculate the correlation value by time of policy with: $corr_B(L_1, L_2) = 0.1453$ (before) and $corr_A(L_1, L_2) = 0.1637$ (after). The resulting p-value for both cases is smaller than 0.0001; hence, we reject the null hypothesis at a significance level of 1% and conclude the correlation between labor market decisions of the spouses is statistically significant and different from zero.

We provide evidence that a dependence exists between the impact of the policy and the household initial sorting into the labor market. Given this dependence, we need a framework to control for the endogenous sorting of the household into different labor market sectors and the reasoning behind their behavior through the analysis of their labor market dynamics. Besides determining the changes in the formality rates, by studying the household inflows and outflows of the labor market, we tease out the within-household motivations to switch or not to the formal sector. In addition, the evidence also suggests through the correlation between labor market statuses of married couples the need to model risk-averse households in our framework.

Therefore, we develop a household search model with a formal and informal sector, which allows us to model the household's endogenous sorting and labor dynamics. We use a partial-equilibrium model in which we embed the treatment component into the model to take advantage of the exogenous shift of the policy to later recover possible labor-demand effects on the sector composition of the labor market.

[21] The behavior exhibited by households is in line with the results presented by Samaniego de la Parra (2017) regarding the household's labor supply and their response to random inspections of the government to informal firms in Mexico. Note the policies are different. In her case, the informal sector's penalty increases, leading to more jobs in the formal sector but with higher hiring costs and a negative effect in wages or the destruction of jobs by closing establishments that cannot transition to the formal sector. Instead, in our case, labor costs are reduced, leading to more available jobs in the formal sector without an increment of hiring costs, which translates to positive effects on formal wages. Either way, we find similar responses of the household labor supply.

5 Household Search Model with Formal and Informal Sector

The theoretical framework in this section consists of a household search model with two sectors (formal and informal) in a frictional labor market. This framework builds on previous literature regarding search models for developing countries in the presence of informality (see Meghir, Narita and Robin (2015) and Bobba et al. (2021)). We combine this framework with that of household search where the joint decision of labor market choices are taken at the household level (see Conti, Ginja and Narita (2018) and Fang and Shephard (2019)). Under these two frameworks, we can develop a model for an economy with individuals searching for jobs in the formal or informal sector but having married couples taking into account their spouse's labor market decisions. Finally, to study the impact of formalization policies on these labor markets, we include a treatment component in the model.

Environment. The economy consists of married couple households and single-individual households with a population of size $N = N_S + N_M$ and $J = J_S + J_M$. (N = males, J = females, S = single, M = married). The model is stationary and set in continuous time, where all households live infinitely and discount the future at the common rate $r > 0$. For married-couple households, we assume a unitary model of the household with pooled income to purchase a public good, and the household maximizes a common utility function.[22] Workers are heterogeneous in their observable characteristics, marital status and gender, and their unobserved value of leisure, which is an individual-specific component.

Workers randomly search for jobs in the formal (F) and informal (I) sector for the possibility of employment[23] and assume every job offer, if accepted, is a full-time position. No search cost is incurred. Workers are allowed to search on the job. For tractability reasons, we restrict on-the-job search to be only across sectors (and not within); therefore, a job-to-job switch occurs only between the formal and informal sectors. This model considers the exogenous variation from the policy we are interested in and defines treatment according to the firm's sector of activity. Besides, job offers in this setting are going to be sector and treatment specific, namely, formal-treated (FT), formal-non-treated (FNT), informal-treated (IT), and informal-non-treated (INT).

On the one hand, married-couple households can be in four possible general household states:

[22] The unitary model of the household is an assumption common in the household search literature as in Dey and Flinn (2008), Flabbi and Mabli (2018), and Fang and Shephard (2019).

[23] We abstract from modeling the intensive margin where offers include the number of hours of the job as in Flabbi and Mabli (2018). In this case, the authors discretize the intensive-margin decision into part-time and full-time job offers. In our case, we assume workers only receive full-time offers; however, modeling hours within our framework is an avenue for future research. Because the informal sector allows any amount of hours to be reported, distribution characterized by high dispersion and part-time and full-time discretization is not a suitable approach for our framework. Instead, a possible path to follow is the one presented by Iskhakov and Keane (2021), in which the choice of hours is restricted to six discrete levels using a k-median clustering algorithm with six clusters, providing a better fit to the observed distribution of hours.

joint employment (denoted by EE, which describes the husband-wife labor market state, respectively), worker-searcher (UE, EU), and joint unemployment (UU).[24] By contrast, single-headed households can only be employed (E) or unemployed (U). For both types of households, a member can be employed in either of the four sector-treatment jobs, that is, E = {FNT, FT, INT, IT}.

The model uses the following notation. Married couples with two members in the household are indexed by $k \in \{1, 2\}$, where 1 is the husband and 2 is the wife. For singles, we abstract from any indexing, because the model applies equally to men and women. Let the value of leisure, sector, and treatment be denoted by b_k, s_k, and d_k, respectively. Denote the spouse's characteristics, such as labor market status and wages, by z_{-k}. For single individuals, we assume $z_{-k} = 0$. Job offers are characterized by a wage rate w_k, a sector s_k, and treatment d_k and are sampled from the conditional distribution denoted by $G(w_k|s_k, d_k; z_{-k})$. Bold variables represent vectors with both the husband's and wife's information. Finally, ρ denotes a scaled-discount rate.

Labor market shocks and treatment. Single and married individuals face three potential labor market shocks. First, unemployed individuals sequentially sample job offers from $G(w_k|s_k, d_k; z_{-k})$. They receive job offers w_k from sector s_k according to a Poisson process with parameter $\lambda_U(s_k|z_{-k})$. Conditional on sector s_k and spouse's characteristics z_{-k}, the offer arrives from a firm with treatment d_k with probability $P(s_k, d_k|z_{-k})$. Therefore, while unemployed, sector-treatment jobs arrive at the following rate:

$$\lambda_U(s_k, d_k|z_{-k}) = P(s_k, d_k|z_{-k}) \times \lambda_U(s_k|z_{-k}), \tag{4}$$

Second, employed individuals are allowed to search on the job and sequentially sample job offers from $G(w'_k|s'_k, d'_k; z_{-k})$, where they only search for jobs in the opposite sector. Conditional on the current sector s_k, job offers w'_k from opposite sector s'_k follow a Poisson process with parameter $\lambda_E(s'_k|s_k; z_{-k})$. Conditional on sector s'_k and the spouse's characteristics z_{-k}, the offer arrives from a firm with treatment d'_k with probability $P(s'_k, d'_k|z_{-k})$. Therefore, while employed and searching on the job, sector-treatment offers arrive at the following rate:

$$\lambda_E(s'_k, d'_k|s_k; z_{-k}) = P(s'_k, d'_k|z_{-k}) \times \lambda_E(s'_k|s_k; z_{-k}). \tag{5}$$

Note the treatment is attached to the offer and is not a choice that the individual faces. Incorporating treatment into the model becomes relevant for the identification and estimation of the structural parameters. To this end, those who are employed in a job that is part of the treatment pool will face changes in income taxes, Social Security contributions, conditional wage distributions, and arrival rates of job offers for all $d_k = 1$.

[24] In the model, we continue to use the same notation regarding the joint-household labor status, where the first letter corresponds to the husband and the second to the wife. Hence, UE means the husband is unemployed and the wife is employed.

Upon receiving an offer, the worker decides to accept or reject it. For married couples, the decision is taken considering the labor market position of their spouse. If an offer is accepted, workers face the risk of being separated from their jobs in two ways. First, exogenous job destruction is allowed at rate $\delta(s_k, d_k|z_{-k})$. Second, workers may decide to endogenously quit following their spouse's labor market status. As Flabbi and Mabli (2018) explain the reservation value of one spouse depends on the labor market status and wage of the other spouse, allowing for endogenous quits to occur as they re-optimize.

Formal sector benefits and costs. The main difference between the formal and informal sectors in the model is the worker's taxes and the benefits received when separated from their jobs. A worker in the formal sector pays payroll taxes (τ), including income taxes and Social Security contributions. Workers who exit employment can collect unemployment insurance (UI) and severance pay (η).[25] We denote these benefits as follows:

$$B(w_k, s_k) = \begin{cases} (UI + \eta) \times (1 - \tau) \times w_k & \text{if } s_k = F \text{ (Formal)} \\ 0 & \text{if } s_k = I \text{ (Informal).} \end{cases} \tag{6}$$

Finally, if workers are part of the informal sector, they do not pay taxes, but they cannot collect benefits.

Preferences. The instantaneous utility function is defined at the household level and assumed to be strictly increasing, concave, and smooth. We assume a unitary model of the household with a constant relative risk aversion (CRRA) utility:

$$u(\boldsymbol{w}; \boldsymbol{b}) = \begin{cases} b_1 + b_2 & \text{if Joint-Unemployed} \\ \frac{\widetilde{w_k}^{1-\psi} - 1}{1-\psi} + b_{-k} & \text{if Worker-Searcher} \\ \frac{(\widetilde{w_1} + \widetilde{w_2})^{1-\psi} - 1}{1-\psi} & \text{if Joint-Employed,} \end{cases} \tag{7}$$

where ψ is the coefficient of risk aversion and $\psi \neq 1$. After-tax income is denoted as $\widetilde{w_k} = (1 - \tau) \times w_k$. This economy has no savings or borrowing technology and all households consume their after-tax total family earnings, that is, $c = \widetilde{w_1} + \widetilde{w_2}$. As stated by Guler, Guvenen and Violante (2012), in the presence of CRRA preferences, married couples are less concerned about smoothing consumption as household resources increase, which allows them to be pickier while searching for a job.

[25] Given the differences in legislation between sectors, the effect of the formal-sector benefits on the labor market composition and the aggregate economy has been of great interest in the literature. For example, Bardey, Jaramillo and Peña (2015) analyzes the effect of unemployment insurance benefits on an unemployed worker's effort to find a job in the formal sector, resulting in an impact on the labor market composition. Figueiredo and Francis (2018) study the formal-informal sectors and the role of severance payment during recessions and the subsequent recovery time.

5.1 Singles Value Functions

The value functions that describe the single-household labor market follow from the labor-supply description in Meghir, Narita and Robin (2015) with the difference that we restrict on-the-job search to be only across sectors and include treatment in our framework. A single individual's possible labor market states are: unemployed, employed formal sector in a treated or non-treated firm, and employed in the informal sector in a treated or non-treated firm. The following value functions describe the optimal behavior of a single individual, either a man or woman.

Letting $V_U(b)$ be the value of being unemployed for a parameter of value of leisure b, the equation is given by

$$\rho_U(s,d)V_U(b) = u(b) + \sum_{d\in D}\sum_{s\in S}\lambda_U(s,d)\int_{\underline{w}}^{\overline{w}} \max\{V_E(w,s,d), V_U(b)\}dG(w|s,d), \tag{8}$$

where $\rho_U(s,d) \equiv r + \sum_{d\in D}\sum_{s\in S}\lambda_U(s,d)$. In this case, a single individual exits unemployment if they receive an offer w^* from sector s and treatment d, such that w^* equals or exceeds the reservation value while employed, that is, $V_U(b) \leq V_E(w^*,s,d)$.

For an employed worker in sector s, treatment d, and earning wage w, the value of being employed denoted as $V_E(w,s,d)$ is given by

$$\begin{aligned}\rho_E(s,d)V_E(w,s,d) = u(w) + \delta(s,d)\times[V_U(b) + B(w,s)] \\ + \sum_{d'\in D}\lambda_E(s',d'|s)\int_{\underline{w}}^{\overline{w}} \max\{V_E(w',s',d'), V_E(w,s,d)\}dG(w'|s',d'),\end{aligned} \tag{9}$$

where $\rho_E(s,d) \equiv r + \delta(s,d) + \sum_{d'\in D}\lambda_E(s',d'|s)$. In this case, a single individual exits the current employment state and becomes unemployed if laid off at rate $\delta(s,d)$. Those who are laid off from the formal sector are entitled to compensation benefits $B(w,s) > 0$, and those in the informal sector receive $B(w,s) = 0$. The worker also exits the current employment state when they receive an offer w' while searching on the job from sector s' and treatment d', such that w' is high enough that it exceeds the current value of employment, that is, $V_E(w,s,d) < V_E(w',s',d')$. Recall that $s \neq s'$; for example, if employed in the formal sector, a job-to-job switch only occurs towards the informal sector.

5.2 Married-Couples Value Functions

The value functions that describe the labor market for married-couples households build on the labor-supply framework from Fang and Shephard (2019). As described above, four possible

general household states exist: joint employment (EE), worker-searcher (UE, EU), and joint unemployment (UU). However, because the model allows four different sector-treatment cases (FNT, FT, INT, IT), household states increase. We discuss all possible household states in the following subsections. Given that both household members are allowed to search for a job in the labor market, we assume job offers are received sequentially for each spouse to avoid multiple equilibria that commonly arise in the context of simultaneous-move games.[26]

Let $V_{UU}(\boldsymbol{b})$ be the value of the household when both members are unemployed and let $\boldsymbol{b} = (b_1, b_2)$ the vector of the value of leisure for the spouses. Let $V_{EU}(w_1, b_2, s_1, d_1)$ be the value of the household when the husband is employed at wage w_1 in sector s_1 and treatment d_1 with an unemployed wife with value of leisure b_2; and let $V_{UE}(b_1, w_2, s_2, d_2)$ be the value of the household when the wife is employed at wage w_2 in sector s_2 and treatment d_2 with an unemployed husband with value of leisure b_1. Finally, let $V_{EE}(\boldsymbol{w}, \boldsymbol{s}, \boldsymbol{d})$ be the value of the household when both members are employed at wages $\boldsymbol{w} = (w_1, w_2)$, in sectors $\boldsymbol{s} = (s_1, s_2)$, and treatment $\boldsymbol{d} = (d_1, d_2)$.

5.2.1 Joint-Unemployed Household

In a joint-unemployed household, both spouses are searching for a job in the labor market, either in the formal or informal sector. In addition, we assume that for households to become joint-employed, they must go through the worker-searcher state first. Then, the equation for the value function, $V_{UU}(\boldsymbol{b})$, is given by

$$\begin{aligned}\rho_{UU}(\boldsymbol{s}, \boldsymbol{d}; \boldsymbol{z}) V_{UU}(\boldsymbol{b}) = u(\boldsymbol{b}) &+ \underbrace{\sum_{d_1 \in D} \sum_{s_1 \in S} \lambda_U(s_1, d_1 | z_2) \int_{\underline{w}_1}^{\overline{w}_1} \max\{V_{EU}(w_1, b_2, s_1, d_1), V_{UU}(\boldsymbol{b})\} dG(w_1 | s_1, d_1; z_2)}_{\text{Husband receives an offer (FNT, FT, INT, IT) - Wife Unemployed}} \\ &+ \underbrace{\sum_{d_2 \in D} \sum_{s_2 \in S} \lambda_U(s_2, d_2 | z_1) \int_{\underline{w}_2}^{\overline{w}_2} \max\{V_{UE}(b_1, w_2, s_2, d_2), V_{UU}(\boldsymbol{b})\} dG(w_2 | s_2, d_2; z_1)}_{\text{Wife receives an offer (FNT, FT, INT, IT) - Husband Unemployed}},\end{aligned} \tag{10}$$

where $\rho_{UU}(\boldsymbol{s}, \boldsymbol{d}; \boldsymbol{z}) \equiv r + \sum_{d_1 \in D} \sum_{s_1 \in S} \lambda_U(s_1, d_1 | z_2) + \sum_{d_2 \in D} \sum_{s_2 \in S} \lambda_U(s_2, d_2 | z_1)$. In this household state, the following events may happen. On the one hand, the husband receives a job offer, w_1^*, at rate $\lambda_U(s_1, d_1 | z_2)$. This offer is accepted if $V_{UU}(\boldsymbol{b}) \leq V_{EU}(w_1^*, b_2, s_1, d_1)$. On the other hand, the wife receives a job offer, w_2^*, at rate $\lambda_U(s_2, d_2 | z_1)$. This offer is accepted if $V_{UU}(\boldsymbol{b}) \leq V_{EU}(b_1, w_2^*, s_2, d_2)$. Otherwise, the married couple stays in joint-unemployment. Note the optimal decision rule when

[26] For example, suppose a household is in a joint-unemployed state and both of the spouses receive an offer at the same moment in time t; then, at least two Nash equilibria exist: (i) The husband accepts the offer and the wife rejects it; or (ii) The husband rejects the offer and the wife accepts it (see Dey and Flinn (2008)).

both spouses are currently unemployed is given by the indifference condition:

$$V_{EU}(w^*, b_2, s_1, d_1) = V_{UU}(\boldsymbol{b}) = V_{EU}(b_1, w^*, s_2, d_2), \tag{11}$$

where w^* is the minimal wage accepted by spouse k to optimally exit unemployment reaching a worker-searcher state.

5.2.2 Worker-Searcher Household

A worker-searcher household has an employed and an unemployed spouse. Both cases, EU (husband employed and wife unemployed) and UE (wife employed and husband unemployed), are symmetric; therefore, we only discuss the case in which the husband is employed and the wife is searching for a job. According to the job's sector and treatment, when the husband is employed, we have four possible household states: FNT-U, FT-U, INT-U, and IT-U. The value function for the worker-searcher case when the husband is employed in sector s_1, treatment d_1, and is earning wage w_1 with a wife whose value of leisure is b_2 is given by

$$\begin{aligned}
\rho_{EU}(\boldsymbol{s}, \boldsymbol{d}; \boldsymbol{z}) V_{EU}(w_1, b_2, s_1, d_1) &= u(w_1, b_2) + \delta(s_1, d_1|z_2) \times [V_{UU}(\boldsymbol{b}) + B(w_1, s_1)] \\
&+ \underbrace{\sum_{d_1' \in D} \lambda_E(s_1', d_1'|s_1; z_2) \int_{\underline{w}_1}^{\overline{w}_1} \max\{V_{EU}(w_1', b_2, s_1', d_1'), V_{EU}(w_1, b_2, s_1, d_1)\} dG(w_1'|s_1', d_1'; z_2)}_{\text{Husband receives an offer from the opposite sector - Wife Unemployed}} \\
&+ \underbrace{\sum_{d_2 \in D} \sum_{s_2 \in S} \lambda_U(s_2, d_2|z_1) \int_{\underline{w}_2}^{\overline{w}_2} \max\{V_{EE}(\boldsymbol{w}, \boldsymbol{s}, \boldsymbol{d}), V_{UE}(b_1, w_2, s_2, d_2), V_{EU}(w_1, b_2, s_1, d_1)\} dG(w_2|s_2, d_2; z_1)}_{\text{Wife receives an offer (FNT, FT, INT, IT) - Husband remains employed in sector } s_1 \text{ or quits}},
\end{aligned} \tag{12}$$

where $\rho_{EU}(\boldsymbol{s}, \boldsymbol{d}; \boldsymbol{z}) \equiv r + \delta(s_1, d_1|z_2) + \sum_{d_1' \in D} \lambda_E(s_1', d_1'|s_1; z_2) + \sum_{d_2 \in D} \sum_{s_2 \in S} \lambda_U(s_2, d_2|z_1)$.

The following events can occur. First, the husband is laid off of his current job at rate $\delta(s_1, d_1|z_2)$. Those who lose their job from the formal sector can collect the compensation benefits $B(w_1, s_1) > 0$, whereas those in the informal sector collect $B(w_1, s_1) = 0$. Second, the husband, while searching on the job, receives an offer w_1' from the opposite sector s_1' and treatment d_1' at rate $\lambda_E(s_1', d_1'|s_1; z_2)$. If the offer w_1' is high enough that it exceeds the current value of employment, such that $V_{EU}(w_1, b_2, s_1, d_1) < V_{EU}(w_1', b_2, s_1', d_1')$, the husband accepts the offer and continues in a worker-searcher state at a higher value at a job in the opposite sector. If the offer is rejected, the household stays in the current state.

Lastly, the unemployed wife receives a job offer w_2 at rate $\lambda_U(s_2, d_2|z_1)$. This case induces three choices from which the household optimally decides. If either of the following conditions holds, the wife accepts the job and becomes employed: $V_{EE}(\boldsymbol{w}, \boldsymbol{s}, \boldsymbol{d}) > V_{EU}(w_1, b_2, s_1, d_1)$

or $V_{UE}(b_1, w_2, s_2, d_2) > V_{EU}(w_1, b_2, s_1, d_1)$. Conditional on the wife accepting the job offer, the household must decide if the husband remains at his current job and continues earning w_1 or if the wife's wage is high enough to induce the husband to quit and search for another job. Endogenous quits occur when $V_{UE}(b_1, w_2, s_2, d_2) > V_{EE}(\boldsymbol{w}, \boldsymbol{s}, \boldsymbol{d})$. An endogenous quit is possible given that the employed husband's reservation utility (or value) might increase due to its dependence on the other spouse's labor market state. Note these additional dynamics are not present under a single-agent framework but are necessary when studying household behavior.

As described by Guler, Guvenen and Violante (2012), for every w_1, let $w_2^+(w_1)$ be the lowest wage offered to the wife such that the couple weakly prefers being jointly employed: $V_{EE}(w_1, w_2^+(w_1), \boldsymbol{s}, \boldsymbol{d}) = V_{EU}(w_1, b_2, s_1, d_1)$. Now, let $w_2^-(w_1)$ be the lowest wage offered to the wife such that an endogenous quit occurs and only the wife remains employed: $V_{UE}(b_1, w_2^-(w_1), s_2, d_2) = V_{EU}(w_1, b_2, s_1, d_1)$. Therefore, the reservation wage function for the wife to accept or reject an offer is given by

$$w_2^R(w_1) \equiv \min\{w_2^-(w_1), w_2^+(w_1)\}. \tag{13}$$

Given that the husband quitting also depends on the wife's accepted offer, we must define the highest value of w_1, denoted as $w_1^*(w_2)$, such that the worker-searcher case in which the wife is employed is weakly preferred to joint employment. The indifference condition is given by

$$V_{UE}(b_1, w_2, s_2, d_2) = V_{EE}(w_1^*(w_2), w_2, \boldsymbol{s}, \boldsymbol{d}). \tag{14}$$

For completeness, we include the value function for the worker-searcher case when the wife is the single-earner. The events described above apply to this case as well, but for the opposite spouse. According to the job's sector and treatment, when the wife is employed, we have four possible household states: U-FNT, U-FT, U-INT, and U-IT. The value function is given by

$$\begin{aligned}
&\rho_{UE}(\boldsymbol{s}, \boldsymbol{d}; \boldsymbol{z}) V_{UE}(b_1, w_2, s_2, d_2) = u(b_1, w_2) + \delta(s_2, d_2|z_1) \times [V_{UU}(\boldsymbol{b}) + B(w_2, s_2)] \\
&+ \underbrace{\sum_{d_1 \in D} \sum_{s_1 \in S} \lambda_U(s_1, d_1|z_2) \int_{\underline{w}_1}^{\overline{w}_1} \max\{V_{EE}(\boldsymbol{w}, \boldsymbol{s}, \boldsymbol{d}), V_{EU}(w_1, b_2, s_1, d_1), V_{UE}(b_1, w_2, s_2, d_2)\} dG(w_1|s_1, d_1; z_2)}_{\text{Husband receives an offer (FNT, FT, INT, IT) - Wife remains employed in sector } s_2 \text{ or quits}} \\
&+ \underbrace{\sum_{d_2' \in D} \lambda_E(s_2', d_2'|s_2; z_1) \int_{\underline{w}_2}^{\overline{w}_2} \max\{V_{UE}(b_1, w_2', s_2', d_2'), V_{UE}(b_1, w_2, s_2, d_2)\} dG(w_2'|s_2', d_2'; z_1)}_{\text{Wife receives an offer from the opposite sector - Husband Unemployed}}
\end{aligned} \tag{15}$$

where $\rho_{UE}(\boldsymbol{s}, \boldsymbol{d}; \boldsymbol{z}) \equiv r + \delta(s_2, d_2|z_1) + \sum_{d_1 \in D} \sum_{s_1 \in S} \lambda_U(s_1, d_1|z_2) + \sum_{d_2' \in D} \lambda_E(s_2', d_2'|s_2; z_1)$.

5.2.3 Joint-Employed Household

In a joint-employed household, both spouses are employed in the labor market in a sector and treatment-specific job leading to the following possible household types. First, both individuals work in the same sector and treatment (FNT-FNT, FT-FT, INT-INT, or IT-IT). Second, they may work in the same sector but with different treatment (FNT-INT, FT-IT, INT-FNT, or IT-FT). Third, they may work in different sectors but the same treatment (FNT-INT, FT-IT, INT-FNT, or IT-FT). Lastly, they may work in different sectors and treatments (FNT-IT, FT-INT, INT-FT, or IT-FNT). We have a total of 16 joint-employed household states.

The value function for the joint-employed household when the husband is employed in sector s_1, treatment d_1, earning wage w_1 with a wife employed in sector s_2, treatment d_2, earning wage w_2 is given by

$$\begin{aligned}
&\rho_{EE}(\boldsymbol{s},\boldsymbol{d};\boldsymbol{z})V_{EE}(\boldsymbol{w},\boldsymbol{s},\boldsymbol{d}) = u(\boldsymbol{w}) \\
&+\delta(s_1,d_1|z_2)\times[V_{UE}(b_1,w_2,s_2,d_2)+B(w_1,s_1)]+\delta(s_2,d_2|z_1)\times[V_{EU}(w_1,b_2,s_1,d_1)+B(w_2,s_2)] \\
&+\underbrace{\sum_{d_1'\in D}\lambda_E(s_1',d_1'|s_1;z_2)\int_{\underline{w}_1}^{\overline{w}_1}\max\{V_{EE}(w_1',w_2,s_1',s_2,d_1',d_2),V_{EU}(w_1',b_2,s_1',d_1'),V_{EE}(\boldsymbol{w},\boldsymbol{s},\boldsymbol{d})\}dG(w_1'|s_1',d_1';z_2)}_{\text{Husband receives an offer from the opposite sector - Wife remains employed or quits}} \\
&+\underbrace{\sum_{d_2'\in D}\lambda_E(s_2',d_2'|s_2;z_1)\int_{\underline{w}_2}^{\overline{w}_2}\max\{V_{EE}(w_1,w_2',s_1,s_2',d_1,d_2'),V_{UE}(b_1,w_2',s_2',d_2'),V_{EE}(\boldsymbol{w},\boldsymbol{s},\boldsymbol{d})\}dG(w_2'|s_2',d_2';z_1)}_{\text{Wife receives an offer from the opposite sector - Husband remains employed or quits}},
\end{aligned} \tag{16}$$

where $\rho_{EE}(\boldsymbol{s},\boldsymbol{d};\boldsymbol{z}) \equiv r+\delta(s_1,d_1|z_2)+\delta(s_2,d_2|z_1)+\sum_{d_1'\in D}\lambda_E(s_1',d_1'|s_1;z_2)+\sum_{d_2'\in D}\lambda_E(s_2',d_2'|s_2;z_1)$.

The following events could potentially affect the value of a joint-employed household. First, the husband is laid off of his current job at rate $\delta(s_1,d_1|z_2)$ or the wife at rate $\delta(s_2,d_2|z_1)$. We restrict those joint-employed households to go through the worker-searcher state first before reaching joint unemployment. Those who lose their job from the formal sector can collect the compensation benefits $B(w_1,s_1)>0$ for the husband and $B(w_2,s_2)>0$ for the wife, whereas those in the informal sector do not collect any monetary compensation.

Second, while searching on the job, the husband receives an offer w_1' from the opposite sector s_1' and treatment d_1' at rate $\lambda_E(s_1',d_1'|s_1;z_2)$. If either of the following conditions hold, the husband accepts the offer and switches jobs: $V_{EE}(w_1',w_2,s_1',s_2,d_1',d_2) > V_{EE}(w_1,w_2,s_1,s_2,d_1,d_2)$ or $V_{EU}(w_1',b_2,s_1',d_1') > V_{EE}(w_1,w_2,s_1,s_2,d_1,d_2)$. Otherwise, the offer is rejected and the household remains in the same state. Conditional on the husband accepting the job offer, the household must decide if the wife remains at her current job and continues earning w_2 or if the

husband's wage is high enough to induce the wife to quit. An endogenous quit occurs when $V_{EU}(w_1', b_2, s_1', d_1') > V_{EE}(w_1, w_2, s_1, s_2, d_1, d_2)$. Note a similar indifference condition to (14) can be derived to determine the highest value of w_2, denoted as $w_2^*(w_1')$, such that the worker-searcher case in which the husband is employed is weakly preferred to joint employment. This indifference condition is given by

$$V_{EU}(w_1', b_2, s_1', d_1') = V_{EE}(w_1', w_2^*(w_1'), s_1', s_2, d_1', d_2), \tag{17}$$

Third, while searching on the job, the wife receives an offer w_2' from the opposite sector s_2' and treatment d_2' at rate $\lambda_E(s_2', d_2'|s_2; z_1)$. As in the previous case, symmetric conditions can be derived to decide if the new job offer w_2' is accepted or rejected. In addition, a similar expression for the indifference condition as in (17) can be derived to determine when an endogenous quit of the husband is optimal for the household.

6 Identification

Recall that *SuperSimples* aims to promote the formalization of micro and small firms in Brazil by combining the main taxes and Social Security contributions into one tax rate. For this reason, the policy impacts the following objects in the model: income taxes, Social Security contributions, conditional wage distributions, reservation wages, and the arrival rates of jobs offers; however, preferences do not change.

First, we assume knowledge of the monthly discount rate r (set to $r = 0.06/12$). Second, we set the taxation parameters and benefits of the formal sector. These rates are calculated using the sample means by the time of policy and treatment for the income taxes and Social Security contributions. In the case of unemployment insurance and severance payment, we do not control for either the time of the policy or the treatment. The rates used in the estimation of the structural model were previously calculated and shown in Table 1.

The remaining parameters of the model can be categorized into three groups. We add a subscript T for those components that are affected by the policy and must be estimated as separate objects. The first group of parameters comprise the mean (μ) and variance (σ) of the conditional wage distributions for singles $G_T(w|s, d; \mu, \sigma)$ and married couples $G_T(w_k|s_k, d_k; z_{-k}, \mu_k, \sigma_k)$. A second group of parameters compose by the arrival rates of jobs while unemployed and while searching on the job, for both singles and married: $\lambda_{U,T}(s, d), \lambda_{E,T}(s', d'|s), \lambda_{U,T}(s_k, d_k|z_{-k}), \lambda_{E,T}(s_k', d_k'|s_k; z_{-k})$; and the exogenous job-destruction rates: $\delta(s, d), \delta(s_k, d_k|z_{-k})$. A third group of parameters for preferences (value of leisure and risk aversion), which are not affected by the policy; therefore, they remain the same in both periods (before and after).

Conditional Wage-Offer Distribution Parameters. We assume a log-normal distribution for the sector-treatment wage-offer distributions, due to its recoverability property, which allows us to recover the wage-offer distribution using the accepted-wage distribution and the reservation wage as the truncation point (see Flinn and Heckman (1982)). The density is given by

$$g(w;\mu,\sigma) = \frac{1}{w} \times \frac{1}{\sigma\sqrt{2\pi}} exp\left(- \frac{(\ln(w)-\mu)^2}{2\sigma^2} \right) \tag{18}$$

and the cumulative density function,

$$G(w;\mu,\sigma) = \Phi\left(\frac{\ln(w)-\mu}{\sigma} \right), \tag{19}$$

where Φ is the cumulative distribution function of a standard normal, μ is the mean, and σ is the standard deviation. The truncation point of the distribution corresponds to the reservation wage, $w_T^R \equiv w_T^R(s_k, d_k; z_{-k})$, in each sector-treatment, which we set equal to the minimum of the observed wages from the sample controlling by marital status, gender, spouse's labor market state (if married), sector, treatment, and time of policy. We also use the maximum accepted wage from the sample for the upper bound of the support of each conditional wage distribution.

We need to identify the mean $\mu_T \equiv \mu_T(s_k, d_k; z_{-k})$ and standard deviation $\sigma_T \equiv \sigma_T(s_k, d_k; z_{-k})$ of the distributions for single and married men and women. Denote as θ_W^S the set of the wage-distribution parameters for single men and women and θ_W^M as the set of the wage-distribution parameters for married men and women.

Given the functional-form assumption of the wage-offer distribution, the wage-offer parameters are identified from the observed-wages information. Let g^A be the accepted-wages density with mean μ^A and σ^A, and let g be the offered-wages density with mean μ and σ. Then,

$$g_T^A(w|w \geq w_T^R; \mu_T^A, \sigma_T^A) = \frac{g_T(w_T; \mu_T, \sigma_T)}{1 - G_T(w_T^R; \mu_T, \sigma_T)}. \tag{20}$$

We can use the data sample's accepted-wage distribution, the reservation wage, w_T^R, and the parametric form of the distribution to recover the left side of (20). Given the assumed functional-form for the offered-wage distribution G_T and expression (20), we are able to identify $\theta_W = \{\theta_W^S, \theta_W^M\}$.

Mobility Parameters. To identify the arrival rates of job offers and exogenous job-destruction rates for both single and married men and women, we use the individual transition probabilities of labor market status conditional on observables, the offered wage distribution for which we have already identified its parameters, the reservation wages, and the probabilities of treatment conditional on sector (formal or informal). Recall from section 5 that for an unemployed individual, the arrival

rate of jobs is given by

$$\lambda_{U,T}(s_k, d_k|z_{-k}) = P_T(s_k, d_k|z_{-k}) \times \lambda_{U,T}(s_k|z_{-k}). \tag{21}$$

We take $P_T(s_k, d_k|z_{-k})$ directly from the data because it is the probability of being in treatment d_k conditional on being in sector s_k and spouse's characteristics z_{-k}. Denote the transition probability from unemployment to a sector-treatment job as $P[U \to (s_k, d_k)|z_{-k}]$, which is also recovered from the data. Note this probability can be decomposed using the probability of being treated conditional on sector; that is,

$$\begin{aligned} P[U \to (s_k, d_k)|z_{-k}] = P_T(s_k, d_k = 0|z_{-k}) \times P_T[U \to (s_k, d_k = 0)|z_{-k}] \\ + P_T(s_k, d_k = 1|z_{-k}) \times P_T[U \to (s_k, d_k = 1)|z_{-k}]. \end{aligned} \tag{22}$$

A similar decomposition can be done for the probability of accepting a job offer:

$$\begin{aligned} [1 - G_T(w_T^R|s_k, d_k; z_{-k})] = P_T(s_k, d_k = 0|z_{-k}) \times [1 - G_T(w_T^R|s_k, d_k = 0; z_{-k})] \\ + P_T(s_k, d_k = 1|z_{-k}) \times [1 - G_T(w_T^R|s_k, d_k = 1; z_{-k})]. \end{aligned} \tag{23}$$

Therefore, using (22) and (23), we can identify $\lambda_{U,T}(s_k|z_{-k})$ by the following expression:

$$\lambda_{U,T}(s_k|z_{-k}) = \frac{P_T[U \to (s_k, d_k)|z_{-k}]}{[1 - G_T(w_T^R|s_k, d_k; z_{-k})]}. \tag{24}$$

We follow a similar logic to identify the arrival rate of jobs while searching on the job. Recall that we restrict on-the-job search to be only across sectors; that is, $s_k \neq s'_k$. For an employed individual, the arrival rate of jobs is given by

$$\lambda_{E,T}(s'_k, d'_k|s_k; z_{-k}) = P_T(s'_k, d'_k|z_{-k}) \times \lambda_{E,T}(s'_k|s_k; z_{-k}). \tag{25}$$

Denote the transition probability from employment at wage w_k in sector s_k and treatment d_k to a sector-treatment (s'_k, d'_k) job as $P_T[(s_k, d_k) \to (s'_k, d'_k)|z_{-k}]$, which is calculated directly from the data. We decompose this probability using the probability of being treated conditional on sector; that is,

$$\begin{aligned} P_T[(s_k, d_k) \to (s'_k, d'_k)|z_{-k}] = P_T(s'_k, d'_k = 0|z_{-k}) \times P_T[(s_k, d_k) \to (s'_k, d_k = 0)|z_{-k}] \\ + P_T(s'_k, d'_k = 1|z_{-k}) \times P_T[(s_k, d_k) \to (s'_k, d_k = 1)|z_{-k}]. \end{aligned} \tag{26}$$

A similar decomposition can be done for the probability of accepting a job offer w'_k such that $w'_k \geq w_k$,

$$\begin{aligned} [1 - G_T(w'_k|s'_k, d'_k; z_{-k})] = P_T(s'_k, d'_k = 0|z_{-k}) \times [1 - G_T(w'_k|s'_k, d'_k = 0; z_{-k})] \\ + P_T(s'_k, d'_k = 1|z_{-k}) \times [1 - G_T(w'_k|s'_k, d'_k = 1; z_{-k})]. \end{aligned} \tag{27}$$

Hence, using (26) and (27), we can identify $\lambda_{E,T}(s'_k|s_k;z_{-k})$ by the following expression:

$$\lambda_{E,T}(s'_k|s_k;z_{-k}) = \frac{P_T[(s_k,d_k) \to (s'_k,d'_k)|z_{-k}]}{[1-G_T(w'_k|s'_k,d'_k;z_{-k})]}. \tag{28}$$

Finally, we need to identify the exogenous separation rates, for which we use the data transition from employment in sector s_k and treatment d_k to unemployment conditional on the spouse's characteristics, z_{-k}. That is,

$$\delta_T(s_k,d_k|z_{-k}) = P_T[(s_k,d_k) \to U|z_{-k}]. \tag{29}$$

Denote the set of mobility parameters for singles and married couples as $\theta_M = \{\theta_M^S, \theta_M^M\}$.

Preference Parameters. The preference parameters are the value of leisure and risk aversion. For single men and women, the preference parameters are gender specific. For married couples, the value of leisure is gender-specific; however, risk aversion is common for the household. We drop the time of policy index T because this set of parameters does not vary with the policy change.

We identify these parameters using two set of moments: (i) the steady-state proportion of singles (five possible labor market states) and households (25 household labor market states) and (ii) the labor-supply optimal decisions in two consecutive periods for the transition probabilities across sectors. These targeted moments are calculated for each sub-sample, controlling for the time of the policy. In particular, the addition of the informal sector to the model provides us with additional moments to identify risk aversion through the transition of workers across sectors while searching on the job. The left-hand side of the following expressions corresponds to the data moments. The right-hand side corresponds to the predicted moment estimated using the model. We denote the preference parameters for singles as θ_P^S and married couples as θ_P^M.

For singles, the steady-state proportions are denoted as, $u_T, e_{F,T}(d)$, and $e_{I,T}(d)$ for unemployment, employment in the formal sector and treatment d, and employment in the informal sector and treatment d for time of policy T, respectively. We denote the steady-state employment status in sector s and treatment d as $L_i(s,d;\theta_P^S)$, which equals 1 if individual i is employed in (s,d), and 0 otherwise. Then, the steady-state proportions for single men are given by

$$e_{F,T}(d) = \frac{\sum_{i=1}^{N_S} L_i(s=F,d;\theta_P^S)}{N_S} \quad \text{and} \quad e_{I,T}(d) = \frac{\sum_{i=1}^{N_S} L_i(s=I,d;\theta_P^S)}{N_S}, \tag{30}$$

where N_S is the population of single men. The unemployment rate can be calculated by $u_T = 1 - \sum_{d\in D} e_{F,T}(d) - \sum_{d\in D} e_{I,T}(d)$. We use the same procedure to calculate the steady-state proportion for single women with population J_S. The steady-state proportions allow us to pin down the value of leisure for single men and women. To pin down risk aversion for singles, we use the transition

probability across sector-treatment states (which is gender specific); that is,

$$P_T[(s,d) \to (s',d')] = \frac{\sum_{i=1}^{N_S} \mathbb{1}\{L_i(s,d;\theta_P^S) = 1 \quad \& \quad L_i(s',d';\theta_P^S) = 1\}}{\sum_{i=1}^{N_S} L_i(s,d;\theta_P^S)}, \tag{31}$$

where $s \neq s'$. This expression determines the proportion of workers employed in sector-treatment (s,d) and transitions to the opposite sector to either treatment (s',d'). The right-hand side depends only on the risk-aversion parameter because the single individual decides to transition by comparing two different values of being employed, values where the only parameter that remains unknown is risk aversion, ψ.

For the case of married couples, we identify the value of leisure separately for married men and women using the steady-state proportions for all household states (25 possible states in the labor market). Let the total number of households be $H = N_M + J_M$, and let the individual employment-status indicator be $L_1(s_1,d_1;z_2,\theta_P^M)$ for the husband and $L_2(s_2,d_2;z_1,\theta_P^M)$ for the wife. The steady-state proportions are denoted as $uu_T, eu_T(s_1,d_1), ue_T(s_{2,d}\,2), ee_T(\boldsymbol{s},\boldsymbol{d})$, for joint-unemployed, worker-searcher (husband employed), worker-searcher (wife employed), and joint-employed for the time of policy T. Then, for the worker-searcher cases, we have that the steady-state proportions are given by

$$eu_T(s_1,d_1) = \frac{\sum_{h=1}^{H} L_1^h(s_1,d_1;z_2=0,\theta_P^M)}{H} \quad \text{and} \quad ue_T(s_2,d_2) = \frac{\sum_{h=1}^{H} L_2^h(s_2,d_2;z_1=0,\theta_P^M)}{H}. \tag{32}$$

For households who are joint-employed, we have that the steady-state proportions are given by

$$ee_T(\boldsymbol{s},\boldsymbol{d}) = \frac{\sum_{h=1}^{H} \mathbb{1}\{L_1^h(s_1,d_1;z_2=1,\theta_P^M) = 1 \quad \& \quad L_2^h(s_2,d_2;z_1=1,\theta_P^M) = 1\}}{H}. \tag{33}$$

Hence, the remaining joint-unemployed proportion is recovered from

$$uu_T = 1 - \sum_{d_1 \in D} \sum_{s_1 \in S} eu_T(s_1,d_1) - \sum_{d_2 \in D} \sum_{s_2 \in S} ue_T(s_2,d_2) - \sum_{\boldsymbol{d} \in D} \sum_{\boldsymbol{s} \in S} ee_T(\boldsymbol{s},\boldsymbol{d}). \tag{34}$$

Finally, to identify risk aversion, we use the over-identifying restrictions of the transition probabilities across sectors for either treatment conditional on the spouse being employed in both periods, that is, a transition from a joint-employed status to another joint-employed status. In this case, the probability is also able to isolate the risk-aversion parameter. Consider the case in which the husband transitions to a new job in the opposite sector, but the wife remains employed instead of endogenously quitting. Then,

$$P_T^1[(s_1, d_1; z_2 = 1) \to (s_1', d_1'; z_2 = 1)] = \frac{\sum_{h=1}^{H} \mathbb{1}\{L_1^h(s_1, d_1; z_2 = 1, \theta_P^M) = 1 \;\&\; L_1^h(s_1', d_1'; z_2 = 1, \theta_P^M) = 1\}}{\sum_{h=1}^{H} L_1^h(s_1, d_1; z_2 = 1; \theta_P^M)}, \quad (35)$$

where $s \neq s'$. This expression determines the proportion of married men employed in sector-treatment (s, d) and transitions to the opposite sector to either treatment, (s', d') with a wife who remains employed. The right-hand side depends only on the risk-aversion parameter given that the household decides to transition by comparing two different values of being joint-employed, values for which the only parameter that remains unknown is the household risk aversion, ψ. A similar expression can be derived for married women.

Thus, we are able to identify all preference parameters, $\theta_P = \{\theta_P^S, \theta_P^M\}$. Our model is over-identified given that we have more moments than parameters. In sum, for the estimation, we only targeted the steady-state proportions and the transition probabilities from the informal sector to the formal sector (for either treatment), and we leave untargeted the remaining transition and job-finding rates. However, the model does a good job with the untargeted moments as well.

7 Estimation Method

We estimate the parameters of the model, $\theta = \{\theta_W, \theta_M, \theta_P\}$, using a multi-step method that mirrors the identification strategy in section 6. We use the generalized method of moments (GMM) to estimate the conditional wage-offer distributions and the preference parameters while non-parametrically estimating the mobility parameters. The multi-step estimation procedure goes as follows.

Our first step consists of the estimation of the conditional wage-offer-distribution parameters for which we use the mean and standard deviation of workers' accepted wages and the reservation wages (conditional on individual and household characteristics) to describe the wage information. In this step, we estimate $\theta_W = \{\theta_W^S, \theta_W^M\}$ using a GMM. Let h_w be the vector of moments and let x denote all the observables such that $h_w(x)$ are the empirical moments and $h_w(x, \theta_W)$ are the predicted moments from the model; both are vectors of size $M_w \times 1$. The empirical moments as well as the predicted moments include moments that are specific to the time of the policy, T. The

GMM estimator, $\hat{\theta}_W$, is given by

$$\hat{\theta}_W = \underset{\theta_W}{\operatorname{argmin}} \big[h_w(x, \theta_W) - h_w(x)\big]' W_w \big[h_w(x, \theta_W) - h_w(x)\big], \tag{36}$$

where W_w is a weighting matrix with dimensions $M_w \times M_w$; in this step, we use the identity matrix as weighting matrix.

For our second step, having estimated the wage parameters, $\hat{\theta}_W$, we proceed to non-parametrically estimate the mobility parameters, θ_M: the arrival rates of job offers while unemployed, the arrival rates of job offers while searching on the job, and job-destruction rates. These rates are specific by sector-treatment, gender, marital status, spouse's labor market status (if married), and time of policy. Recall from our identification strategy that we set the job-destruction rates equal to the employment exit rate for each sector-treatment (see equation (29)). With respect to the arrival rates of job offers, it suffices to know the conditional wage-offer distributions to recover the probability of accepting a job offer. If the individual is unemployed and searching for a job, we estimate the arrival rate of job offers while unemployed using equations (21) and (24). If the individual is searching while employed, we estimate the arrival rate of job offers using equations (25) and (28).

Finally, our third step estimates the preference parameters, θ_P, for which we use a GMM as well. Let h_p be the vector of moments and let x denote all the observables such that $h_p(x)$ are the empirical moments and $h_p(x, \hat{\theta}_W, \hat{\theta}_M; \theta_P)$ are the predicted moments from the model, which both are vectors of size $M_p \times 1$. The different set of moments we choose to match are the proportion of workers in each labor market state for singles, the proportion of workers in each household labor market state for married, and the job-to-job transition probabilities across sectors. In this case, the empirical and predicted moments are also specific to the time of the policy, T; however, the preference parameters (value of leisure and risk aversion) are not dependent on T and remain unchanged over time. The GMM estimator, $\hat{\theta}_P$, is given by

$$\hat{\theta}_P = \underset{\theta_P}{\operatorname{argmin}} \big[h_P(x, \hat{\theta}_W, \hat{\theta}_M; \theta_P) - h_P(x)\big]' W_p \big[h_P(x, \hat{\theta}_W, \hat{\theta}_M; \theta_P) - h_P(x)\big], \tag{37}$$

where W_p is a weighting matrix with dimensions $M_p \times M_p$; in this step, we use the identity matrix as weighting matrix. The standard errors of the preference parameters are corrected using a multi-step standard-errors procedure.[27]

[27] Appendix A.2 presents a detailed description of the procedure for the estimation of the standard errors.

7.1 Model Fit and Parameter Estimates

Appendices B.3 and B.5 present for singles and married couples,[28] respectively, the accepted-wage distributions from the model compared to the empirical counterpart. In addition, we include the offered-wage distribution from the model and the truncation given by the reservation wages. Overall, the proposed estimation strategy for the wage-distribution parameters allows us to fit all these distributions well and reproduce the wage differences between the formal and informal sectors by gender and across all household types.

In Appendix C.6, we present the parameter estimates and their corresponding standard errors for the arrival rates of offers for each sector-treatment by gender and household type while searching when unemployed or on the job. Table C.14 presents the results for women and men. When searching while unemployed before the policy is introduced, single women receive more offers from the informal sector than the formal sector independently of treatment. After the policy is introduced, we see a significant increase of job offers in the formal-treated sector, going from 0.0520 to 0.1238. However, while searching on the job, single women's arrival-rate differences between before and after are small. For instance, a single women who is employed in the informal-treated sector receives job offers from the formal-treated sector before the policy at a rate of 0.0630 whereas after the policy was introduced, it only increased to 0.0681. Similarly, single men present higher arrival rates of jobs from the formal-treated sector after the policy was implemented; however, the before and after difference for single men is significantly higher than for single women, going from 0.0861 to 0.2046. In addition, single men who are employed in the informal-treated sector receive job offers from the formal-treated sector before at a rate of 0.0554 versus 0.0687 after the policy.

For married women, we find heterogeneous rates conditional on the husband's labor market status. For example, even though we also see an increase in the arrival rates of jobs in the formal-treated sector for all married women, for those with a husband who is unemployed, formal treated, and informal treated, the arrival rates from the formal-treated sector are 0.1473, 0.2973, and 0.2256. Wives with a husband in the formal non-treated and informal non-treated sector present arrival rates from the formal-treated sector of 0.0813 and 0.0556, respectively. Similarly, we also find heterogeneous arrival rates from the informal-treated to formal-treated sector while searching on the job after the policy was implemented. Arrival rates of jobs in the formal-treated sector increase for all married men conditional on their spouse's labor market status. For married men with a wife who is unemployed, formal treated, and informal treated, the arrival rates from the formal-treated sector are 0.1450, 0.2918, and 0.2298, respectively. Men with a wife in the formal-non-treated or informal-non-treated sector present arrival rates from the formal-treated sector of 0.0790 and 0.0567, respectively. As in the married-women case, we find heterogeneous arrival

[28] Appendix B.4 presents the model fit for the distribution of wages for each sector-treatment and for married by gender and time of policy; however, these distributions are for the case in which we estimate the model under an individual search model without considering the joint decisions of the household.

Table 4: Estimation Results: Preference Parameters by Gender and Marital Status

	Single Men	Single Women	Married Men	Married Women
Value of Leisure	1.2350	1.1031	1.0449	1.8913
	(0.0011)	(0.0092)	(0.0003)	(0.0003)
Risk Aversion	1.1637	1.2474	**0.5933**	
	(0.0020)	(0.0016)	(0.0007)	

Note: Standard errors in parentheses.

rates from the informal-treated to the formal-treated sector while searching on the job after the policy was implemented for married men. The estimates follow the same pattern and have similar magnitudes as in the married-women case by household type.

Our parameter estimates are in line with the stylized facts presented above. Higher arrival rates of offers while unemployed translate to higher job-finding rates of formal jobs. Lower arrival rates while searching on the job translate into small changes in the transition rate across sectors.

Finally, we present in Table 4 our estimates for the preference parameters. For singles, women have a lower value of leisure given that they tend to accept lower wages than single men. Additionally, they tend to be more risk averse than single men. However, comparing married and single women, we find married women have a higher value of leisure. Their outside option is higher and can be pickier while searching for a job, because their spouse might be already working in the labor market and supporting them financially while they find a job.

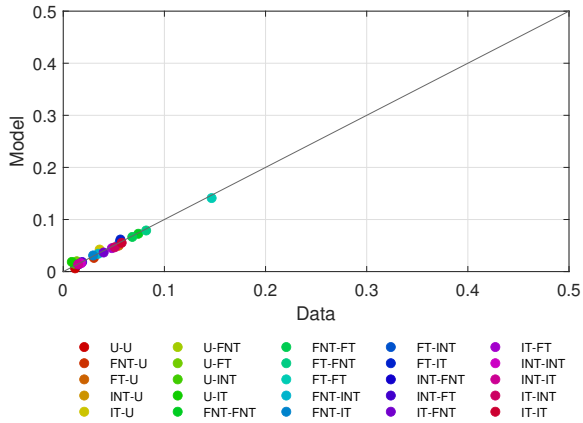
Recall that our targeted moments were the steady-state labor market proportions and the transition rates across sectors.[29] Given that the estimation of the household model requires more moments to be estimated, we present the model fit at the household level in Figure 2 and leave singles in Figure B.15 in Appendix B.6.[30] For each plot, the x-axis represents the data moment and the y-axis represents the predicted moment. We have a perfect fit if the point for each moment in the plot is on top of the 45-degree line. If the moment is below this line, the predicted moment is under-predicted, and if a point is located above the line, the predicted moment is over-predicted. Overall, we have a very good model fit for both before and after the policy for single women and men. We do not reach a perfect fit, due to some deviations from the transition probabilities from the informal to the formal sector.

[29] We leave the remaining transition probabilities across sectors untargeted, yet the model also provides a very good fit of them.

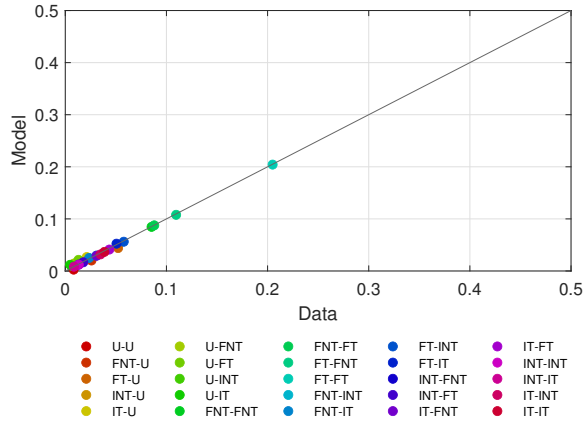
[30] We provide the model fit for married men and women under the individual search model in Appendix B.6. Overall, we are able to fit the data moments very well; however, we do a better job for married women than married men.

Figure 2: Model Fit: Labor Market Moments at the Household Level by Time of Policy

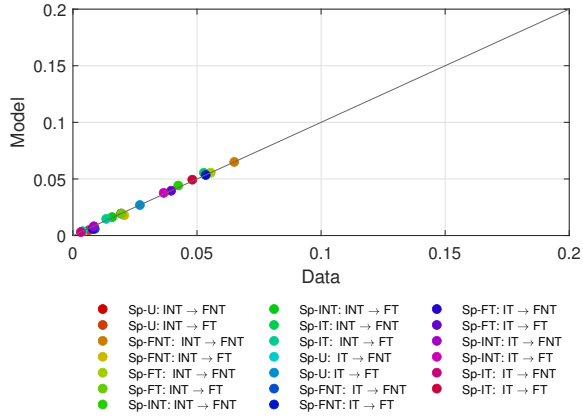
(a) Before *SuperSimples*: Household Work Status Proportions



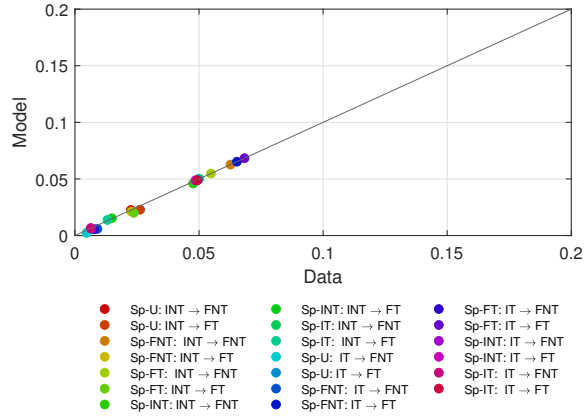
(b) After *SuperSimples*: Household Work Status Proportions



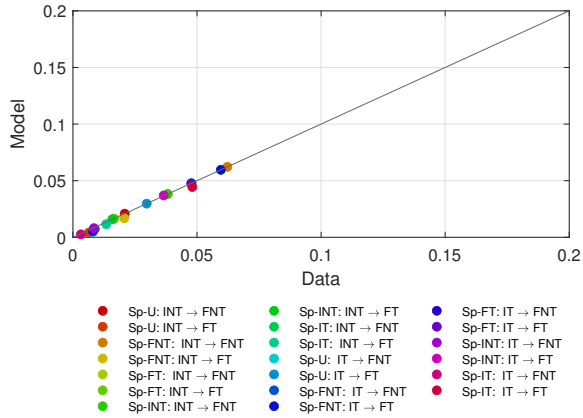
(c) Before *SuperSimples*: Transitions from Informal to Formal for Married Women



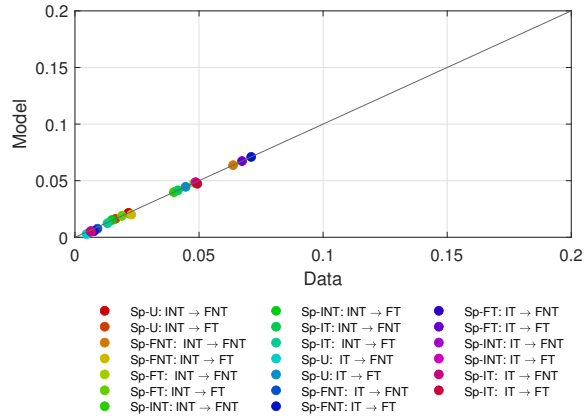
(d) After *SuperSimples*: Transitions from Informal to Formal for Married Women



(e) Before *SuperSimples*: Transitions from Informal to Formal for Married Men



(f) After *SuperSimples*: Transitions from Informal to Formal for Married Men



For the case of the household, Figure 2 shows the steady-state proportions of the labor market in panel (a) and (b), the transition probabilities from the informal to formal sector among married women in panels (c) and (d), and the transition probabilities from the informal to formal sector among married men in (e) and (f). Our model performs very well and can fit the majority of the targeted moments presented for the household. Some deviations from the 45-degree line are present for the proportion of FT-FT before the policy, which is being under-predicted. Meanwhile, because women's labor market activity is more volatile than men's, the model cannot perfectly match some of the transition rates across sectors in panel (d) and under-predicts them. Nevertheless, overall, we find no significant deviation from the targeted moments.

7.2 Specification Test

Differences between the household search and the individual search specifications depend on the assumptions of the utility function. Guler, Guvenen and Violante (2012) and Flabbi and Mabli (2018) argue that, on the one hand, under linear utility, agents in the household are risk neutral. The specifications are equivalent because the labor market decision of one spouse is independent of the other spouse's employment status and wage, due to the marginal utility of income being constant; hence, under risk neutrality, two spouses are optimally maximizing their individual income. On the other hand, under strictly concave utility, agents in the household are risk averse. The authors argue the reservation values resulting from concave preferences are qualitatively different from those resulting from linear preferences. The difference arises from the effect of one spouse's labor market status and wage on the other spouse's optimal reservation value affecting the marginal cost and benefit of searching, leading to dependence between the reservation utilities of the two household members. This dependence creates an additional difference between specifications: endogenous quits from jobs due to changes in the spouses' outside option are allowed for the household search model but not for the individual search model.

Given the difference between the specifications is reduced to the utility function's assumptions, we perform a specification test to validate our specification. We test the risk-aversion parameter, ψ, to rule out risk neutrality. Given the CRRA specification of the preferences, risk neutrality occurs when $\psi = 0$. Then, the null hypothesis is $H_0 : \psi = 0$ (alternative, $H_1 : \psi \neq 0$). If we reject the null hypothesis, both model specifications differ, and we favor the household model specification with the assumption of the unitary household preferences. In particular, our model's risk-aversion estimated parameter is equal to $\psi = 0.5933$, for which we can reject the null hypothesis at a significance level of 1%. The risk-aversion parameter is statistically significant and different from zero.

8 Policy Evaluation of SuperSimples: A Structural Approach

In this section, we answer the main question: How do within-household behavior and taxation affect the formal-informal labor market composition in developing countries? To this end, in the following subsections, we provide the structural analysis in which we quantify and decompose the causal impact of the policy on the labor market proportions and inflows to the formal sector at the individual and household level. We find the policy impact is ambiguous conditional on gender, marital status, and household type. In addition, we present the policy impact on the aggregate labor market, specifically, on the formality rate, the transition rate across sectors, and job-finding rates. To determine if, on average, individuals well-being improved, we quantify the impact of the policy on welfare and inequality.

8.1 Policy Impact at the Individual and Household Level

From our causal-inference analysis in section 4, we concluded that *SuperSimples* indeed had an impact on the transition of informal workers to the formal sector. In the case of married couples, we provided evidence that responses to the policy depend on the initial sorting of the household into the labor market sectors. Furthermore, we estimated the parameters of the structural household search model, which we use in this section to quantify and decompose the effect of *SuperSimples* by gender, marital status, and household type (defined by the household labor supply).

As in a difference-in-differences approach, we quantify the policy effect using the estimated mean differences of the outcome variable. In this case, our outcome variables are going to be the estimated steady-state proportions of the labor market and the mean transition rates of informal workers switching to the formal sector by treatment and time of the policy (before and after). In this section, we focus on the policy effect on the transition of informal workers to a formal-treated job and the proportion of the formal sector; however, all results regarding the policy-effect estimation are presented in Appendix C.7.

Table 5 summarizes the magnitudes of the baseline policy effect of *SuperSimples*. Overall, we find the responses are heterogeneous by gender, marital status, and household composition, confirming our causal-inference results. Given these differences, we argue that modeling both singles and married couples is crucial because their optimal response to government policies can be ambiguous between demographic groups. This goes in line with Galiani and Weinschelbaum (2012), Borella, De Nardi and Yang (2019), and De Nardi, Fella and Paz-Pardo (2021), who also argue that the response by the second earner of the household differs from the head and tends to have more volatile labor market activity, given that they react accounting for the head's optimal behavior.

Table 5: Policy Evaluation: *SuperSimples* Effect by Gender and Marital Status

		Married	Married - Household Search (Cond. on Spouse's LS)				
	Single	Ind Search	U	FNT	FT	INT	IT
Women							
Transition from Informal to Formal Treated	0.0013**	0.0111***	0.0044	0.0085***	0.0282***	0.0122***	0.0003
Proportion Formal	0.0469***	0.0297***	0.0032***	0.0090***	0.0342***	0.0000***	0.0036***
Men							
Transition from Informal to Formal Treated	0.0022**	0.0039***	0.0027	0.0082***	0.0173***	0.0124***	0.0020*
Proportion Formal	0.0557***	0.0093***	0.0005***	0.0169***	0.0421***	0.0046***	-0.0031***

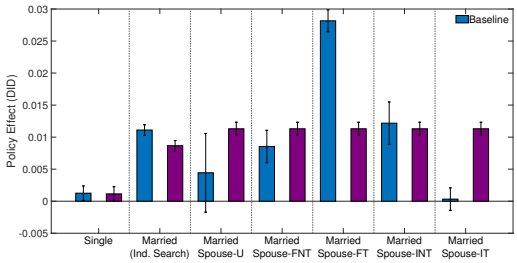
In particular, we find that among singles, the policy has a more substantial effect on men. Meanwhile, we find the individual search specification for married couples cannot accurately measure the policy effect, because it hides the heterogeneity in the magnitude and significance of the policy impact conditional on household composition. Lastly, we still find the dependence of the household sorting into the labor market sectors to the responses to the tax reform. For example, we find both married men and women who are part of a worker-searcher household are not affected by the policy. However, joint-employed households are positively affected by the policy, except for married women with husbands in an informal-treated job. A married couple employed across sectors has one spouse involuntarily excluded from the formal sector because they potentially become a joint-employed household in which both are in the formal sector (F-F) after the policy. When both members are informally employed, we see they are voluntarily in the informal sector and seek to insure themselves by having just one switching to the formal sector (I-F or F-I).

These results show individuals and households in this economy exhibit both motivations presented in the literature regarding sector choice. Some have a strong taste for formality, as in the case of married couples who both become formal workers; others prefer to remain in the informal sector, where a formalization policy will have little to no effect on these individuals, negatively affecting the formal-sector size.

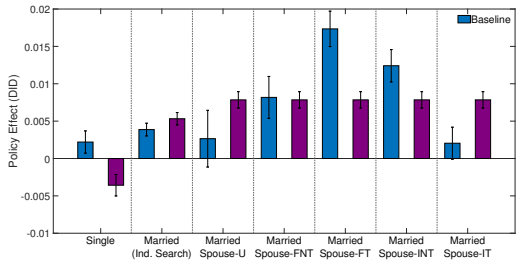
Decomposition. Recall that *SuperSimples* incentivizes informal firms and workers to transition to the formal sector, providing a differentiated tax system that unifies a series of primary taxes and Social Security contributions into one single rate. Hence, we assess which policy mechanism is the most effective in reducing the informality rate and decompose the policy effect through labor-supply and labor-demand channels. To quantify each channel, we estimate the policy impact for the hypothetical cases in which *SuperSimples* did not change each particular component: income taxes, Social Security contributions, wage distributions, and arrival rates. For example, for the income tax channel, we replace the tax rate for treated individuals after the policy with the tax rate they had before it was implemented.

Figure 3: *SuperSimples* Policy-Effect Decomposition:
Income Tax Channel by Gender

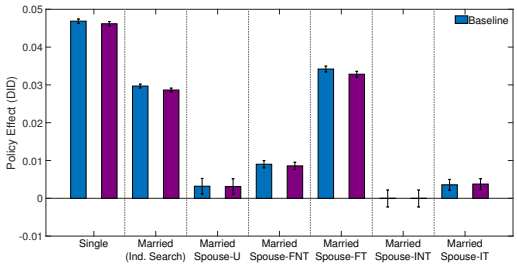
(a) **Income Tax Channel - Women:**
Transition from Informal to Formal Treated



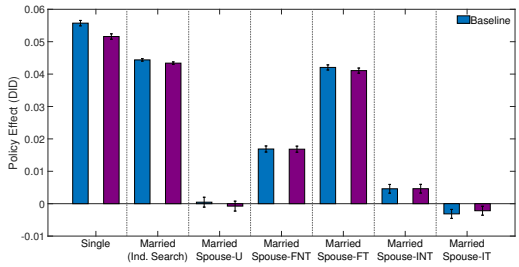
(b) **Income Tax Channel - Men:**
Transition from Informal to Formal Treated



(c) **Income Tax Channel - Women:**
Proportion Formal Sector



(d) **Income Tax Channel - Men:**
Proportion Formal Sector



This decomposition allows us to answer, what *SuperSimples*' policy impact would have been in the absence of each particular channel? The decomposition is done controlling by gender, marital status, and household labor market composition.

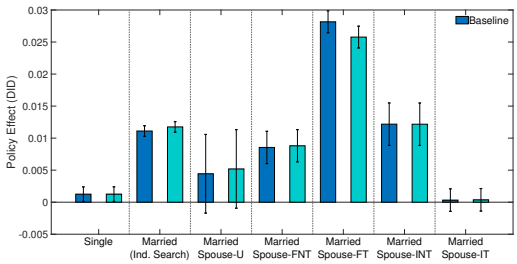
First, we discuss the results for the labor-supply channels: income tax and Social Security contributions. Overall, we find that households with significant policy effects respond the most through changes in income tax. For the income tax channel, we continue to observe heterogeneous responses by gender and marital status presented in Figure 3.

In particular, how the household responds to the policy is determined by the initial sorting into the labor market sectors. For example, for joint-employed households in which spouses are employed in different sectors, the income tax channel represents 60% of the policy impact for married women and 55% for married men. Thus, if the policy design did not decreased the income tax,[31] these married couples' likelihood of becoming an F-F household is less than half of the baseline policy impact. Intuitively, these households have a taste for formality and would therefore prefer to formalize and use the informal sector as a intermediate step while waiting for a formal job to arrive, yet they are currently being excluded from this sector and its benefits. By

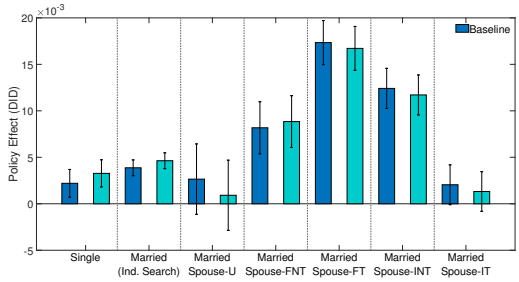
[31]Higher income taxes mean the firm will have higher labor costs and find them high enough that they prefer to remain informal with their workers, which goes in line with Albrecht, Navarro and Vroman (2009), who find in their counterfactual analysis that increasing the payroll tax makes formal-sector vacancy creation less attractive. The argument is also presented in Gomes, Iachan and Santos (2020).

Figure 4: *SuperSimples* Policy-Effect Decomposition:
Social Security Channel by Gender

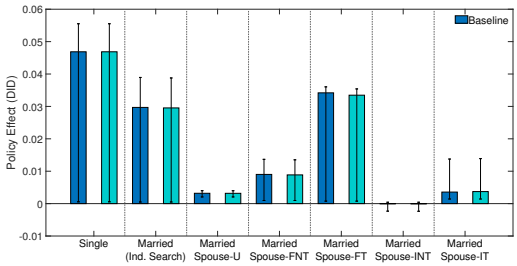
(a) **Social Security Channel - Women:**
Transition from Informal to Formal Treated



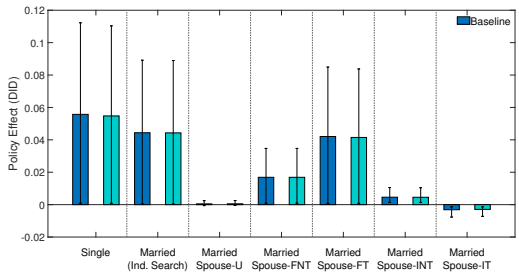
(b) **Social Security Channel - Men:**
Transition from Informal to Formal Treated



(c) **Social Security Channel - Women:**
Proportion Formal Sector



(d) **Social Security Channel - Men:**
Proportion Formal Sector



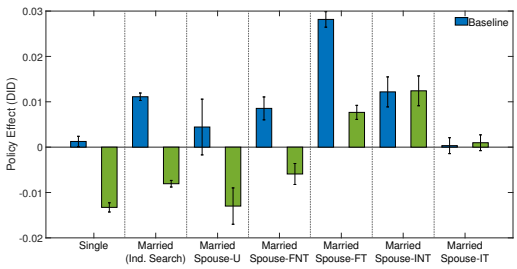
contrast, for joint-employed households in which both spouses are informally employed, we find that even though we shut down the income tax channel, they continue to transition to a formal treated job. This finding implies they are looking to insure themselves through the formal sector while the remaining spouse voluntarily stays informal or unemployed. The impact of the policy for single men who are affected the most is also notable, to the point where the policy effect goes in the opposite direction, becoming negative and representing 2.6 times the baseline effect.

For the Social Security channel, even though we observe heterogeneous responses by gender and marital status, we find that the policy effect under a policy design where we do not include changes in the employee's Social Security contributions is not statistically significant with respect to the baseline. We present the results in Figure 4 and conclude that the household responses to *SuperSimples* are not caused by changes in this instrument, regardless of gender, marital status, and household labor market composition.

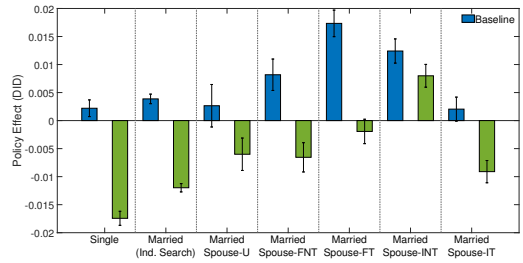
Second, we discuss the results for the labor-demand channels: wage distribution and arrival rates. In this case, we fixed the structural parameters of the conditional wage distributions (arrival rates) to the value before the policy was implemented for those in the treatment group. Given the nature of informal firms, which by definition are not legally registered, having information regarding firms in the informal sector at the panel level (i.e., employer-employee) for a long period of time to study labor market dynamics in developing countries is usually not possible. Therefore,

Figure 5: *SuperSimples* Policy-Effect Decomposition:
Wage-Distribution Channel by Gender

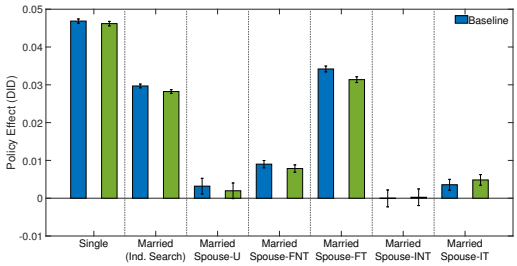
(a) **Wage-Distribution Channel - Women:**
Transition from Informal to Formal Treated



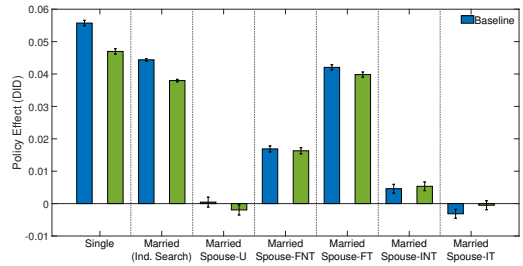
(b) **Wage-Distribution Channel - Men:**
Transition from Informal to Formal Treated



(c) **Wage-Distribution Channel - Women:**
Proportion Formal Sector



(d) **Wage-Distribution Channel - Men:**
Proportion Formal Sector



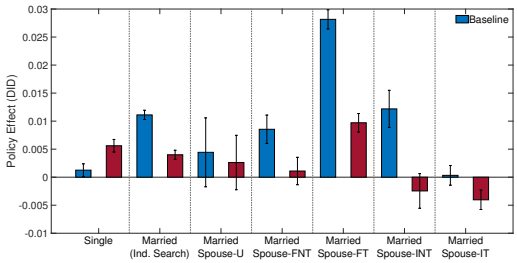
our approach is a novel way that leaves aside the data-restriction issue and provides the advantage that it only relies on panel information at the worker level. Yet, using a partial-equilibrium model and exploiting the exogenous shift of the policy, we can disentangle the causal impact from labor-demand components.

Overall, we find households with significant policy effects through both channels but stronger effects coming from changes in the conditional wage distributions. We present in Figure 5 the results regarding the wage-distribution channel.

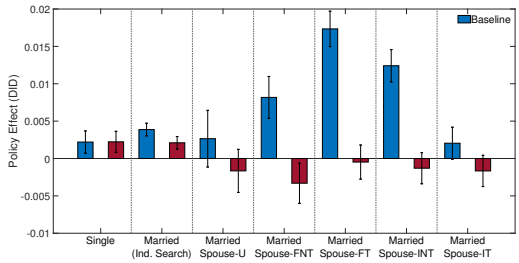
Note that from the firm's point of view, the policy allows eligible firms to become formal at a lower cost, including labor costs such as the wage bill of their workers. Firms that transition to the formal sector due to the advantages presented by the policy will open the door for new formal jobs with lower hiring costs, which will impact the conditional wage-offer distributions in this sector. Therefore, if we do not allow for this adjustment of wages, we find that changes in the wage distributions are the most effective mechanism out of the four channels. In particular, we find the policy effect becomes negative if we shut down this channel for singles and several household cases. If the policy effect remains positive, we find the magnitude is significantly lower than that of the baseline.

Figure 6: *SuperSimples* Policy-Effect Decomposition:
Arrival-Rates Channel by Gender

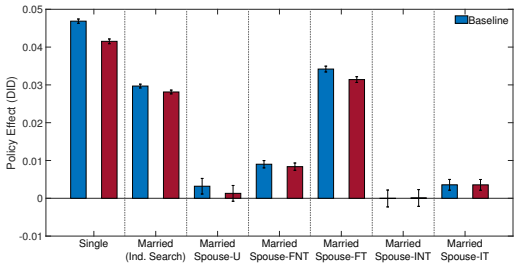
(a) **Arrival-Rates Channel - Women:**
Transition from Informal to Formal Treated



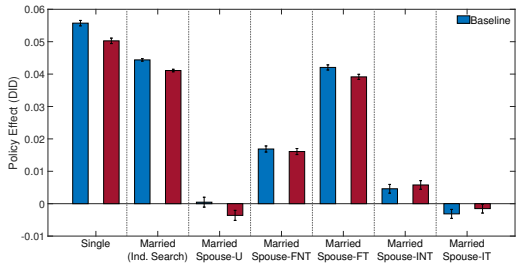
(b) **Arrival-Rates Channel - Men:**
Transition from Informal to Formal Treated



(c) **Arrival-Rates Channel - Women:**
Proportion Formal Sector



(d) **Arrival-Rates Channel - Men:**
Proportion Formal Sector



This channel has the strongest effect on workers who are involuntarily in the informal sector and desire to find a formal job. Specifically, these individuals are singles and married couples in a worker-searcher status. For single men and women, the policy effect is wholly offset and reversed by this channel, representing 12 and 9 times the baseline, respectively. For worker-searcher households, we find the effect also becomes negative and represents 3.9 and 3.3 the baseline for married women and men, respectively. Meanwhile, for joint-employed households, we find heterogeneous responses through this channel. On the one hand, the policy effect still becomes negative for married men with a spouse in the formal sector (either treated or non-treated). These households are also being excluded from the formal sector, even though they prefer formality and, with the changes in wage distributions, will potentially become an F-F household. We find the same for those informally employed married men with a spouse in an informal-treated job who could potentially become an F-I household. On the other hand, for married women, the policy impact is negative when the husband has a formal-non-treated job and positive when the husband has a formal-treated job (representing 73% of the policy effect). These cases also translate into a desire to become part of the formal sector as an F-F household.

Our results regarding the impact of the policy on the labor market sector composition through this channel goes in line with Ulyssea (2018), who use data from Brazil to analyze the impact of formalization policies at the firm level and the aggregate effects on the economy. In particular, he finds that cutting the payroll tax by 20 percentage points to eliminate the employer's Social Security

contribution leads to an increase in labor demand in the formal sector, resulting in a positive effect on equilibrium wages. Additionally, Bosch and Esteban-Pretel (2012) test how direct changes in hiring costs such as payroll taxes affect the labor market dynamics. They show that higher payroll taxes imply lower formality rates and higher unemployment.

Furthermore, we present the results for the arrival-rates channel where, after the policy was implemented, we fixed the arrival rates for treated jobs to those we had before the policy. In this case, we are accounting for how much of the policy impact is explained by search frictions; that is, the frequency with which workers receive offers from the formal sector remains fixed at the previous (lower) rate. A positive policy effect directly affects the arrival rates of jobs in the formal sector because more firms will offer job positions in this sector.

Our results in Figure 6 show workers have been involuntarily excluded from the formal sector, especially households in a joint-employed state. For example, panel (b) shows that regardless of the sector the wife is employed in, this channel's policy effect becomes negative. This finding implies married men would not hesitate to transition into this sector if they received at a higher frequency formal offers where they could find a better firm-worker match in less time, due to an increase in formal job positions. However, for married women with a formally employed husband, the policy effect remains positive as in the baseline but with a lower magnitude, representing 87% if the husband is in a formal-non-treated job and 66% if he is in a formal-treated job. However, if the husband is informally employed, the policy effect shutting down the arrival-rates channel becomes negative. Therefore, our results show that households employed in different sectors (F-I) would have preferred to become F-F; yet, due to search frictions, informally employed married women are forced to remain in the informal sector. Similarly, married women in an I-I household remain in this state, even though they would prefer to become an I-F type. Lastly, single women show a clear preference for formal jobs; even in the absence of this channel, the policy effect continues to be positive and of a greater magnitude than the baseline.

Note that any residual that these channels cannot explain has to do with other unobserved factors such as the impact from other policies, flexibility demands, and experience. Finally, for all four channels, the impact on the proportion of the formal sector is not as severe as in the transition probabilities, showing the importance of studying the transitional dynamics and not just the steady-state proportions. We have been able to determine that the policy effect is ambiguous at the individual and household level, which will have different impacts on the formal-informal composition; therefore, the impact of *SuperSimples* on the aggregate labor market remains to be determined.

Table 6: *SuperSimples* Policy Impact on the Aggregate Labor Market

	Level (%)		Impact	Impact Decomposition (p.p.)							
				Single		Married Women (Cond. on Spouse LS)			Married Men (Cond. on Spouse LS)		
	Before	After	Δ %	Women	Men	U	F	I	U	F	I
Baseline											
Formality Rate	61.17	69.45	13.54	-0.96	1.52	0.10	7.83	-0.46	-0.42	7.83	-0.53
Transition Rate from Informal to Formal (I → F)	5.58	6.23	11.76	-0.38	1.25	-0.07	8.47	-1.94	-0.29	5.19	-0.48
Job-Finding Rate - Formal Sector (U → F)	8.39	17.00	102.65	23.42	11.25	0.23	45.02	1.66	0.15	20.03	0.90
Income Tax Channel											
Formality Rate	61.17	69.29	13.28	-0.98	1.44	0.11	7.73	-0.43	-0.47	7.73	-0.45
Transition Rate from Informal to Formal (I → F)	5.58	5.95	6.69	-1.00	-0.45	-0.11	7.17	-1.97	-0.43	4.41	-0.94
Job-Finding Rate - Formal Sector (U → F)	8.39	16.50	96.61	23.42	11.26	0.24	39.44	1.75	0.16	19.46	0.89
Social Security Contributions Channel											
Formality Rate	61.17	69.41	13.48	-0.95	1.50	0.10	7.78	-0.45	-0.41	7.78	-0.52
Transition Rate from Informal to Formal (I → F)	5.58	6.18	10.75	-0.37	0.86	-0.07	8.16	-1.93	-0.32	5.06	-0.64
Job-Finding Rate - Formal Sector (U → F)	8.39	16.53	96.98	23.41	11.25	0.23	39.30	1.70	0.15	20.04	0.90
Wage-Distribution Channel											
Formality Rate	61.17	68.23	11.54	-1.44	1.21	0.05	7.23	-0.19	-0.73	7.23	-0.35
Transition Rate from Informal to Formal (I → F)	5.58	3.81	-31.64	-14.05	-7.10	-0.44	-2.28	-2.08	-0.79	-1.10	-3.80
Job-Finding Rate - Formal Sector (U → F)	8.39	15.06	79.48	23.44	11.27	0.34	16.72	7.37	0.12	19.21	1.01
Arrival-Rates Channel											
Formality Rate	61.17	69.00	12.81	-1.07	1.30	-0.03	7.48	-0.42	-0.67	7.48	-0.23
Transition Rate from Informal to Formal (I → F)	5.58	5.68	1.84	0.56	-0.46	-0.28	5.06	-2.69	-0.61	2.39	-2.14
Job-Finding Rate - Formal Sector (U → F)	8.39	8.24	-1.81	0.74	-1.00	-0.96	8.28	-5.68	-0.99	1.39	-3.60

8.2 Policy Impact on the Aggregate Labor Market

In this section, we quantify the before-after impact of *SuperSimples* in three aggregate labor market indicators: formality rate, transition probability from informal to formal, and job-finding rate of formal jobs. Recall that we could not evaluate the policy impact on the job-finding rates through our empirical analysis, because we relied on the sector-of-activity variable to define the treatment group. However, our structural estimation opens the door to analyze the policy impact of both dimensions of inflows into the formal sector: transitions across sectors or exit from unemployment. We also decompose the policy effect on labor-supply and labor-demand channels to answer the main question: How do within-household behavior and taxation affect the formal-informal labor market composition in developing countries?

Table 6 presents the estimated labor market indicators, their level before and after the policy, and the percentage change. In addition, we decompose the policy impact by the different types of individuals in our economy and determine who contributes the most to the percentage change. Overall, the policy positively impacted the formality rate by 14%. The majority of this percentage is attributed to households who, after the policy, became F-F. We also find that diverse individuals negatively contributed to the policy impact on the formality rates. Such individuals are primarily those who voluntarily chose to be in the informal sector, for example, single women and married couples with at least one spouse in the informal sector.

Table 7: *SuperSimples* Policy Impact and Decomposition: Welfare and Inequality

	Single			Married Couple Cond. on Household Status Before the Policy								
	All	Women	Men	UU	FU	IU	UF	UI	FF	FI	IF	II
Baseline (Δ% Relative to Before)												
Welfare	4.24	-0.06	3.34	1.32	1.07	1.95	1.99	1.43	0.60	1.19	1.09	1.85
Inequality	-4.07	18.75	-4.54	-6.06	6.33	-11.71	2.92	-4.15	10.26	-2.55	-15.55	-5.67
Welfare (Δ% Relative to Baseline - After)												
Income Tax Channel	-0.89	-0.67	-0.82	-0.52	-0.98	-0.23	-0.72	-0.41	-1.34	-0.78	-0.29	-0.23
Social Security Channel	-0.29	-0.22	-0.27	-0.17	-0.33	-0.08	-0.24	-0.14	-0.45	-0.26	-0.10	-0.08
Wage-Distribution Channel	-8.02	-6.39	-6.92	-4.98	-8.19	-1.95	-6.42	-3.26	-11.98	-6.73	-2.10	-2.57
Arrival-Rates Channel	-0.23	-0.07	0.70	-1.12	-0.93	-1.07	-2.30	-1.21	-0.22	0.03	-0.60	-0.51

Considering the labor market dynamics, we find the increase in the size of the formal sector was mainly explained by higher job-finding rates, which doubled after the policy, and 44% of the inflows corresponded to married women with a formally employed spouse and 23% corresponded to single women. Meanwhile, the percentage change of the transition rate across sectors is just 12%, with married women with a formally employed spouse accounting for 8 percentage points. Note that married women with a formally employed husband have higher reservation wages than women with informal or unemployed spouses. Therefore, the positive impact of the policy in the conditional wage distributions due to the lower hiring costs the firms are now subject to and, in combination with higher arrival rates of formal jobs, are inducing this group of women to find well-suited matched in the formal sector. The decomposition of the four channels confirms this behavior. We find that in the absence of the labor-demand channels, the transition of unemployed married women with a formally employed spouse decreases significantly; in the absence of the changes in wage distributions, their contribution to the job-finding rate halves to be just 22%.

We also find that across the four channels, the formality rate does not decrease significantly, at most 2 percentage points, in the absence of the change in the conditional wage distributions. However, the underneath inflows and outflows into the formal sector vary significantly relative to the baseline policy impact. Changes in the conditional wage distributions are the policy's most effective mechanism, especially on the transition rates across sectors. In particular, we find a negative policy effect of 32%, for which single women are affected the most, representing 14 percentage points of the negative change. Meanwhile, search frictions have the biggest impact on individuals trying to exit unemployment. The policy impact in the job-finding rate reverses and becomes negative (1.81%), and the households with at least one informal spouse are the most affected through this channel, with negative contributions of 6 percentage points for married women and 4 percentage points for married men.

In addition to the aggregate labor market impact, we are interested in the impact of *Super-Simples* in terms of welfare and inequality. As stated by Gasparini and Tornarolli (2009), given

that formal and informal jobs differ beyond wages, we need to account for the social protections that the formal sector provides (e.g., the unemployment insurance and severance payment in our model). Instead of using earnings for our welfare analysis, we use the value of a worker according to their current labor market status for singles. For married couples, the value of their joint labor market status. Then, we measure welfare inequality as the coefficient variation of welfare, that is, the dispersion around the mean.

Overall, we find welfare gains at the baseline of 4.2%. At the baseline, worker-searcher households and joint-employed households with both members in the informal sector before the policy was introduced, and single men gain the most in welfare, with the latter having the highest welfare gains of 3%. By contrast, single women present welfare losses which is consistent with the fact that they favor informality due to non-monetary benefits such as flexible hours.

In terms of welfare inequality, a negative percentage change of the coefficient of variations translates into improvements in inequality. We find that, overall, at the baseline, inequality improves in 4%. However, we find these improvements to be directed toward men, especially those employed in the informal sector. Instead, the measure of inequality for women increased after the policy was implemented. In particular, for single women the coefficient of variation increased 19%, for worker-searcher households with a wife formally employed and a joint-employed household where both are formally employed before the policy was introduced, increased 2% and 10%, respectively.

Welfare gains after the policy was implemented are negatively impacted when we shutdown each labor-supply and labor-demand channel. The most important mechanism is the wage-distribution channel, without which welfare gains decrease 8%. In particular, households who were F-U or F-F before the policy are the most affected by the absence of changes in the conditional wage-distribution for which welfare gains after the policy would be 8% and 12%, respectively, lower than the baseline.

In summary, we find that when introducing formalization policies in these economies, the within-household behavior matters. The household sorting into labor market sectors before the policy was implemented and the motivations behind their joint labor-supply optimal decisions will have a different impact on the formal-informal labor market composition. They contribute the most to increasing formality rates when exiting unemployment. However, we also find evidence that the policy has a negative impact on the formality rates for some types of households that voluntarily choose to work in the informal sector. These households find benefits in the informal sector, such as flexible hours that offset the formal benefits. Also, if one spouse is already in the formal sector, the household can take advantage of the common benefits such as health insurance, without paying double the cost in taxes.

9 Policy Experiment: The Impact of Formalization Policies on Labor Market Dynamics and Lifetime Earnings

In the previous sections, we were able to determine the impact of *SuperSimples* on the main labor market indicators, taking into account workers' optimal decisions conditional on their gender, marital status, and household type. However, our analysis was based on the before and after differences of two steady-states in our economy. Yet, the impact of formalization policies on the labor market careers of workers and their lifetime earnings remains to be analyzed. Studying workers' labor market dynamics as a response to the policies allows us to determine the long-run effects of these policies.

Our simulation procedure builds upon previous work by Flinn (2002) and Flabbi and Mabli (2018). We simulate the labor market histories for a period of 45 years (540 months) and presume workers have exited full-time education and started their labor market career up until retirement. We simulated individual panels for single men and women and a unique panel for the household to account for their endogenous labor-supply decisions. Our final simulated panels track per-period information for each individual regarding earnings, formal benefits (if laid off), labor market status, spouse's information (if married), and value at current employment status. We assume all individuals in this economy start unemployed; then, married couples' initial household status is joint-unemployed. Finally, we assume that married individuals' respective spouses are in the same cohort, so the difference between their years spent in the labor market is relatively small.

Appendix A.3 details the simulation procedure to create the labor market careers of each individual and the household as a unit, in addition to the procedure to estimate lifetime earnings. In particular, we calculate the contribution to lifetime earnings per spell by integrating over discounted values of being employed at a given after-tax wage, sector- and treatment-specific job, or unemployed. If laid off, we account for the formal benefits in the model, unemployment insurance, and severance pay. At the household level, each spell is defined by the joint labor market status, that is, joint-unemployed, worker-searcher, and joint-employed.

We consider five possible scenarios for our economy: (1) **"Before":** No policy change. We set the structural parameters to the pre-policy values. (2) **"After":** We introduce the policy at time 0. All workers enter the labor market under new conditions. The structural parameters are set to the post-policy values and remain fixed for the entire 45 years. (3) **"10Y":** We introduce the policy when the workers have already acquired 10 years of experience in the labor market. In this case, we set the structural parameters to the pre-policy values for the first 10 years and the post-policy values for the remaining 35 years. Similarly, (4) **"20Y":** The policy is introduced after 20 years in the labor market. (5) **"30Y":** The policy is introduced after 30 years in the labor market. We set the Before case as the benchmark and point of comparison.

Figure 7: Impact of Policy on Simulated Labor Market Profiles: All Individuals

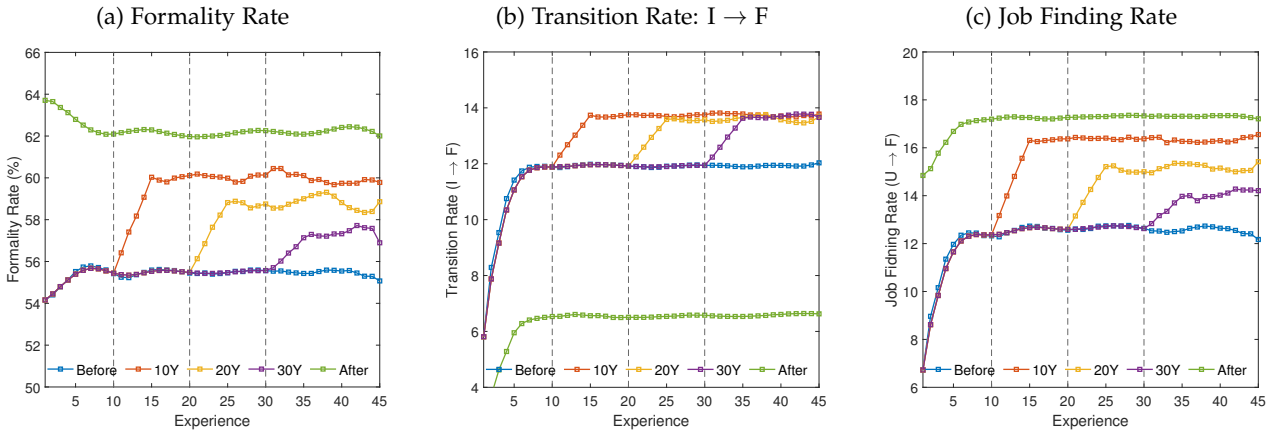
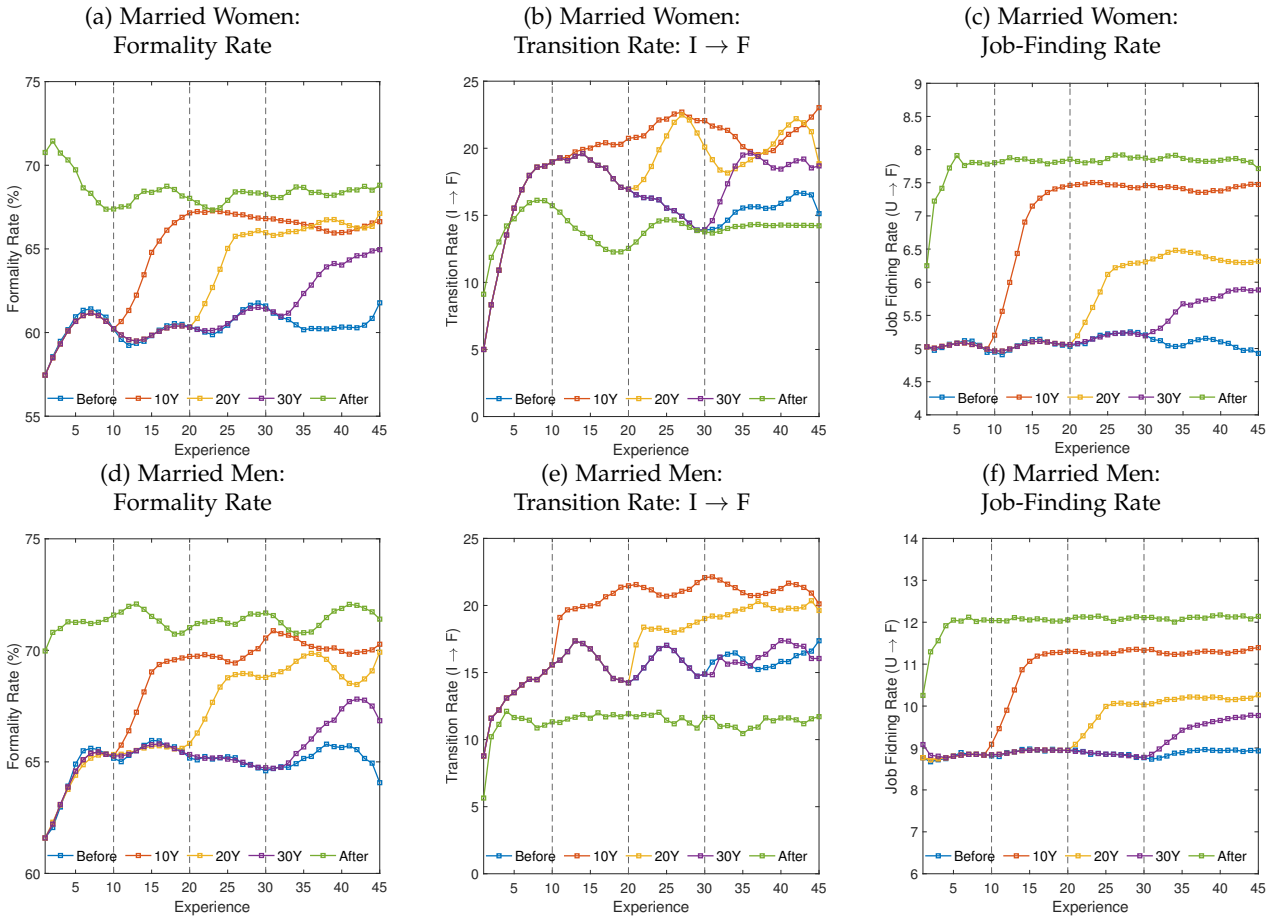


Figure 7 presents for all individuals (singles and married) the labor market profiles for the formality rate, the transition of informal workers to the formal sector, and formal job-finding rates. We find that earlier the policy is introduced bigger responses from workers, which lead to higher formality rates that converge to higher rates than the baseline case. To illustrate, note that at the baseline, the formality rate is, on average, 55%. When we change the policy after the first 10 years, we see a steep change between 10 and 20 years of experience, which converges later to an average formality rate of 60%. In addition, we find that when the economy is only under the new regime ("After"), the initial conditions to enter the labor market are more favorable toward the formal sector, due to lower hiring costs, higher wages, and more formal jobs available in the market. Thus, the formality rate in this case starts and remains at the highest point (around 62%) relative to all other cases.

Are workers entering the formal sector from the informal sector or directly from unemployment? Our results show more significant changes in inflows are present in the job-finding rates. The negative relationship between the time of introduction of the policy and changes in this rate is preserved. For example, we find that when the policy is introduced after the first 10 years instead of 30 years, this rate increases to 16% versus 14% (both cases deviating from the baseline of 12%). The "After" case, on average, 17%, continues to be the highest among all cases. Meanwhile, those who are informally employed and experienced a policy change will switch to the formal sector at a higher rate than the base, a change of at most 2 percentage points that remains relatively constant post policy.

Lastly, we find that in the case in which we are only under the new regime, we have the lowest transition rates across sectors (6%). Under these conditions, people are entering the formal sector directly from unemployment and reducing the pool of informally employed people, where a portion had voluntarily chosen to be in this sector; therefore, in this new regime the role of the informal sector as a port of entry to the formal sector is diminished.

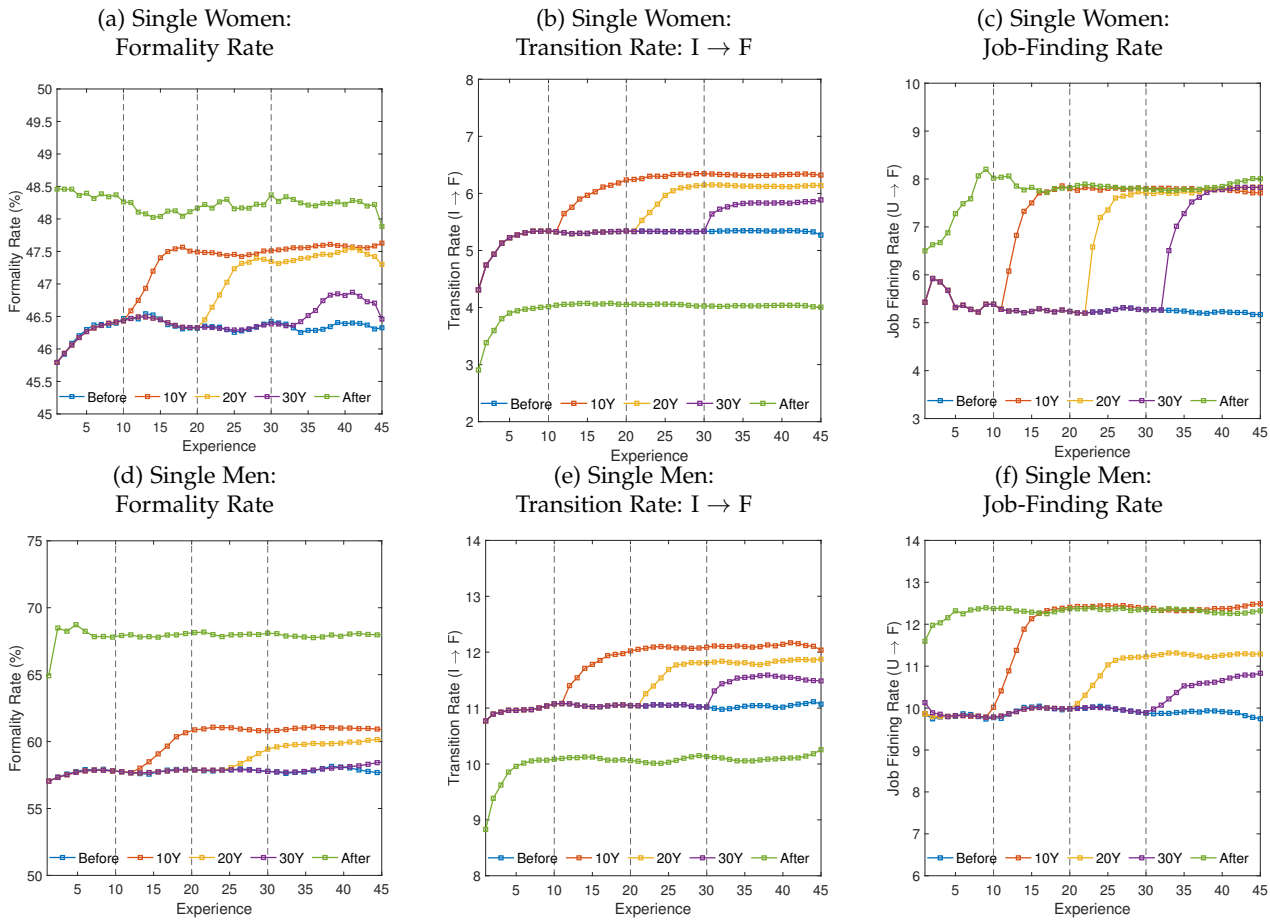
Figure 8: Impact of Policy on Simulated Labor Market Profiles: Married Couples



How do married couples react when the policy is introduced at different stages of their labor market careers? Previously, we had determined that responses to these policies will differ according to joint-household behavior and their optimal sorting into the different labor market sectors. Figure 8 shows the simulated labor market profiles for married couples only. Overall, women's labor market profiles are more volatile, consistent with the literature regarding the role of the second earner in a household as a way to provide insurance against possible negative income shocks that the primary earner might suffer.

We find that married couples have the highest formality rates and steepest changes. For example, suppose we introduce the policy after 10 years. In that case, we have that married women's formality rates change from 60% and reach 65%, whereas for married men, this rate changes from 65% and eventually reach 70%. In particular, married women start with high formality rates for the "After" case; however, in the first 10 years, the rate decreases and stabilizes around 67%. Also note that married couples' inflows to the formal sector come from both the informal sector and unemployment. When a switch in regimes occurs, changes in the inflow rates are similar for married women; for example, in the 10Y case, the transition between sectors changes up to 2.5 percentage

Figure 9: Impact of Policy on Simulated Labor Market Profiles: Singles



points, whereas the job-finding rate changes up to 3 percentage points. Meanwhile, when a switch in regimes occurs, changes in the inflow rates for married men differ significantly; for example, in the 10Y case, the transition between sectors changes up to 2 percentage points, whereas the job-finding rate changes up to 6.5 percentage points; the latter converging afterward.

Beyond married couples, singles exhibit different patterns, emphasizing the importance of modeling both types of individuals. We present these results in Figure 9. On the one hand, single women favor informality and present the lowest formality rates. This finding aligns with the literature that argue that these women voluntarily work in the informal sector, due to the non-tangible benefits within, such as flexible hours, especially single women with young children. Regardless of when the policy is introduced, the impact on the formality rate is at most 1.5 percentage points, and they continue to favor the informal sector. In addition, single women present low transition rates from the informal to the formal sector. Even under the new regime conditions, they remain informal, and the transition rate across sectors converges to 4%. However, their formal job-finding rates increase approximately 3 percentage points when the policy is introduced.

Table 8: Policy Impact on Inequality: Coefficient of Variation for Lifetime Earnings and Welfare by Gender and Marital Status

	Coefficient of Variation					Δ% Relative to Before			
	Before	10y	20y	30y	After	10y	20y	30y	After
Lifetime Earnings									
Single Men	0.0625	0.0414	0.0413	0.0614	0.0412	-33.74	-33.94	-1.72	-34.09
Single Women	0.0542	0.0347	0.0354	0.0526	0.0342	-35.93	-34.68	-2.96	-36.88
Household	0.0817	0.0755	0.0763	0.0772	0.0693	-7.68	-6.64	-5.59	-15.28
Married Men	0.0854	0.0811	0.0812	0.0814	0.0801	-5.04	-4.97	-4.66	-6.22
Married Women	0.1664	0.1572	0.1621	0.1634	0.1427	-5.51	-2.58	-1.80	-14.22
Lifetime Welfare									
Single Men	0.0168	0.0141	0.0142	0.0159	0.0139	-16.19	-15.73	-5.33	-17.37
Single Women	0.0154	0.0117	0.0118	0.0152	0.0116	-23.67	-23.60	-1.08	-24.71
Household	0.0713	0.0649	0.0658	0.0663	0.0593	-8.88	-7.72	-7.02	-16.74

On the other hand, single men exhibit formality rates that are comparable to the overall mean. In particular, when the policy is introduced after 30 years of experience, they behave as if no change occurred in the regime until the last five years. However, if they enter the economy in the new regime only, a gap of 10 percentage points exists relative to the "Before" case. Therefore, this demographic group is searching for formal jobs, yet not all can find a match in the formal sector. Lastly, the primary inflow that explains the increase of the formality rate when the policy is introduced is the increase in the job-finding rate. Note that when we changed regimes after 10 years in the labor market, single men could find jobs at a rate of 12% (same rate as if they entered the market with the new regime from the start) versus 10%.

Finally, we are interested in answering whether higher formality rates translate into improvements in inequality. Following Shaw (1989), we adopt as the measure of lifetime earnings and welfare[32] inequality the coefficient of variation (CV), which is the standard deviation over the mean of the expected present value of lifetime earnings. Then, the higher the coefficient of variation of individual or household lifetime earnings (welfare), the higher the dispersion around the mean (higher inequality). We present the main results in Table 8 for the level and percentage changes of the coefficient of variation for the five scenarios.

We continue to use the "Before" case as our baseline. This case presents the highest inequality for all demographic groups. Overall, lifetime earnings are more dispersed than lifetime welfare; however, both exhibit a negative relationship between inequality and the time the policy was introduced over workers' labor market careers. In particular, we find higher improvements in

[32]Lifetime welfare is calculated similarly to lifetime earnings. However, instead of the earnings contribution to each spell, we use the value of being employed or unemployed. For the household, we continue to define each spell with the joint labor market status.

inequality when the policy is introduced before 20 years of workers' experience - ranging from 5% to 35%. This finding is consistent with the inverse relationship we previously found between improvements in the formality rate and the time of the policy.

Even though the policy improves inequality, we find that married women experienced the highest inequality among all groups. To illustrate, if we compare the two extreme cases, no regime ("Before") and full regime ("After"), we find that for married couples, lifetime welfare inequality improves 17%. This percentage also translates into an improvement of 15% in household lifetime earnings, driven by married women. However, their coefficient of variation remains above that of married men: 0.14 compared to 0.08.

Therefore, in conjunction with those in the previous sections, these results show that besides the institutional setting in developing countries, the motivations behind the labor-supply decision at the individual and household level will affect the formal-informal sector composition differently. Then, when designing formalization policies, we must account for: (i) within-household behavior leading to different responses to policies and (ii) younger workers reacting the most when these policies are introduced in the early stages of their labor market career.

We have shown how both motivations behind the persistence of informality are intertwined. Workers are optimally choosing to stay informal while others cannot find a match in the formal sector and remain unemployed or informal, whereas searching for a formal job. Isolating these two groups provides a new lens for targeted policies or social programs that will be welfare-improving, leading to a more equal society and supporting individuals' well-being.

10 Conclusion

The household decision-making process regarding labor market choices leads to multiple responses when labor market policies are implemented in developing countries. How households sort into the labor market sectors will influence the formal-informal composition, contributing to the persistence of the high informality rates. The endogenous responses of the household are also affected by the different mechanisms that policymakers use to support the transition of workers to the formal sector.

We have examined the case of the Brazilian economy and the effort through the tax reform of *SuperSimples* to decrease the informality rates. Using the Brazilian Monthly Employment Survey from March 2002 to December 2015, under a matching difference-in-differences approach, we provided evidence of the endogenous sorting process of the household, where the response to the policy differs conditional on the initial sorting of the household into the labor market sectors.

For example, households with only one employed spouse (worker-searcher) sort across sectors looking for insurance in the formal sector. Meanwhile, households with both spouses employed (joint-employed) sort into the same sector.

Given the dependence between the impact of the policy and the household sorting into the labor market, we developed and structurally estimated a household search model with formal and informal sectors in the labor market. This model allows for the endogenous sorting of the household, on-the-job search, and risk aversion, while allowing the analysis of the labor market dynamics. We embedded the treatment component for policy-evaluation purposes. We showed the model is able to explain the joint labor-supply decisions for different family structures and transitional dynamics, such as the transition of informal workers to the formal sector and the exit of unemployment to the formal sector, controlling for the time of the policy.

At the individual and household level, we structurally evaluate the policy effect of *Super-Simples* by quantifying and decomposing the causal impact for heterogeneous workers into labor-supply (income tax and Social Security contributions) and labor-demand (wage distributions and arrival rates) channels. This decomposition allowed us to address what *SuperSimples*' policy impact would have been in the absence of each particular channel. Overall, we find the policy effect is ambiguous when decomposed by gender and marital status. From the labor-supply side, income tax changes explain most of the policy effect for married couples; for jointly employed households with one spouse in the formal-treated sector, the income tax channel represents 60% of the policy impact for married women and 55% for married men.

Even though we have a partial-equilibrium model, our novel structural approach only relies on workers' micro-level data and the policy's exogenous shift to disentangle the policy's causal impact through two labor-demand channels: wage distributions and arrival rates. We find that households with significant policy effects respond to both channels; however, the response to changes in the conditional wage distributions is stronger. Workers who are involuntarily in the informal sector and desire to find a formal job are affected the most through this channel. In particular, for single men and women, this channel's policy effect is wholly offset and reversed, representing 12 and 9 times the baseline. We also observe a negative impact for worker-searcher households in the absence of changes in wages. For joint-employed households, note the absence of the wage component significantly impacts those with a clear preference for formality and a desire to be an F-F (formal-formal) household type. The policy impact for married women is negative when the husband has a formal-non-treated job and positive when the husband has a formal-treated job (representing 73% of the policy effect).

Furthermore, we quantified the before-after impact of *SuperSimples* in three aggregate labor market indicators: formality rate, transition probability from informal to formal, and job-finding rate of formal jobs. Our empirical causal-inference analysis was limited to the policy impact on the

transition rate across sectors, due to the need of the sector of activity to define the treatment group. Our structural model circumvented this issue and opened the door to analyze the policy impact on both dimensions of inflows into the formal sector. Overall, the policy positively impacted the formality rate by 14%. The majority of this percentage is attributed to households who, after the policy, became F-F. We also find that diverse individuals negatively contributed to the policy impact on the formality rates. These individuals are mainly those who voluntarily chose to be in the informal sector; among them are single women and married couples with at least one spouse in the informal sector.

Considering the labor market dynamics, we find the increase in the size of the formal sector was mainly explained by higher job-finding rates, which doubled after the policy, and 44% of the inflows corresponded to married women with a formally employed spouse and 23% from single women. Meanwhile, the percentage change of the transition rate across sectors is 12%, where married women with a formally employed spouse explain 8 percentage points. In the absence of the changes in wage distributions, these women's contribution to the job-finding rate halves to be just 22%. Additionally, search frictions have the largest impact on individuals trying to exit unemployment. The policy impact reverses, becoming negative (1.81%). The households with at least one informal spouse are the most affected through this channel, with negative contributions of 6 percentage points for married women and 4 percentage points for married men.

We find *SuperSimples* positively impacted welfare, with overall gains of 4.2%. At the baseline, worker-searcher households and joint-employed households with both members in the informal sector before the policy was introduced, and single men gain the most, with the latter having the highest welfare gains of 3%. Instead, single women present welfare losses. In terms of welfare inequality, we find that, overall, at the baseline, inequality improves 4%, especially for informal men.

Our policy experiment studied the long-run effects of taxation policies on workers' labor market dynamics. We find an inverse relationship between the time the policy is introduced and the formality rates; if we introduce the policy at the earlier stages of workers' careers, we find steeper changes that converge to higher rates than the baseline case. Our results show that more significant changes in inflows are present in the job-finding rates.

Women's labor market profiles are more volatile, and married couples have higher formality rates than the overall average and steeper changes. Married couples' inflows to the formal sector come from both the informal sector and unemployment. When a switch in regimes occurs, changes in the inflow rates are similar for married women; however, for married men differ significantly; for example, when the policy is introduced after 10 years of experience, the transition across sectors changes up to 2 percentage points, whereas the job-finding rate changes up to 6.5 percentage points.

Single women favor informality and present the lowest formality rates. Regardless of when the policy is introduced, the impact on the formality rate is at most 1.5 p.p., and they continue to favor the informal sector. They present low transition rates from informal to formal; yet, their formal job-finding rates increase 3 percentage points when the policy is introduced at any stage. Single men present more stable labor market activity whose primary inflow into the formal sector is also higher job-finding rates.

Lifetime earnings are more dispersed than lifetime welfare; however, both exhibit a negative relationship between inequality and the time the policy was introduced over workers' labor market careers. Significant improvements occur when the policy is introduced before 20 years of workers' experience - ranging from 5% to 35%. Even though the policy improves inequality, we find that married women experienced the highest inequality among all groups.

In summary, we find that when introducing formalization policies in these economies, the within-household behavior matters. The household sorting into labor market sectors before the policy was implemented and the motivations behind their joint labor-supply optimal decisions will have a different impact on the formal-informal labor market composition. We have shown how both motivations behind the persistence of informality are intertwined. Workers are optimally choosing to stay informal while others cannot find a match in the formal sector and remain unemployed or informal, whereas searching for a formal job. Therefore, the multiple responses at the individual and household level have important implications for policy design by providing new avenues for policymakers to design cost-effective targeted policies for those wanting to formalize and to design social programs for those who remain informal while improving the labor market performance, inequality, and the aggregate economy.

We believe our strategy can be used to explore more avenues. We intend to use our framework to study the impact of the policy controlling for more demographic characteristics of the household. For example, we want to decompose the sample by families with and without children, completed education, and regions. In addition, we will extend the household search model to include the choice of working hours in both sectors, non-participation, and the progressive component of the tax system. Finally, in regards to future research we find that given the underlying motivations of individuals to voluntarily choose to be part of the informal sector, designing social programs to provide them with social and labor protections is crucial. However, funding these types of programs will rely on taxes on the formal sector, which might have a reverse effect by increasing the size of the informal sector, due to a penalty on labor costs. Therefore, we intend to develop the general equilibrium framework and look into the optimal policy design.

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A Mathematical Appendix

A.1 Empirical Estimation Method: Matching Difference-in-Differences

Following the methodology presented in Blundell and Dias (2009), we use *SuperSimples* as a naturally occurring event that creates an exogenous variation in our outcome variable, resulting in a "policy" shift for the treated group. Then, we compare the difference in average behavior before and after the policy for those who are treated with the before and after behavior for the non-treated group, that is, the excess outcome change for the treated compared to the non-treated. Therefore, to estimate the effect of *SuperSimples* on the transition from the informal to formal sector, we compare the difference in average outcomes of every individual in the treatment group, $\mathbb{E}[Y_{iA}|D_i = 1] - \mathbb{E}[Y_{iB}|D_i = 1]$, with the difference in average outcomes across time of "comparable" individuals in the non-treated group, $\mathbb{E}[Y_{iA}|D_i = 0] - \mathbb{E}[Y_{iB}|D_i = 0]$; the difference between these two components provides us with the average effect of treatment on treated (which we denote as α^{ATT}),

$$\alpha^{ATT} = \Big(\mathbb{E}[Y_{iA}|D_i = 1] - \mathbb{E}[Y_{iB}|D_i = 1]\Big) - \Big(\mathbb{E}[Y_{iA}|D_i = 0] - \mathbb{E}[Y_{iB}|D_i = 0]\Big). \tag{A.1}$$

The sample analog of this difference corresponds to the difference-in-differences (DID) estimator,

$$\hat{\alpha}^{DID} = \frac{1}{N_1}\sum_{i\in D_1}[Y_{iA} - Y_{iB}] - \frac{1}{N_0}\sum_{j\in D_0}[Y_{jA} - Y_{jB}]. \tag{A.2}$$

This expression identifies (A.1) by $\mathbb{E}[\hat{\alpha}^{DID}] = \alpha^{ATT}$. However, the identification of α^{ATT} relies on the DID estimator to be unbiased, which happens under two key assumptions: *common trends across groups* and *no systematic composition changes within each group.* First, the common-trends assumption means that in absence of the policy, we have the same growth over time of the transition of workers from the informal to the formal sector. Second, no systematic composition changes within each group and no selection of unobservables occur, which rules out selection on untreated outcomes in first differences. Let u_i be an unobservable individual fixed effect; then,

$$\mathbb{E}[u_{iA} - u_{iB}|D_i = 1] = \mathbb{E}[u_{iA} - u_{iB}|D_i = 0] = E[u_{iA} - u_{iB}]. \tag{A.3}$$

As Blundell et al. (2004) points out, an important issue is whether the impact of the policy is heterogeneous with respect to observable characteristics (which we denote as X_{it}). In this case, to correctly obtain the average impact of the policy, we must ensure the comparison group exists, meaning treatment and control groups must be comparable. In Appendices C.3 and C.4, we provide a series of balancing tests regarding treatment and time of policy. We include in the observables variables regarding the demographic characteristics, employment and education char-

acteristics, and spouse's characteristics if the individual is married. The null hypothesis for the tests in Tables C.8 and C.10 is that no significant differences exist across treated and non-treated groups in terms of the observables. In addition, the null hypothesis for the tests in Tables C.7 and C.9 is that no significant differences exist across before and after groups in terms of the observables. For the majority of the observables in these tables, we find that the difference across groups is statistically significant. Under this situation, we need an additional step to be able to provide reliable conclusions regarding the impact of *SuperSimples* on our outcome variable.

Therefore, we need an additional step for our empirical analysis to recover a set of weights and construct suitable comparison groups where we can guarantee that the distribution of the observables, X_{it}, is the same by treatment and time of policy. Following the matching difference-in-differences method proposed by Heckman, Ichimura and Todd (1997) and Heckman, Ichimura and Todd (1998), we construct a set of weights, denoted by ω_{ij}, to balance a series of features of the data at the same time. First, treated and non-treated will have the same distributions of unobservables. Second, they will have the same distribution of observables. Finally, both groups are placed in a common environment. Then, we are able to remove systematic differences in the evaluation outcome between treated and non-treated.

Given the nature of the panel of the *Brazilian Monthly Employment Survey*, we can build the MDID estimator described in Blundell and Dias (2009),

$$\hat{\alpha}^{MDID} = \frac{1}{N_1} \sum_{i \in D_1} \left[(Y_{iA} - Y_{iB}) - \sum_{j \in D_0} \omega_{ij} (Y_{jA} - Y_{jB}) \right], \tag{A.4}$$

where ω_{ij} are the weights that need to be estimated, N_1 (N_0) is the total number of individuals in the treated (non-treated) group, and D_1 (D_0) is the set of treated (non-treated) groups. Subscripts B and A refer to $T_i = 0$ and $T_i = 1$.

To construct the relevant weights, ω_{ij}, we implement the following procedure. First, we estimate the propensity score parametrically through a logit specification using the observables from the balancing test. As in Blundell et al. (2004), two propensity scores are estimated: one for treatment $[P(D_i = 1|X_i)]$ and one for time of policy $[P(T_i = 1|X_i)]$. Then, using the estimated propensity scores,[33] we implement a kernel-matching algorithm. We construct a neighborhood for each treated observation by using a kernel-weighted average over multiple individuals in the non-treated group. Then,

$$\omega_{ij} = \frac{K\left(\frac{P_j - P_i}{h}\right)}{\sum_{k \in D_0} K\left(\frac{P_k - P_i}{h}\right)}, \tag{A.5}$$

[33] We trim 1% at the top and bottom of the propensity-score distribution prior to the matching step.

where P is the propensity score of interest, K corresponds to the Epanechnikov Kernel, and h corresponds to the bandwidth, which we calculate using Silverman's Rule. We assign a positive weight to all observations within the neighborhood, and 0 otherwise. The same procedure applies for time of policy. We then create a matched sample. Figure B.2 shows the two propensity-score distributions for the whole sample pre and post the kernel-matching procedure. Figure B.3 in Appendix B.1 provides the propensity-score distribution pre and post matching by gender and marital status.

To ensure identification of the ATT under the MDID estimator specified in (1), we keep the common trends assumption discussed above and add a weaker version of the conditional mean independence and common-support assumptions as in Heckman, Ichimura and Todd (1998). For the conditional mean independence assumption restated within an MDID framework, we have that, conditional on the observables, X_i, the evolution of Y^0_{iT} for non-treated is independent of the treatment status. That is,

$$\mathbb{E}[Y^0_{iA} - Y^0_{iB} | D_{iT}, X_i] = \mathbb{E}[Y^0_{iA} - Y^0_{iB} | X_i], \tag{A.6}$$

or restated in terms of unobservables,

$$\mathbb{E}[u_{iA} - u_{iB} | D_{iT}, X_i] = \mathbb{E}[u_{iA} - u_{iB} | X_i]. \tag{A.7}$$

In other words, the potential outcome of non-treated is statistically independent of treatment assignment conditional on X_i.

Finally, we assume common-support, meaning all treated individuals have a counterpart of the non-treated before and after the policy. Typically, we assume the propensity scores, $P(D_i = 1|X_i), P(T_i = 1|X_i) \in (0, 1)$, yet it suffices that $P(D_i = 1|X_i) < 1$ and $P(T_i = 1|X_i) < 1$. This assumption is key to guarantee all treated have a counterpart among the non-treated and before and after the policy was implemented. Note Rosenbaum and Rubin (1983) show that if the conditional independence assumption holds for a set of observables, X_i, and the propensity scores are between zero and one,

$$\mathbb{E}[Y^0_{iA} - Y^0_{iB} | D_{iT}, P(X_i)] = \mathbb{E}[Y^0_{iA} - Y^0_{iB} | P(X_i)], \tag{A.8}$$

which reduces the dimension of X_i into a one-dimensional object $P(X_i)$ for the matching process. Figure B.2 shows the overlap between the propensity scores of the subsamples after the matching process. In Appendices C.3 and C.4, we also show the balancing tests regarding treatment and time of policy after the matching process. For the majority of the observables in these tables, we find the difference across groups is not statistically significant.

A.2 Estimation Standard-Errors Procedure

This paper implements an estimation method in three stages: a generalized method of moments (GMM) for the conditional wage-offer-distribution parameters (θ_W), a non-parametric estimation of the mobility parameters (θ_M), and a GMM for the preferences parameters (θ_P). Because the preference parameters depend on the estimated parameters of the previous two stages, the asymptotic variance of the final stage is affected by the estimation done in the previous stages. Suppose we mistakenly estimate the variance of the final stage with the standard formula of the GMM. In that case, we end up with inconsistent standard-error estimates of the preference parameters, leading to non-reliable confidence intervals. Therefore, we must correct the final-stage standard errors, for which we follow the procedure presented by Newey and McFadden (1994). For consistency, we keep the same notation as in section 7.

For the data sample x with a total number of observations of n, we index the observations of x throughout this section with an $i = \{1, ..., n\}$, i.e., $x = \{x_1, x_2, ..., x_n\}$. Recall that $h_w(x, \theta_W)$ are the predicted moments of the model corresponding to the conditional wage-offer distributions. This vector has a dimension of $M_w \times 1$, and x are the observables. We estimated the conditional wage-offer parameters (θ_W) using a GMM. Let H_w be the Jacobian of the moments with respect to θ_W, W_w a consistent weight matrix, and $\Omega_w = \mathbb{E}[h_w(x, \theta_W^0) h_w(x, \theta_W^0)']$, where θ_W^0 are the true parameters where a minimum is reached. Then, the GMM estimator's asymptotic covariance matrix is given by $V_{\theta_W} = (H_w' W_w H_w)^{-1} H_w' W_w \Omega_w W_w H_w (H_w' W_w H_w)^{-1}$. Let $\hat{W}_w$ be the identity matrix and use the sample average for $\hat{H}_w$ and $\hat{\Omega}_w$; that is,

$$\hat{H}_w = \frac{1}{n} \sum_{i=1}^{n} \nabla_{\theta_W} h_w(x_i, \hat{\theta}_W) \quad \text{and} \quad \hat{\Omega}_w = \frac{1}{n} \sum_{i=1}^{n} h_w(x_i, \hat{\theta}_W) h_w(x_i, \hat{\theta}_W)'. \tag{A.9}$$

The estimator of the asymptotic covariance matrix for the wages parameter is given by $\hat{V}_{\theta_W} = (\hat{H}_w' \hat{W}_w \hat{H}_w)^{-1} \hat{H}_w' \hat{W}_w \hat{\Omega}_w \hat{W}_w \hat{H}_w (\hat{H}_w' \hat{W}_w \hat{H}_w)^{-1}$, which converges in probability to V_{θ_W} by Theorem 4.5 in Newey and McFadden (1994). Then, the standard errors for our first-stage parameters, $\hat{\theta}_W$, are given by

$$\hat{s}_{\theta_W} = \sqrt{\frac{diag(\hat{V}_{\theta_W})}{n}}. \tag{A.10}$$

The second-stage parameters in our estimation method are the mobility parameters, θ_M, which we estimated non-parametrically. Therefore, we recover the standard errors of these parameters through the delta method. Let the mobility parameters be $\theta_M = h_m(x, \theta_W)$, where h_M is an M_w-vector of monotonic functions that are continuously differentiable. We have estimated, $\hat{\theta}_M = h_m(x, \hat{\theta}_W)$; however, we still need to estimate the standard errors, $\hat{s}_{\theta_M}$. Assume the estimator $\hat{\theta}_W$ is root-n consistent and asymptotically normal; then,

$$n^{1/2}(\hat{\theta}_W - \theta_W^0) \overset{a}{\sim} N(0, V_{\theta_W}), \tag{A.11}$$

where V_{θ_W} is the asymptotic covariance matrix from the first stage. A first-order Taylor expansion of $h_m(x, \hat{\theta}_W)$ around θ_W^0 is given by

$$\hat{\theta}_M \cong h_m(x, \theta_W^0) + \nabla_{\theta_W} h_m(x, \theta_W^0)(\hat{\theta}_W - \theta_W^0). \tag{A.12}$$

Denote $\theta_M^0 = h_m(x, \theta_W^0)$, because it is the true value of θ_M, and $H_m^0 = \nabla_{\theta_W} h_m(x, \theta_W^0)$. Then, (A.12) becomes

$$n^{1/2}(\hat{\theta}_M - \theta_M^0) \overset{a}{=} H_m^0 n^{1/2}(\hat{\theta}_W - \theta_W^0). \tag{A.13}$$

Hence, the asymptotic distribution of $\hat{\theta}_M$ is given by

$$n^{1/2}(\hat{\theta}_M - \theta_M^0) \overset{a}{\sim} N(0, H_m^0 V_{\theta_W} H_m^{0\prime}). \tag{A.14}$$

Denote V_{θ_M} as the asymptotic covariance matrix of the mobility parameters. Then, we have that the estimator for this covariance matrix is given by $\hat{V}_{\theta_M} = \hat{H}_m \hat{V}_{\theta_W} \hat{H}_m'$, where $\hat{H}_m = \frac{1}{n} \sum_{i=1}^{n} \nabla_{\theta_W} h_m(x_i, \hat{\theta}_W)$. Hence, the standard errors for our second-stage parameters, $\hat{\theta}_M$, are given by

$$\hat{s}_{\theta_M} = \sqrt{\frac{diag(\hat{V}_{\theta_M})}{n}}. \tag{A.15}$$

Finally, we estimate the standard errors for the preference parameters, θ_P. As stated above, the asymptotic covariance matrix of the third-stage parameters is affected by the estimated parameters in the previous two stages; therefore, we must correct the final-stage standard errors to ensure that we end with consistent standard errors. From the previous step, note the mobility parameters are a series of functions that depend on the conditional wage-offer-distribution parameters; that is, $\hat{\theta}_M = h_m(x, \hat{\theta}_W)$. Then, we can stack the predicted moments from the first two steps and denote them as $h_{wm}(x, \theta_W) = [h_w(x, \theta_W)', h_m(x, \theta_W)']'$, which only depend on the first-stage parameters but have dimension $(M_w + M_m) \times 1$. Similarly, let $h_p(x, \theta_P, \theta_W)$ be the vector of predicted moments with dimension $M_p \times 1$ and let the stacked predicted moments be $\tilde{h}_p(x, \theta_P, \theta_W) = [h_{wm}(x, \theta_W)', h_p(x, \theta_P, \theta_W)']'$, with dimension $(M_w + M_m + M_p) \times 1$.

Newey and McFadden (1994) provide conditions for which we can calculate the corrected asymptotic covariance matrix for the preference parameters, $\hat{\theta}_P$. Denote the Jacobians as follows:

$$H_{\theta_P} = \mathbb{E}[\nabla_{\theta_P} h_p(x, \theta_P^0, \theta_W^0)], \quad H_{\theta_W} = \mathbb{E}[\nabla_{\theta_W} h_p(x, \theta_P^0, \theta_W^0)] \quad \text{and} \quad Q_{\theta_W} = \mathbb{E}[\nabla_{\theta_W} h_{wm}(x, \theta_W^0)]. \tag{A.16}$$

For conciseness, denote $h_p(x) = h_p(x, \theta_P^0, \theta_W^0)$ and $\Psi(x) = -Q_{\theta_W}^{-1} h_{wm}(x, \theta_W^0)$. Theorem 6.1. from Newey and McFadden (1994) establishes that if $n^{-1} \sum_{i=1}^{n} h_p(x_i, \theta_P, \hat{\theta}_W)$ and $n^{-1} \sum_{i=1}^{n} h_{wm}(x_i, \theta_W)$ are satisfied with probability approaching one, $\hat{\theta}_P \overset{p}{\to} \theta_P^0$, $\hat{\theta}_W \overset{p}{\to} \theta_W^0$ and $\tilde{h}_p(x, \theta_P, \theta_W)$ satisfies the conditions in Theorem 3.4. Then, $\hat{\theta}_P$ and $\hat{\theta}_W$ are asymptotically normal and $\sqrt{n}(\hat{\theta}_P - \theta_P^0) \overset{d}{\to}$

$N(0, V_{\theta_P})$, where

$$V_{\theta_P} = H_{\theta_P}^{-1}\mathbb{E}[\{h_p(x) + H_{\theta_W}\Psi(x)\}\{h_p(x) + H_{\theta_W}\Psi(x)\}']H_{\theta_P}^{-1\prime}. \tag{A.17}$$

Note the Jacobian terms can be estimated by using the sample averages,

$$\hat{H}_{\theta_P} = \frac{1}{n}\sum_{i=1}^{n}\nabla_{\theta_P}h_p(x_i, \hat{\theta}_P, \hat{\theta}_W), \quad \hat{H}_{\theta_W} = \frac{1}{n}\sum_{i=1}^{n}\nabla_{\theta_W}h_p(x_i, \hat{\theta}_P, \hat{\theta}_W) \quad \text{and} \quad \hat{Q}_{\theta_W} = \frac{1}{n}\sum_{i=1}^{n}\nabla_{\theta_W}h_{wm}(x_i, \hat{\theta}_W). \tag{A.18}$$

Let $\hat{h}_p^i = h_p(x_i, \hat{\theta}_P, \hat{\theta}_W)$ and $\hat{h}_{wm}^i = h(x_i, \hat{\theta}_W)$; then, we have the sample equivalent, $\hat{\Psi}_i = -\hat{Q}_{\theta_W}^{-1}\hat{h}_{wm}^i$. The sample equivalent of equation (A.17) is given by

$$\hat{V}_{\theta_P} = \hat{H}_{\theta_P}^{-1}\left[\frac{1}{n}\sum_{i=1}^{n}\{\hat{h}_p^i + \hat{H}_{\theta_W}\hat{\Psi}_i\}\{\hat{h}_p^i + \hat{H}_{\theta_W}\hat{\Psi}_i\}'\right]\hat{H}_{\theta_P}^{-1\prime}. \tag{A.19}$$

If the moment conditions are uncorrelated (i.e., $\mathbb{E}[h_p(x, \theta_P^0, \theta_W^0)h_{wm}(x, \theta_W^0)'] = 0$), then for $\hat{V}_{\theta_{WM}} = n^{-1}\sum_{i=1}^{n}\hat{\Psi}_i\hat{\Psi}_i'$, the estimator of the asymptotic covariance for $\hat{\theta}_P$ is

$$\hat{V}_{\theta_P} = \hat{H}_{\theta_P}^{-1}\left(n^{-1}\sum_{i=1}^{n}\hat{h}_p^i\hat{h}_p^{i\prime}\right)\hat{H}_{\theta_P}^{-1\prime} + \hat{H}_{\theta_P}^{-1}\hat{H}_{\theta_W}\hat{V}_{\theta_{WM}}\hat{H}_{\theta_W}'\hat{H}_{\theta_P}^{-1\prime}. \tag{A.20}$$

Once we have corrected the asymptotic variance estimator for the previous-stages estimation, we have that the standard errors for the preference parameters:

$$\hat{s}_{\theta_P} = \sqrt{\frac{diag(\hat{V}_{\theta_P})}{n}} \tag{A.21}$$

A.3 Simulation of Lifetime Earnings

The simulation method for individual and household lifetime earnings follows Flinn (2002), and Flabbi and Mabli (2018). However, given that our framework embeds the formal and informal sector plus treatment, we cannot discard the unemployment spells because the formal benefits need to be accounted for in the lifetime-earnings measure.

Given the structural parameters estimated in section 7, we simulate labor market histories for single-headed and married-couples households where, if married, we account for the optimal joint labor market decision for the husband and wife. Recall that N_S and J_S denote the population of single men and women, respectively. For married men and women, N_M and J_M, for a total number of households, $H = N_M + J_M$. We use the monthly discount rate from the estimation procedure, $\rho = r/12 = 0.06/12$.

We use the following notation. Denote a generic spell as ι, which we index by i starts at $\iota_1 = 0$ and ends after 540 months corresponding to a 45-year labor market career for the individual (or household). The labor market status attached to spell ι_i is denoted by l_i, which equals 1 if the individual is employed in such a spell and equals 0 if unemployed. The total duration of the spell is denoted by t_i (should not be confused with the time of policy T). We start each individual's labor market career as unemployed, meaning a household starts in a joint-unemployed state.

Lastly, we recover from the data the probability of being in the formal or informal sector at time of policy T, $P_T(s_k|z_{-k})$, where for individual k, s_k denotes the sector of employment and z_k denotes the labor market status of the spouse (if single, $z_k = 0$). Conditional on the sector of employment, we recover the probability of treatment d_k in sector s_k; that is, $P_T(s_k, d_k|z_{-k})$.

A.3.1 Simulation of Lifetime Earnings among Singles

We record the labor market status, sector, treatment, and wage for single individuals for every spell. Every individual at the initial spell, ι_1, starts at an unemployment spell, $l_1 = 0$, such that the only way to leave this spell is to become employed in ι_2. However, we must define the sector and treatment of the job of the following spell. We generate a random draw x from a uniform distribution on the unit interval such that if $x \geq P_T(s = F)$, the job is in the formal sector, and if $x < P_T(s = F)$, the job is in the informal sector. Next, conditional on the job's sector, we define treatment. Then, for those in sector s we generate a random draw y from a uniform distribution such that if $y \geq P_T(s, d = 1)$ the job in sector s is at a treated firm; otherwise, the job is at a non-treated firm. Because we have assigned a sector and treatment for the upcoming job, then for an unemployment spell (so that $l_i = 0$), we generate a draw t_i from an exponential distribution with parameter $\lambda_{U,T}(s, d) \times [1 - G_T(w_T^R|s, d)]$. We then generate a wage draw w_{i+1} assigned to the next spell, from the accepted conditional wage-offer distribution $G_T(w|w \geq w_T^R, s, d)$. The contribution of spell i to lifetime earnings is given by

$$LE_i = exp(-\rho\iota_i) \int_0^{t_i} B_{i-1}(w, s) \times exp(-\rho\nu)d\nu = \frac{1}{\rho} exp(-\rho\iota_i)[1 - exp(-\rho t_i)] \times B_{i-1}(w, s), \quad \text{(A.22)}$$

for $\iota_i \neq \iota_1$. $B(w, s)$ corresponds to the function for the benefits defined by equation (6) if separated from a formal-sector job. To be able to collect these benefits, the individual must be employed in the previous spell $i - 1$; hence, for $\iota_1 = 0$, we have that the contribution of the spell is equal to $LE_i = 0$. Spell $i + 1$ will be an employment spell beginning at calendar time $\iota_{i+1} = \iota_i + t_i$ at the wage w_{i+1} in sector s_{i+1} and treatment d_{i+1}.

When spell i is an employment spell ($l_i = 1$), we have that the spell ends due to two events: dismissal due to exogenous separation or quit into a better job (on-the-job search). Denote the

wage at the current spell as w_i and draw t_i from an exponential distribution with parameter $\delta(s_i, d_i) + \lambda_{E,T}(s_{i+1}, d_{i+1}|s_i) \times [1 - G_T(w_i|s_{i+1}, d_{i+1})]$. Recall that we restrict workers to only search across sectors while employed. Therefore, those employed in the formal sector can only receive job offers from the informal sector, and those employed in the informal sector can only receive job offers from the formal sector. However, we must assign a treatment to the potential job offer for those we determined to continue being employed in spell $i+1$. Then, for those in sector s, we generate a random draw y from a uniform distribution such that if $y \geq P_T(s, d = 1)$, the job in sector s is at a treated firm; otherwise, the job is at a non-treated firm. As in Flinn (2002), we generate a random draw x from a uniform distribution on the interval $[0, 1]$ such that if $x < \frac{\delta(s_i,d_i)}{\delta(s_i,d_i)+\lambda_{E,T}(s_{i+1},d_{i+1}|s_i)\times[1-G_T(w_i|s_{i+1},d_{i+1})]}$, the spell ended due to exogenous separation; otherwise, the following spell, $i+1$, is an employment spell but in a better job in the opposite sector.

Lastly, for those who continue to be employed in spell $i+1$, we generate a wage draw w_{i+1} from the conditional accepted-wage distribution $G_T(w|w \geq w_i, s_{i+1}, d_{i+1})$ (where $s_i \neq s_{i+1}$). Therefore, employment spell i contributes to lifetime earnings by

$$LE_i = exp(-\rho\iota_i) \int_0^{t_i} \widetilde{w}_i \times exp(-\rho v) dv = \frac{1}{\rho} exp(-\rho\iota_i)[1 - exp(-\rho t_i)] \times \widetilde{w}_i, \tag{A.23}$$

where $\widetilde{w}$ corresponds to the after-tax monthly income of the individual. Denote M as the number of spells starting prior to the 540th month. Then, the labor market career of individual k (single man or woman) generates mean lifetime earnings of

$$\Omega_S = \sum_{k=1}^{K} \omega(k) = \frac{1}{\rho} \sum_{k=1}^{K} \sum_{i=1}^{M} exp(-\rho\iota_{k,i})[1 - exp(-\rho t_{k,i})] \times [B_{k,i-1}(w, s) \times (1 - l_{k,i}) + \widetilde{w}_{k,i} \times l_{k,i}]. \tag{A.24}$$

A.3.2 Simulation of Lifetime Earnings among Married

For married couples, the simulation procedure is similar to that for singles; however, we must take the joint labor market decisions into account when determining the household state for each spell i. We continue to record the labor market status, sector, treatment, and wage for married couples for every spell. For household h in the initial spell, ι_1, each spouse starts in an unemployment spell, $l_1 = 0$, meaning the household is in a joint-unemployed state. If one spouse becomes employed in spell $i+1$, the married couple becomes a worker-searcher household. Therefore, we must define the sector and treatment of the potential job for each spouse in spell $i+1$.

We generate a random draw x_k from a uniform distribution on the unit interval such that if $x_k \geq P_T(s_k = F|z_{-k})$, the job is in the formal sector; otherwise, the job is in the informal sector. Next, conditional on the job's sector, we define treatment. For those in sector s_k, we generate a random draw y_k from a uniform distribution such that if $y_k \geq P_T(s_k, d_k = 1|z_{-k})$ for spouse k, the job in sector s_k is at a treated firm; otherwise, the job is at a non-treated firm. Because we have assigned a sector and treatment for the upcoming job, then for an unemployment spell (so that $l_i = 0$), we generate a draw $t_{k,i}$ from an exponential distribution with parameter $\lambda_{U,T}(s_k, d_k|z_{-k}) \times [1 - G_T(w^R_{k,T}|s_k, d_k; z_{-k})]$. Because labor market decisions in the household are done jointly, we set the duration of the spell for the household as $t_{h,i} = \min\{t_{1,i}, t_{2,i}\}$, where $t_{1,i}$ is the duration of spell i for the husband and $t_{2,i}$ for the wife. We generate a wage draw $w_{k,i+1}$ assigned to the next spell, from the conditional accepted-wage distribution $G_T(w_k|w_k \geq w^R_{k,T}, s_k, d_k; z_{-k})$. Then, the household determines their new household status recurring to the joint-optimal-decision rules discussed in section 5. Note that if $t_{1,i} \leq t_{2,i}$ the household transitions to a worker-searcher state where the husband is employed, yet if $t_{1,i} > t_{2,i}$, the worker-searcher is reached through the wife. The contribution of spell i to household lifetime earnings is given by

$$\begin{aligned} HLE_i &= exp(-\rho\iota_i) \int_0^{t_{h,i}} \left[\sum_{k=1}^{2} B_{k,i-1}(w_k, s_k) \right] \times exp(-\rho\nu) d\nu \\ &= \frac{1}{\rho} exp(-\rho\iota_i)[1 - exp(-\rho t_{h,i})] \times \left[\sum_{k=1}^{2} B_{k,i-1}(w_k, s_k) \right] \end{aligned} \tag{A.25}$$

for $\iota_i \neq \iota_1$. $B_k(w_k, s_k)$ corresponds to the function for the benefits defined by equation (6) if separated from a formal-sector job. To be able to collect these benefits, the individual must be employed in the previous spell $i - 1$; hence, for $\iota_1 = 0$, we have that the contribution of the spell is equal to $HLE_i = 0$. Spell $i + 1$ will be a worker-searcher spell beginning in calendar time $\iota_{i+1} = \iota_i + t_{h,i}$.

We implement the following procedure for the case in which the household is in a worker-searcher state in spell i. Assume a worker-searcher case in which the husband is in an employment spell i and the wife is in an unemployment spell i. For the wife, the assignment of the sector, treatment, spell duration, and wage is done identically as in joint unemployment. The main difference is z_{-k}, where the husband, instead of being unemployed, is employed in sector s_{-k}, treatment d_{-k} at wage w_{-k}.

For the husband's case, where spell i is an employment spell ($l_i = 1$), the spell ends by two events: dismissal or quitting into a better job (on-the-job search). Recall that we restrict workers to only search across sectors while employed. Therefore, those employed in the formal sector can only receive job offers from the informal sector, and those in the informal sector can only receive job offers from the formal sector. However, we must assign a treatment to the potential job offer for those we determined to continue employed in spell $i + 1$. Then, for those in sector $s_{1,i+1}$, we

generate a random draw y_1 from a uniform distribution such that if $y_1 \geq P_T(s_{1,i+1}, d_{1,i+1} = 1|z_{2,i})$, the job in sector $s_{1,i+1}$ is at a treated firm; otherwise, the job is at a non-treated firm.

Denote the wage in the current spell as $w_{1,i}$ and draw $t_{1,i}$ from an exponential distribution with parameter $\delta(s_{1,i}, d_{1,i}|z_{2,i}) + \lambda_{E,T}(s_{1,i+1}, d_{1,i+1}|s_{1,i}; z_{2,i}) \times [1 - G_T(w_{1,i}|s_{1,i+1}, d_{1,i+1}; z_{2,i})]$. Then, we generate a random draw x_1 from a uniform distribution such that if $x_1 < \frac{\delta(s_{1,i},d_{1,i}|z_{2,i})}{\delta(s_{1,i},d_{1,i}|z_{2,i})+\lambda_{E,T}(s_{1,i+1},d_{1,i+1}|s_{1,i};z_{2,i})\times[1-G_T(w_{1,i}|s_{1,i+1},d_{1,i+1};z_{2,i})]}$, the spell ends due to exogenous separation; otherwise, the following spell, $i+1$, is an employment spell but in a better job in the opposite sector. For those who continue to be employed in spell $i+1$, we generate a wage draw $w_{1,i+1}$ from the conditional accepted-wage distribution $G_T(w_1|w_1 \geq w_{1,i}, s_{i+1}, d_{i+1}; z_{2,i})$ where $s_{1,i} \neq s_{1,i+1}$. The household determines its new status following the joint-optimal-decision rules. Note that if the wife receives a job offer, the household has three choices: (i) reject and remain as worker-searcher with the husband employed; (ii) accept the offer and become a joint-employed household; or (iii) accept the offer and induce an endogenous quit of the husband, inducing a worker-searcher state where the wife is employed. If the husband is exogenously separated from his job, the household returns to a joint-unemployed state. However, suppose the husband accepts a job offer while searching on the job. In that case, they remain as a worker-searcher household but with a different monthly income. We also set the duration of the spell for the household as $t_{h,i} = \min\{t_{1,i}, t_{2,i}\}$, where $t_{1,i}$ is the duration of spell i for the husband and $t_{2,i}$ for the wife. Therefore, the contribution of spell i to the household lifetime earnings at a worker-searcher state is given by

$$\begin{aligned} HLE_i &= exp(-\rho\iota_i) \int_0^{t_{h,i}} \left[\widetilde{w}_{1,i} + B_{2,i-1}(w_2, s_2)\right] \times exp(-\rho\nu)d\nu \\ &= \frac{1}{\rho} exp(-\rho\iota_i)[1 - exp(-\rho t_{h,i})] \times \left[\widetilde{w}_{1,i} + B_{2,i-1}(w_2, s_2)\right], \end{aligned} \tag{A.26}$$

where $\widetilde{w}$ corresponds to the after-tax monthly income of the individual and $B_{2,i-1}(w_2, s_2) > 0$ if ι_{i-1} was an employment spell for the wife in the formal sector. For a worker-searcher household with the wife employed, the simulation procedure in spell i is symmetric.

Finally, when the household is in a joint-employed state in spell i, we have that for either spouse, the spell ends by two events: dismissal or quitting into a better job. We must assign a treatment to the potential job offer for those we determined to continue employed in spell $i+1$. Then, for those in sector $s_{k,i+1}$, we generate a random draw y_k from a uniform distribution such that if $y_k \geq P_T(s_{k,i+1}, d_{k,i+1} = 1|z_{-k,i})$, the job in sector $s_{k,i+1}$ is at a treated firm; otherwise, the job is at a non-treated firm.

Denote the wage in the current spell as $w_{k,i}$ and draw $t_{k,i}$ from an exponential distribution with parameter $\delta(s_{k,i}, d_{k,i}|z_{-k,i}) + \lambda_{E,T}(s_{k,i+1}, d_{k,i+1}|s_{k,i}; z_{-k,i}) \times [1 - G_T(w_{k,i}|s_{k,i+1}, d_{k,i+1}; z_{-k,i})]$. Then, we generate a random draw x_k from a uniform distribution such that if $x_k < \frac{\delta(s_{k,i},d_{k,i}|z_{-k,i})}{\delta(s_{k,i},d_{k,i}|z_{-k,i})+\lambda_{E,T}(s_{k,i+1},d_{k,i+1}|s_{k,i};z_{-k,i})\times[1-G_T(w_{k,i}|s_{k,i+1},d_{k,i+1};z_{-k,i})]}$, the spell ends due to exogenous separa-

tion; otherwise, the following spell, $i+1$ is an employment spell but in a better job in the opposite sector. For those who continue to be employed in spell $i+1$, we generate a wage draw $w_{k,i+1}$ from the conditional accepted-wage distribution $G_T(w_k|w_k \geq w_{k,i}, s_{k,i+1}, d_{k,i+1}; z_{-k,i})$, where $s_{k,i} \neq s_{k,i+1}$. Note that in this case, endogenous quits are also considered when the spouses are searching on the job and jointly decide the optimal household status for the $i+1$ spell. We also set the duration of the spell for the household as $t_{h,i} = \min\{t_{1,i}, t_{2,i}\}$. Therefore, the contribution of the spell i to the household lifetime earnings in a joint-employed state is given by

$$\begin{aligned} HLE_i &= exp(-\rho\iota_i) \int_0^{t_{h,i}} \left[\widetilde{w}_{1,i} + \widetilde{w}_{2,i}\right] \times exp(-\rho\nu) d\nu \\ &= \frac{1}{\rho} exp(-\rho\iota_i)[1 - exp(-\rho t_{h,i})] \times \left[\widetilde{w}_{1,i} + \widetilde{w}_{2,i}\right]. \end{aligned} \tag{A.27}$$

Denote M as the number of spells starting prior to the 540th month. Then, the mean lifetime earnings of household h is given by

$$\Omega_{HH} = \sum_{h=1}^{H} \omega_{HH}(h) = \frac{1}{\rho} \sum_{h=1}^{H} \sum_{i=1}^{M} exp(-\rho\iota_{h,i})[1 - exp(-\rho t_{h,i})] \times HLE_{h,i}, \tag{A.28}$$

where

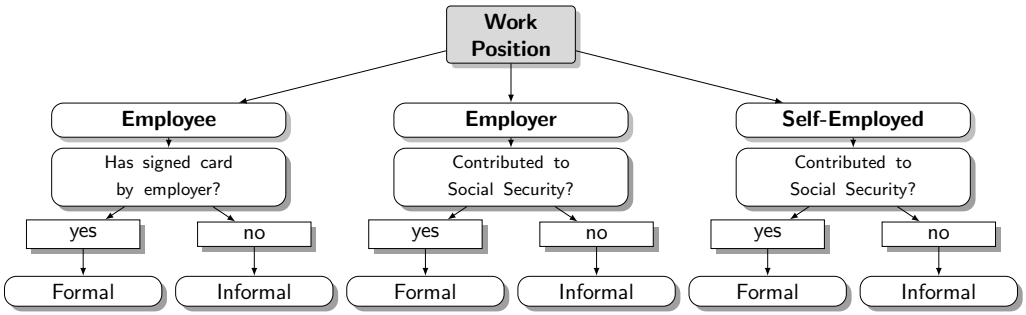
$$HLE_{h,i} = [B_{1,i-1}(w,s) \times (1 - l_{1,i}) + \widetilde{w}_{1,i} \times l_{1,i}] + [B_{2,i-1}(w,s) \times (1 - l_{2,i}) + \widetilde{w}_{2,i} \times l_{2,i}]. \tag{A.29}$$

Finally, given that we have the labor market status of each member of the household and their accepted wages and benefits when unemployed, we can determine their individual lifetime earnings, LE_i, similarly to that for singles and their mean lifetime earnings. Individually, for married men and women, we have

$$\Omega^1_{HH} = \sum_{n=1}^{H} \omega(n) \quad \text{and} \quad \Omega^2_{HH} = \sum_{j=1}^{H} \omega(j). \tag{A.30}$$

B Appendix: Supplemental Figures

Figure B.1: Definition Formal and Informal Sector

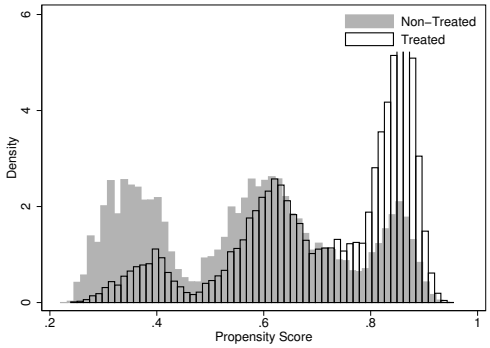


Source: Author's elaboration using the Brazilian Monthly Employment Survey (PME).

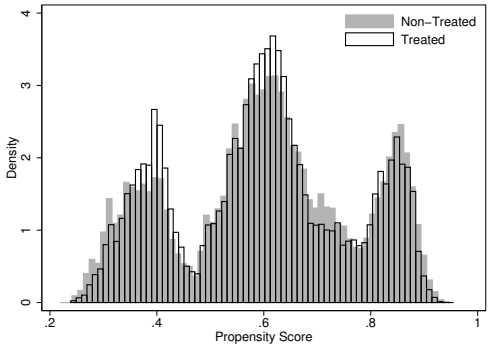
B.1 Propensity Scores: Pre and Post Matching

Figure B.2: Propensity Scores Pre/Post Matching: All Sample

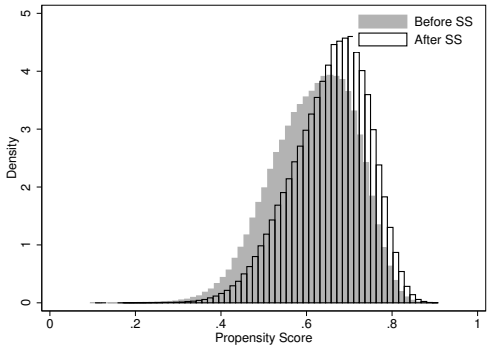
(a) Pre-Matching:
Propensity Score Treatment



(b) Post-Matching:
Propensity Score Treatment



(c) Pre-Matching:
Propensity Score Time of Policy



(d) Post-Matching:
Propensity Score Time of Policy

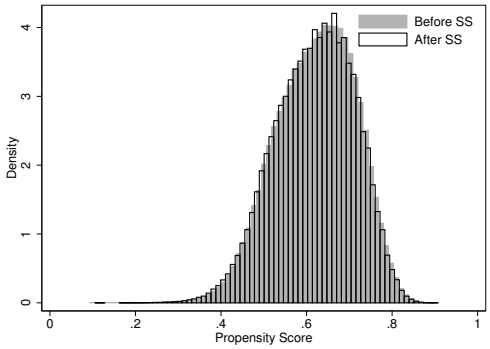
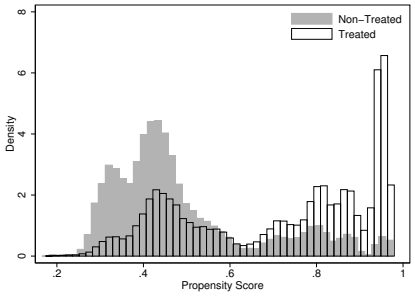
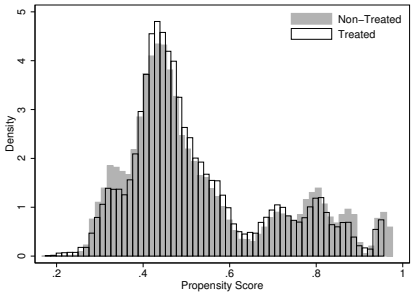


Figure B.3: Propensity Scores Treatment Pre/Post Matching by Gender and Marital Status

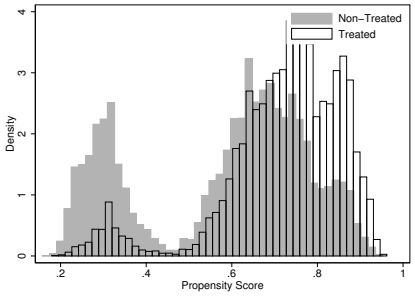
(a) Pre-Matching: Single Women



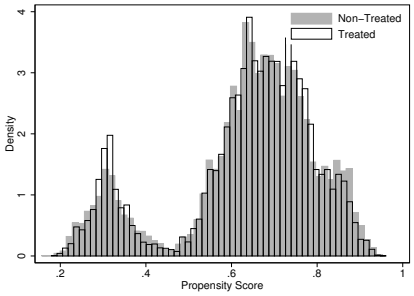
(b) Post-Matching: Single Women



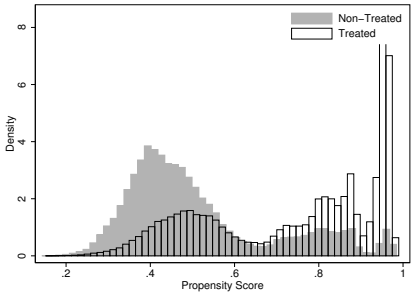
(c) Pre-Matching: Single Men



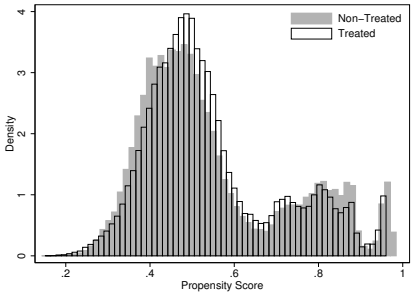
(d) Post-Matching: Single Men



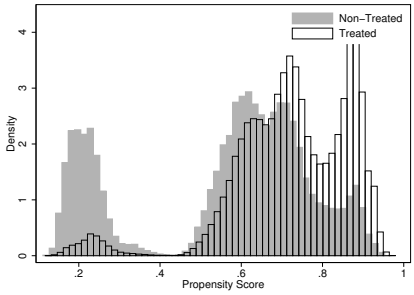
(e) Pre-Matching: Married Women



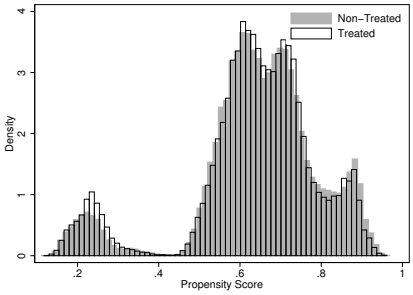
(f) Post-Matching: Married Women



(g) Pre-Matching: Married Men

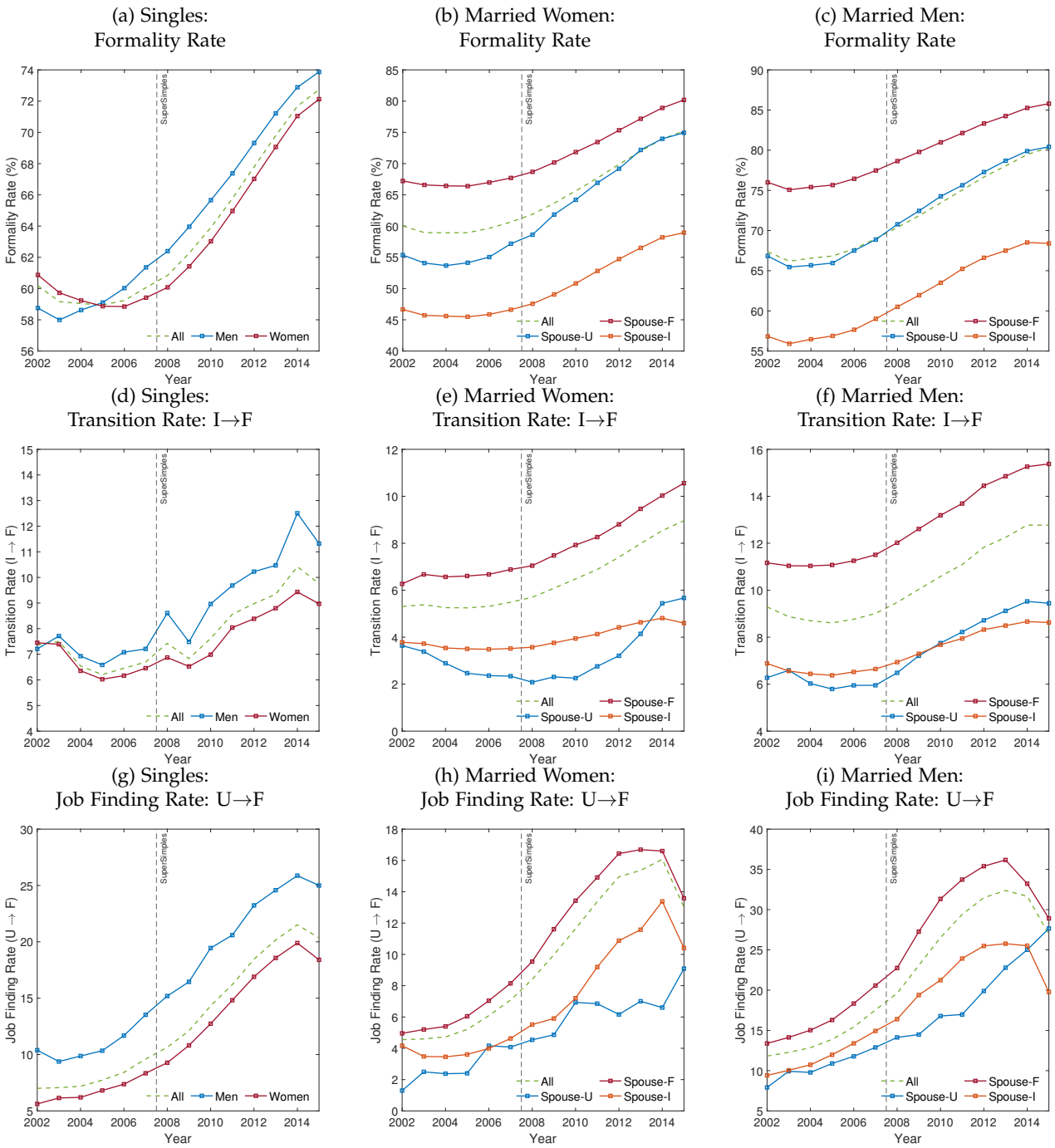


(h) Post-Matching: Married Men



B.2 Descriptive Data: Labor Market Trends

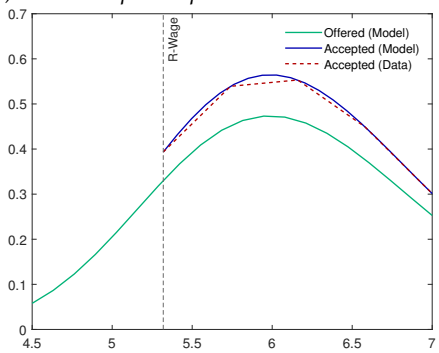
Figure B.4: Labor Market Trends by Gender and Marital Status



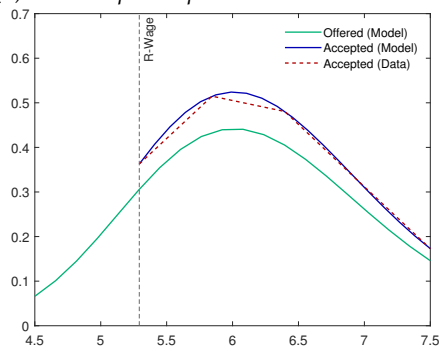
B.3 Model Fit: Wage Distribution for Singles

Figure B.5: Model Fit: Wage Distribution for Single Women by Time of Policy

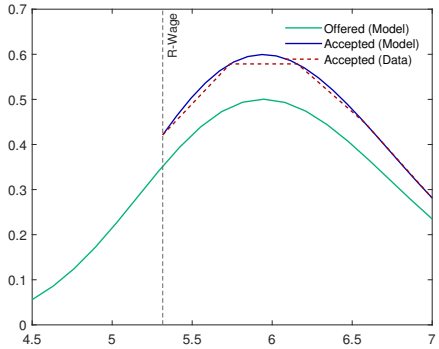
(a) Before *SuperSimples*: Formal Non-Treated



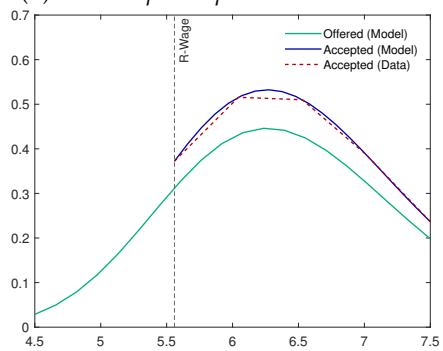
(b) After *SuperSimples*: Formal Non-Treated



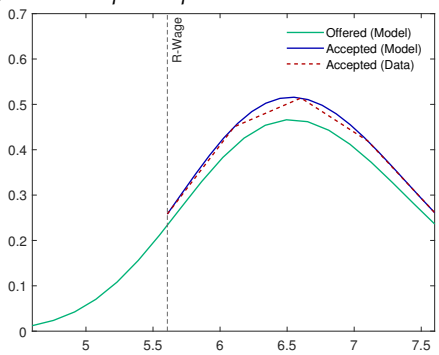
(c) Before *SuperSimples*: Formal Treated



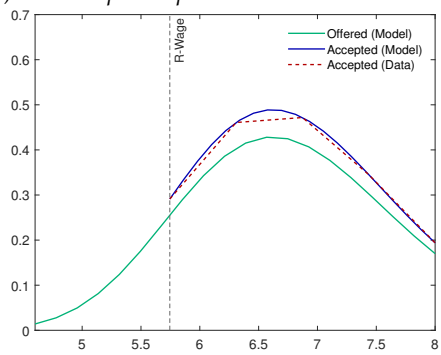
(d) After *SuperSimples*: Formal Treated



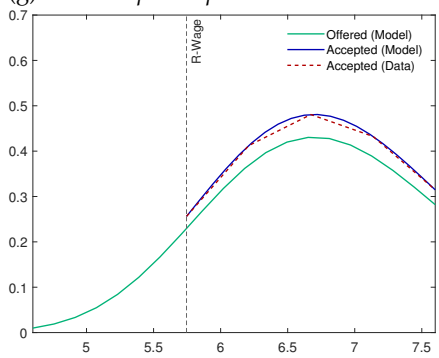
(e) Before *SuperSimples*: Informal Non-Treated



(f) After *SuperSimples*: Informal Non-Treated



(g) before*SuperSimples*: Informal Treated



(h) After *SuperSimples*: Informal Treated

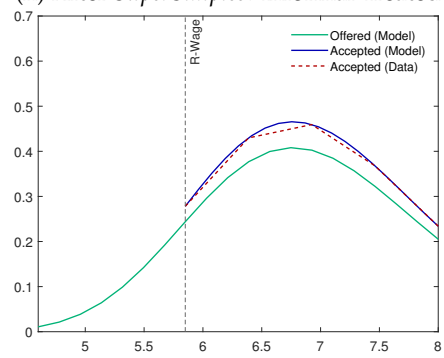
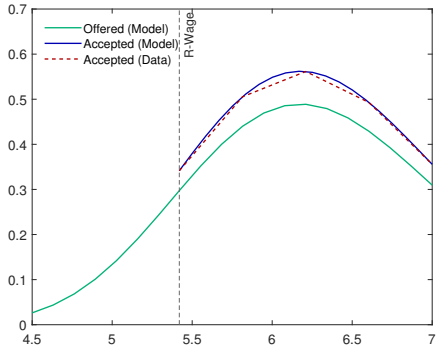
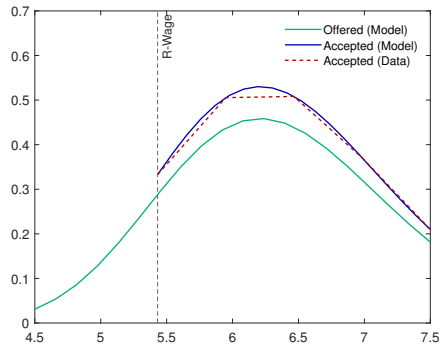


Figure B.7: Model Fit: Wage Distribution for Single Men by Time of Policy

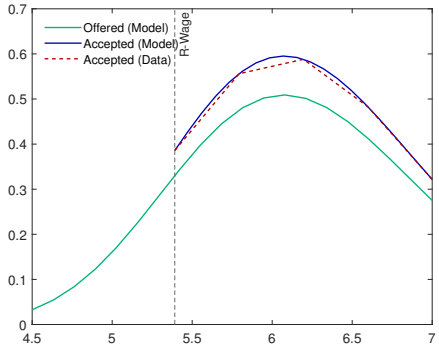
(a) Before *SuperSimples*: Formal Non-Treated



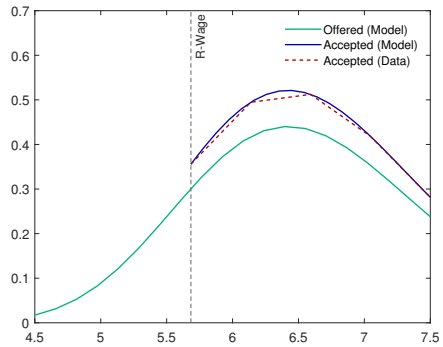
(b) After *SuperSimples*: Formal Non-Treated



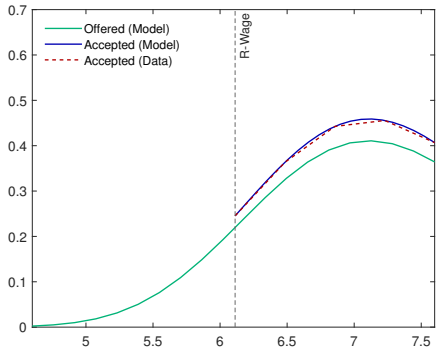
(c) Before *SuperSimples*: Formal Treated



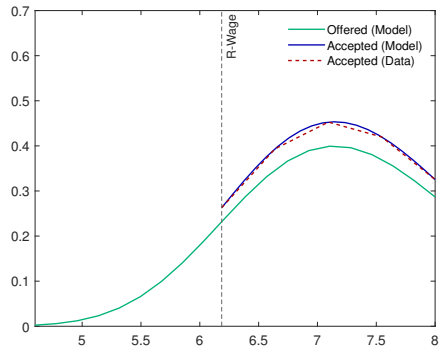
(d) After *SuperSimples*: Formal Treated



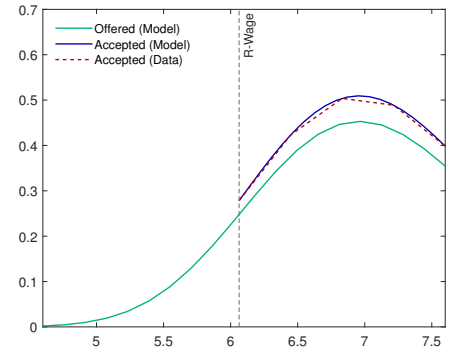
(e) Before *SuperSimples*: Informal Non-Treated



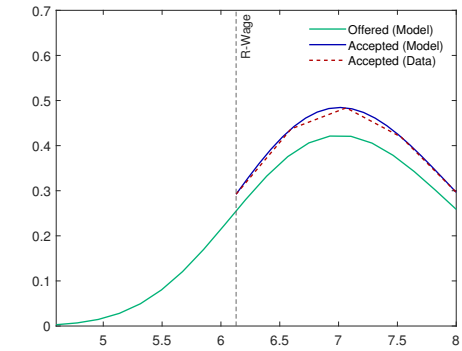
(f) After *SuperSimples*: Informal Non-Treated



(g) before*SuperSimples*: Informal Treated



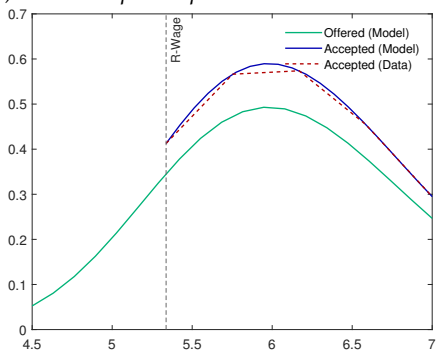
(h) After *SuperSimples*: Informal Treated



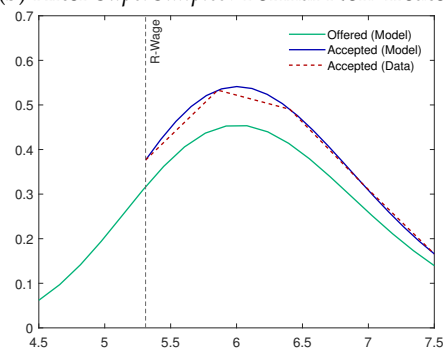
B.4 Model Fit: Wage Distribution for Married (Individual Search)

Figure B.8: Model Fit: Wage Distribution for Married Women by Time of Policy (Individual Search Model)

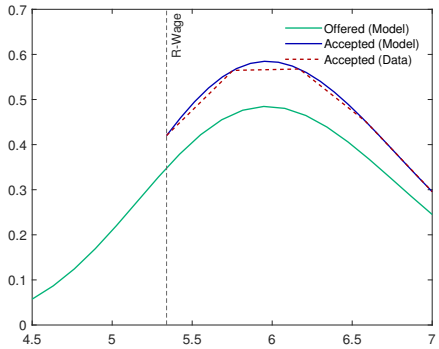
(a) Before *SuperSimples*: Formal Non-Treated



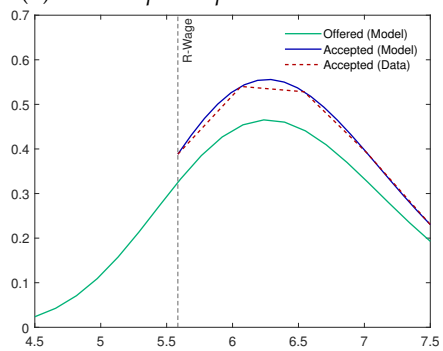
(b) After *SuperSimples*: Formal Non-Treated



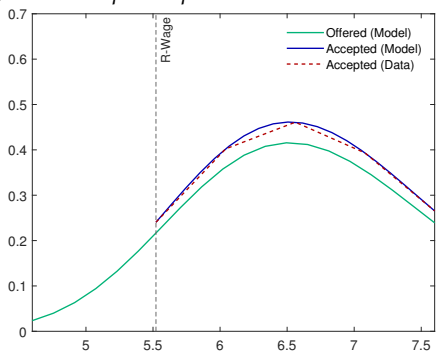
(c) Before *SuperSimples*: Formal Treated



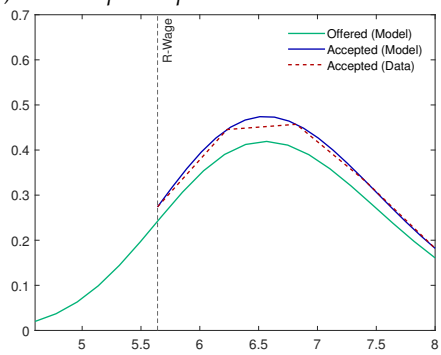
(d) After *SuperSimples*: Formal Treated



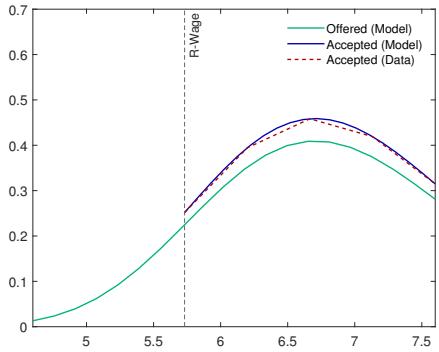
(e) Before *SuperSimples*: Informal Non-Treated



(f) After *SuperSimples*: Informal Non-Treated



(g) before*SuperSimples*: Informal Treated



(h) After *SuperSimples*: Informal Treated

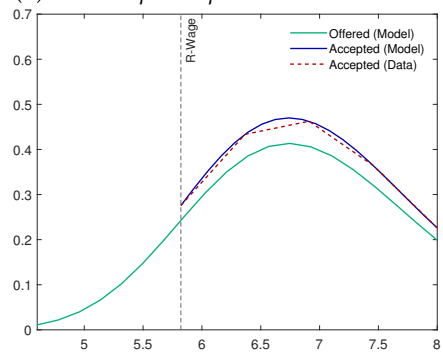
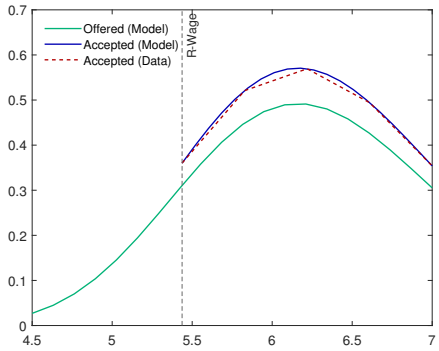
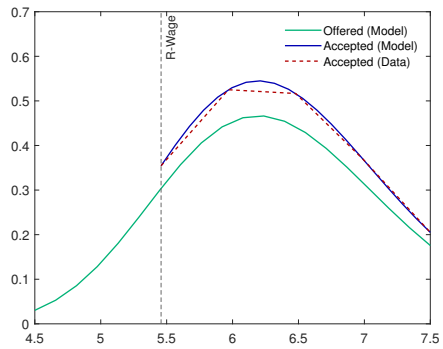


Figure B.10: Model Fit: Wage Distribution for Married Men by Time of Policy (Individual Search Model)

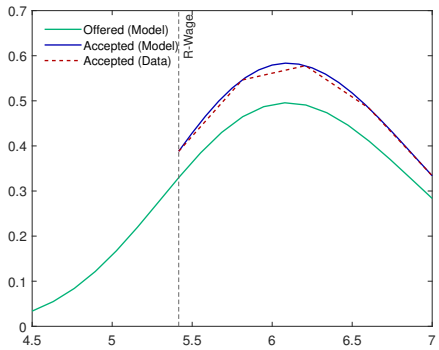
(a) Before *SuperSimples*: Formal Non-Treated



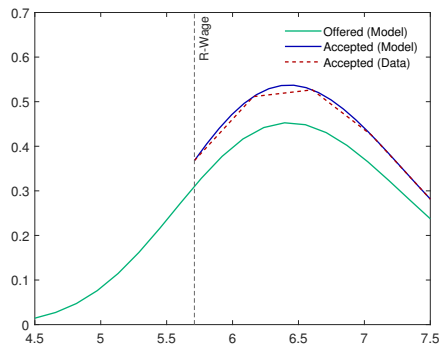
(b) After *SuperSimples*: Formal Non-Treated



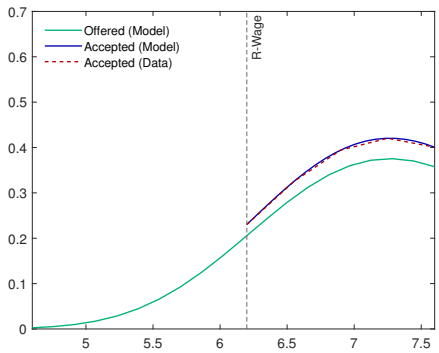
(c) Before *SuperSimples*: Formal Treated



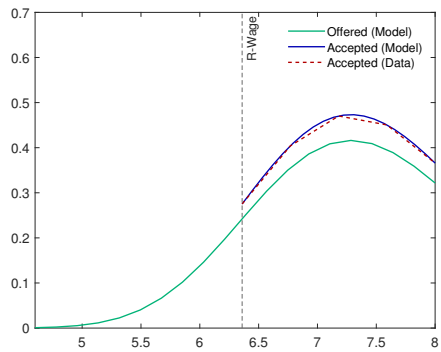
(d) After *SuperSimples*: Formal Treated



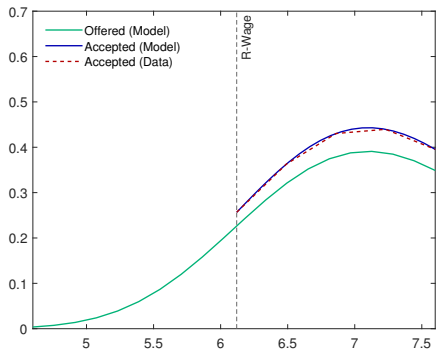
(e) Before *SuperSimples*: Informal Non-Treated



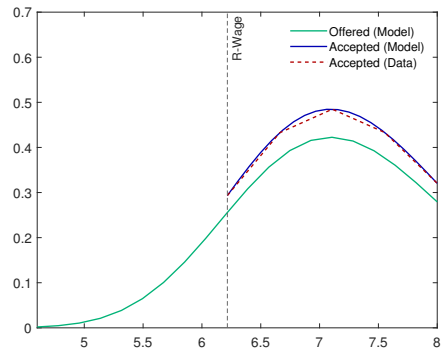
(f) After *SuperSimples*: Informal Non-Treated



(g) before*SuperSimples*: Informal Treated



(h) After *SuperSimples*: Informal Treated



B.5 Model Fit: Wage Distribution for Married (Household Search)

Figure B.11: Model Fit: Sector-Treatment Wage Distribution for Married Women Before *SuperSimples* (Household Search Model)

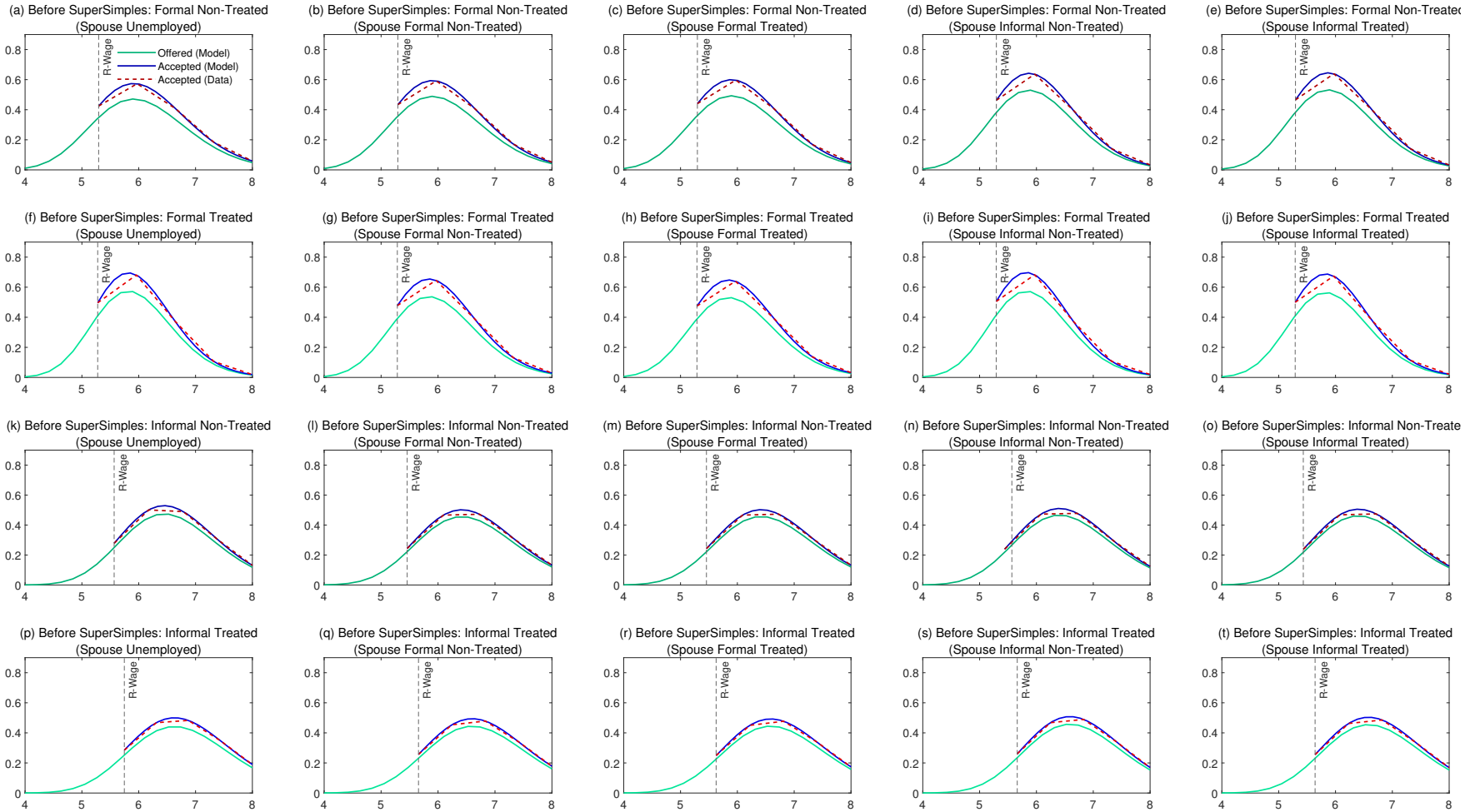


Figure B.12: Model Fit: Sector-Treatment Wage Distribution for Married Women After *SuperSimples* (Household Search Model)

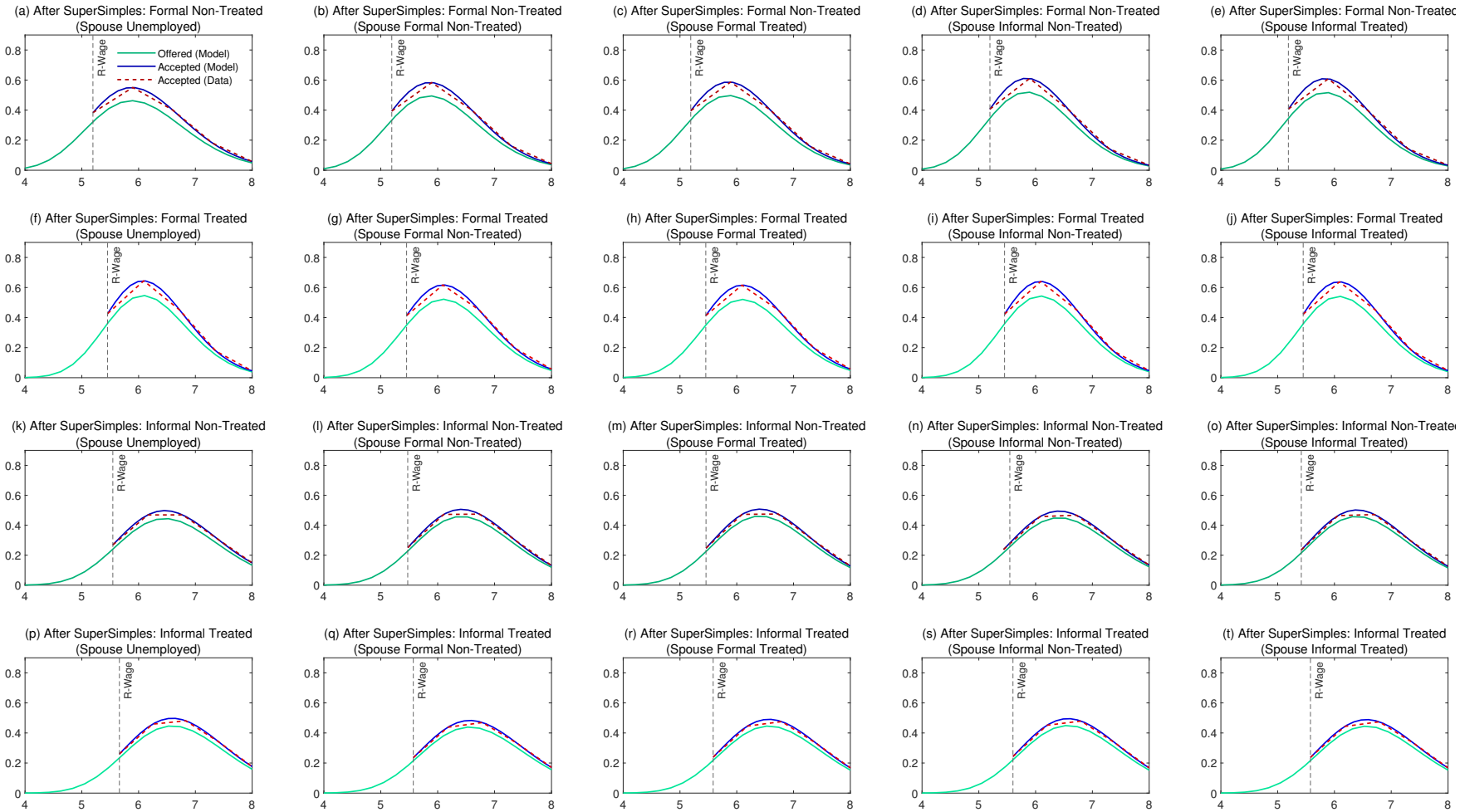


Figure B.13: Model Fit: Sector-Treatment Wage Distribution for Married Men Before *SuperSimples* (Household Search Model)

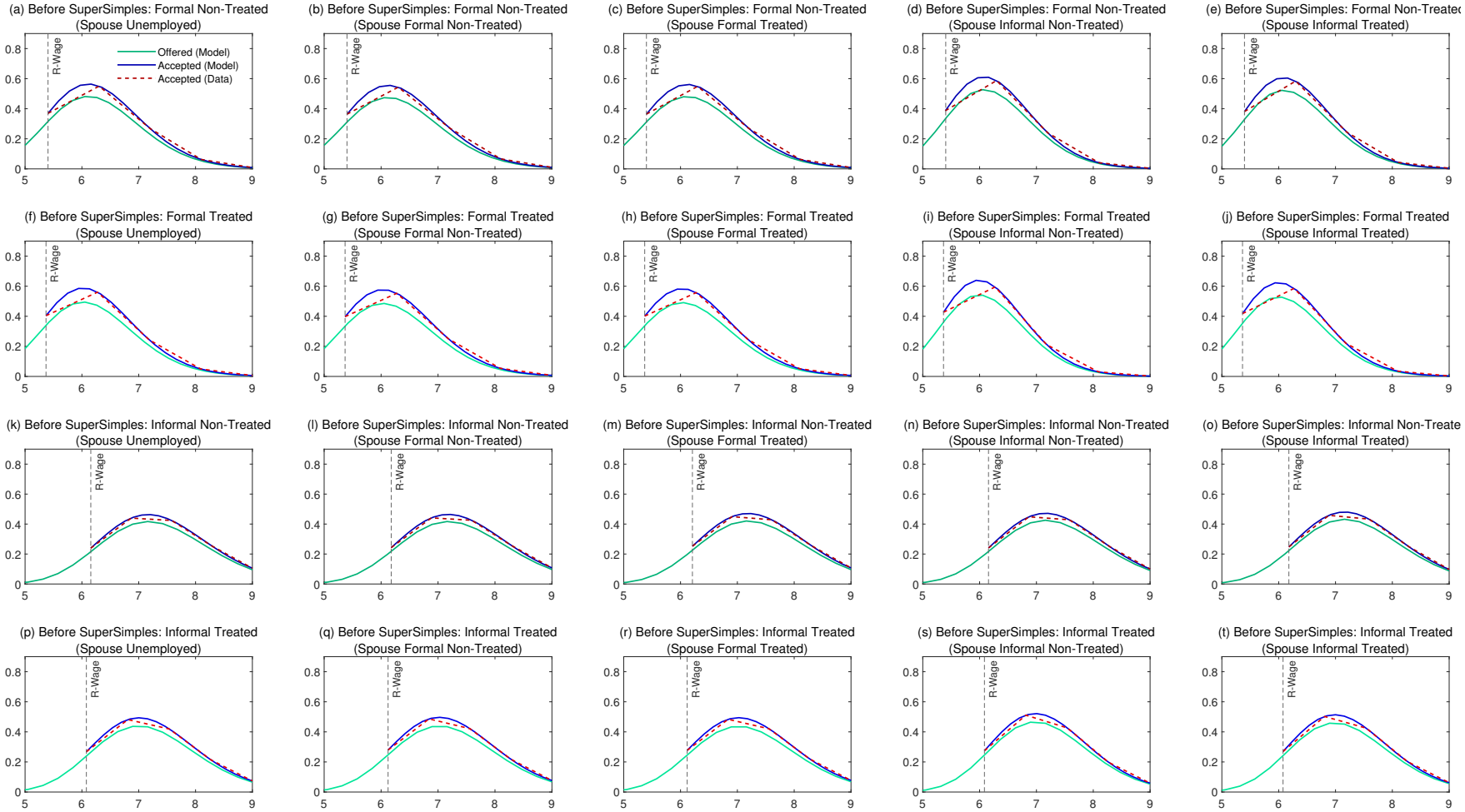
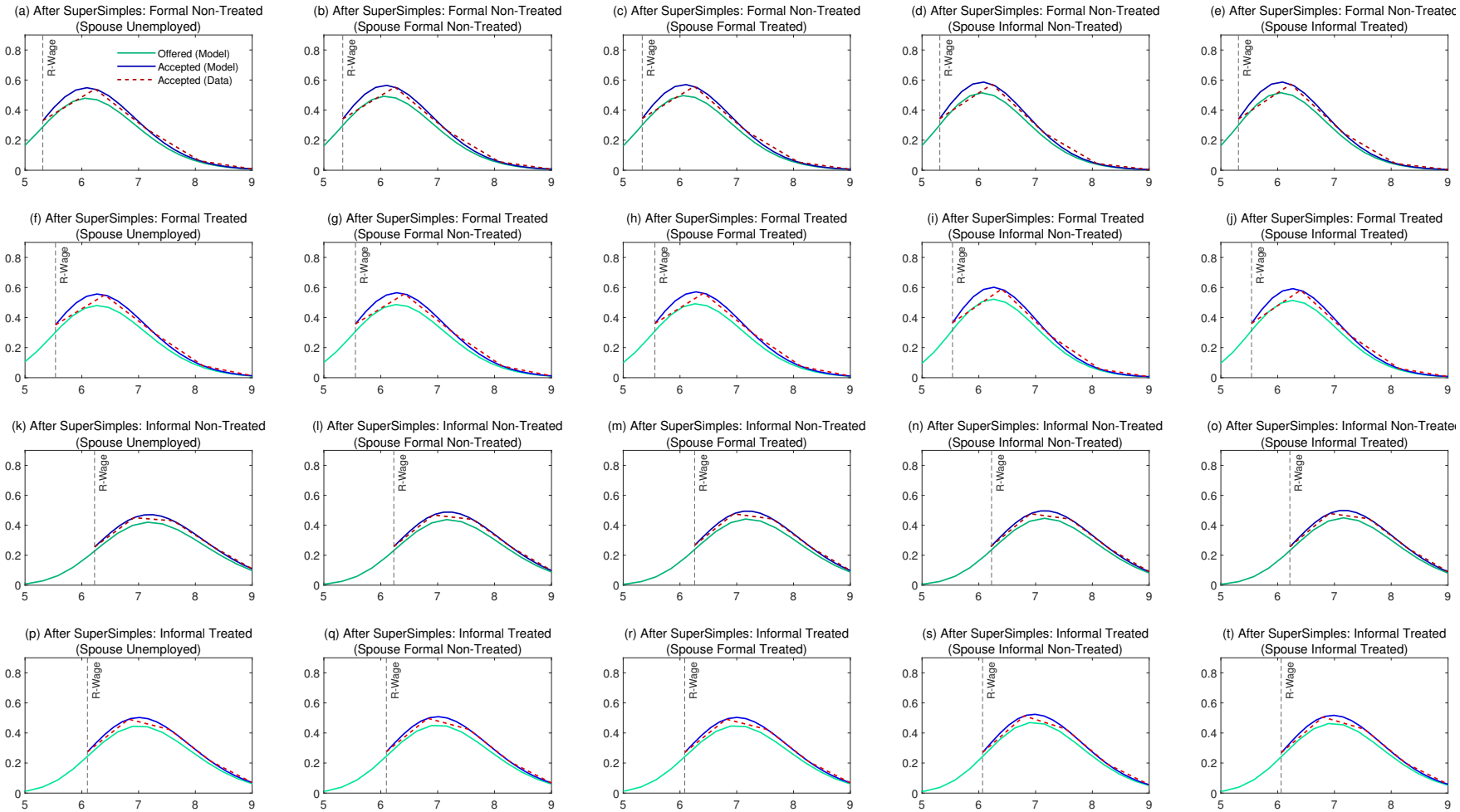


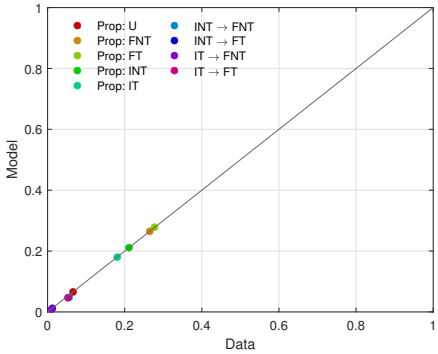
Figure B.14: Model Fit: Sector-Treatment Wage Distribution for Married Men After *SuperSimples* (Household Search Model)



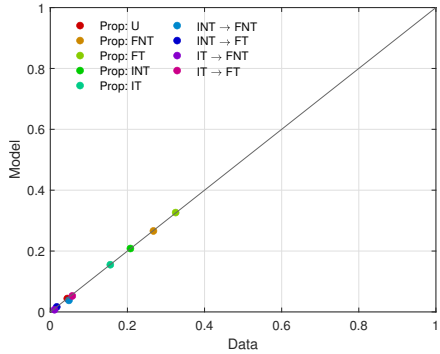
B.6 Model Fit: Targeted Moments

Figure B.15: Model Fit: Singles by Time of Policy

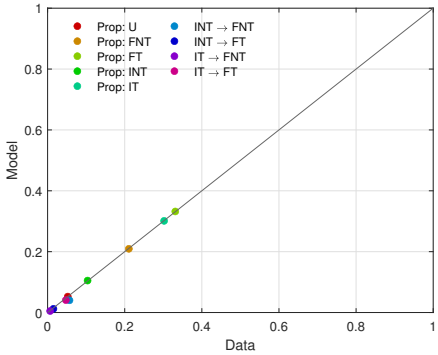
(a) Before *SuperSimples*: Single Women



(b) After *SuperSimples*: Single Women



(c) Before *SuperSimples*: Single Men



(d) After *SuperSimples*: Single Men

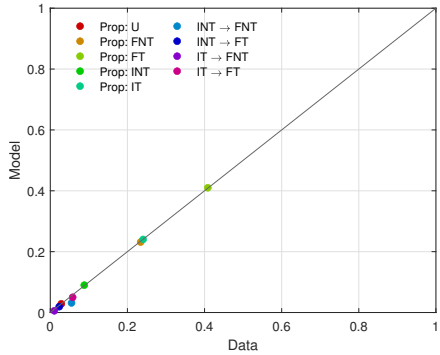
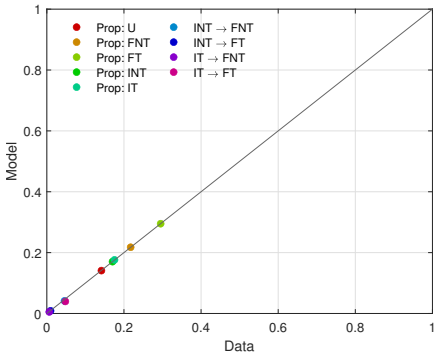
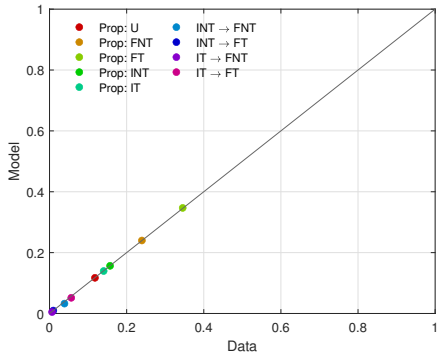


Figure B.16: Model Fit: Married by Time of Policy (Individual Search Model)

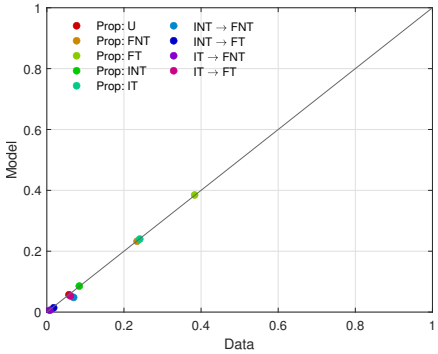
(a) Before *SuperSimples*: Married Women



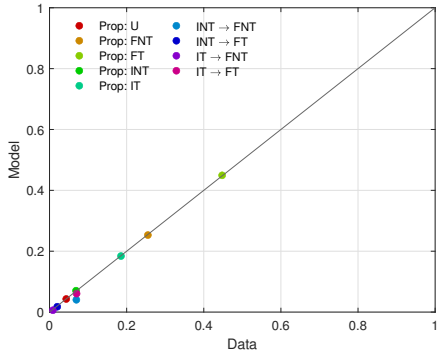
(b) After *SuperSimples*: Married Women



(c) Before *SuperSimples*: Married Men



(d) After *SuperSimples*: Married Men



C Appendix: Supplemental Tables

C.1 Brazilian Tax Brackets and Benefits

Table C.1: Personal Income Tax Brackets
(January-2002 to December-2008)

Income Bracket (R$)	Tax Rate	Income Bracket (R$)	Tax Rate
January-2002 to December-2004		*January-2005 to January-2006*	
$\leq$ 1,058.00	0%	$\leq$ 1,164.00	0%
1,058.01 to 2,115.00	15%	1,164.01 to 2,326.00	15%
$\geq$ 2,115.01	27.50%	$\geq$ 2,326.01	27.50%
February-2006 to December-2006		*January-2007 to December-2007*	
$\leq$ 1,257.12	0%	$\leq$ 1,313.69	0%
1,257.13 to 2,512.08	15%	1,313.70 to 2,625.12	15%
$\geq$ 2,512.09	27.50%	$\geq$ 2,625.13	27.50%
January-2008 to December-2008			
$\leq$ 1,372.81	0%		
1,372.82 to 2,743.25	15%		
$\geq$ 2,743.26	27.50%		

Note: Brazil's Personal Income Tax is called *Imposto sobre a renda das pessoas físicas (IRPF)*. Income brackets are nominal amounts in reals (R$).

Table C.2: Personal Income Tax Brackets
(January-2009 to December-2015)

Income Bracket (R$)	**Tax Rate**	**Income Bracket (R$)**	**Tax Rate**
January-2009 to December-2009		*January-2010 to March-2011*	
$\leq$ 1,434.59	0%	$\leq$ 1,499.15	0%
1,4434.60 to 2,150	7.50%	1,499.16 to 2,246.75	7.50%
2,150.01 to 2,866.70	15%	2,246.76 to 2,995.70	15%
2,866.71 to 3,582.00	22.50%	2,995.71 to 3,743.19	22.50%
$\geq$ 3,582.01	27.50%	$\geq$ 3,743.20	27.50%
April-2011 to December-2011		*January-2012 to December-2012*	
$\leq$ 1,566.61	0%	$\leq$ 1,637.11	0%
1,566.62 to 2,347.85	7.50%	1,637.12 to 2,453.50	7.50%
2,347.86 to 3,130.51	15%	2,453.51 to 3,271.38	15%
3,130.52 to 3,911.63	22.50%	3,271.39 to 4,087.65	22.50%
$\geq$ 3,911.64	27.50%	$\geq$ 4,087.66	27.50%
January-2013 to December-2013		*January-2014 to March-2015*	
$\leq$ 1,710.78	0%	$\leq$ 1,787.77	0%
1,710.79 to 2,563.91	7.50%	1,787.78 to 2,679.29	7.50%
2,563.92 to 3,418.59	15%	2,679.30 to 3,572.43	15%
3,418.60 to 4,271.59	22.50%	3,572.44 to 4,663.81	22.50%
$\geq$ 4,271.60	27.50%	$\geq$ 4,663.82	27.50%
April-2015 to December-2015			
$\leq$ 1,903.98	0%		
1,903.99 to 2,826.65	7.50%		
2,826.66 to 3,751.05	15%		
3,751.06 to 4,664.68	22.50%		
$\geq$ 4,664.69	27.50%		

Note: Brazil's Personal Income Tax is called *Imposto sobre a renda das pessoas físicas (IRPF)*. Income brackets are nominal amounts in reals (R$).

Table C.3: Social Security Contribution Brackets
(June-2001 to December-2015)

Income Bracket (R$)	Tax Rate	Income Bracket (R$)	Tax Rate	Income Bracket (R$)	Tax Rate
June-2001 to March-2002		*April-2002 to May-2002*		*June-2002 to March-2003*	
≤ 429.00	7.65%	≤ 429.00	7.65%	≤ 468.47	7.65%
429.01 to 540.00	8.65%	429.01 to 600.00	8.65%	468.48 to 600.00	8.65%
540.01 to 715.00	9.00%	600.01 to 715.00	9.00%	600.01 to 780.78	9.00%
715.01 to 1,430.00	11.00%	715.01 to 1,430.00	11.00%	780.79 to 1,561.56	11.00%
April-2003 to May-2003		*June-2003 to December-2003*		*January-2004 to April-2004*	
≤ 468.47	7.65%	≤ 560.81	7.65%	≤ 720.00	7.65%
468.48 to 720.00	8.65%	560.82 to 720.00	8.65%	720.01 to 1,200.00	9.00%
720.01 to 780.78	9.00%	720.01 to 934.67	9.00%	1200.01 to 2,400.00	11.00%
780.79 to 1,561.56	11.00%	934.68 to 1,869.34	11.00%		
May-2004 to April-2005		*May-2005 to March-2006*		*April-2006 to July-2006*	
≤ 752.62	7.65%	≤ 800.45	7.65%	≤ 840.47	7.65%
752.63 to 780.00	8.65%	800.46 to 900.00	8.65%	840.48 to 1,050.00	8.65%
780.01 to 1,254.36	9.00%	900.01 to 1,334.07	9.00%	1,050.01 to 1,400.77	9.00%
1,254.37 to 2,508.72	11.00%	1,334.08 to 2,668.15	11.00%	1,400.78 to 2,801.56	11.00%
August-2006 to March-2007		*April-2007 to December-2007*		*August-2008 to February-2008*	
≤ 840.55	7.65%	≤ 868.29	7.65%	≤ 868.29	8.00%
840.56 to 1,050.00	8.65%	868.30 to 1,140.00	8.65%	868.30 to 1,447.14	9.00%
1,050.01 to 1,400.91	9.00%	1,140.01 to 1,447.14	9.00%	1,447.15 to 2,894.28	11.00%
1,400.92 to 2,801.82	11.00%	1,447.15 to 2,894.28	11.00%		
March-2008 to January-2009		*February-2009 to December-2009*		*January-2010 to May-2010*	
≤ 911.70	8.00%	≤ 965.67	8.00%	≤ 1,024.97	8.00%
911.71 to 1,519.50	9.00%	965.68 to 1,609.45	9.00%	1,024.98 to 1,708.27	9.00%
1,519.51 to 3,038.99	11.00%	1,609.46 to 3,218.90	11.00%	1,708.28 to 3,416.24	11.00%
June-2010 to December-2010		*January-2011 to June-2011*		*July-2011 to December-2011*	
≤ 1,040.22	8.00%	≤ 1,106.90	8.00%	≤ 1,107.52	8.00%
1,040.23 to 1,733.70	9.00%	1,106.91 to 1,844.83	9.00%	1,107.52 to 1.845.87	9.00%
1,733.71 to 3,467.40	11.00%	1,844.84 to 3,689.66	11.00%	1,845.88 to 3,691.74	11.00%
January-2012 to December-2012		*January-2013 to December-2013*		*January-2014 to December-2014*	
≤ 1,174.86	8.00%	≤ 1,247.70	8.00%	≤ 1,317.07	8.00%
1,174.87 to 1,958.10	9.00%	1,247.71 to 2,079.50	9.00%	1,317.08 to 2,195.12	9.00%
1,958.11 to 3,916.20	11.00%	2,079.51 to 4,159.00	11.00%	2,195.13 to 4,390.24	11.00%
January-2015 to December-2015					
≤ 1,399.12	8.00%				
1,399.13 to 2,331.88	9.00%				
2,331.89 to 4,663.75	11.00%				

Note: Brazil's Social Security Contributions is collected by the National Institute of Social Security (*Instituto Nacional do Seguro*). Income brackets are nominal amounts in reals (R$).

Table C.4: Unemployment Insurance Amount by Mean Income Brackets
(January-2002 to December-2015)

Mean Income Bracket (R$)	UI Rule	Mean Income Bracket (R$)	UI Rule
January-2002 to March-2002		*April-2002 to March-2003*	
$\leq$ 297.14	80% of the mean income	$\leq$ 330.14	80% of the mean income
297.15 to 495.28	50% of the mean income plus R$237.71	330.15 to 550.31	50% of the mean income plus R$264.11
$\geq$ 495.29	Fixed amount of R$336.78	$\geq$ 550.32	Fixed amount of R$374.20
April-2003 to March-2004		*April-2004 to April-2005*	
$\leq$ 396.18	80% of the mean income	$\leq$ 424.20	80% of the mean income
396.19 to 660.37	50% of the mean income plus R$316.94	429.21 to 715.40	50% of the mean income plus R$343.36
$\geq$ 660.38	Fixed amount of R$449.04	$\geq$ 715.41	Fixed amount of R$486.46
May-2005 to March-2006		*April-2006 to March-2007*	
$\leq$ 495.23	80% of the mean income	$\leq$ 577.77	80% of the mean income
495.24 to 825.46	50% of the mean income plus R$396.18	577.78 to 963.04	50% of the mean income plus R$462.22
$\geq$ 825.47	Fixed amount of R$561.30	$\geq$ 963.05	Fixed amount of R$654.85
April-2007 to February-2008		*March-2008 to January-2009*	
$\leq$ 627.29	80% of the mean income	$\leq$ 685.06	80% of the mean income
627.30 to 1,045.48	50% of the mean income plus R$501.83	685.07 to 1,141.88	50% of the mean income plus R$548.05
$\geq$ 1,045.49	Fixed amount of R$710.97	$\geq$ 1,141.89	Fixed amount of R$776.46
February-2009 to December-2009		*January-2010 to December-2010*	
$\leq$ 767.60	80% of the mean income	$\leq$ 841.88	80% of the mean income
767.61 to 1,279.46	50% of the mean income plus R$614.08	841.89 to 1,403.28	50% of the mean income plus R$673.50
$\geq$ 1,279.47	Fixed amount of R$870.01	$\geq$ 1,403.29	Fixed amount of R$954.21
January-2011 to February-2011		*March-2011 to December-2011*	
$\leq$ 891.40	80% of the mean income	$\leq$ 899.66	80% of the mean income
891.41 to 1,485.83	50% of the mean income plus R$713.12	899.67 to 1,499.58	50% of the mean income plus R$719.73
$\geq$ 1,485.84	Fixed amount of R$1,010.34	$\geq$ 1,499.57	Fixed amount of R$1,019.70
January-2012 to December-2012		*January-2013 to December-2013*	
$\leq$ 1,026.77	80% of the mean income	$\leq$ 1,090.43	80% of the mean income
1,026.78 to 1,711.45	50% of the mean income plus R$821.41	1,090.44 to 1,817.56	50% of the mean income plus R$872.34
$\geq$ 1,711.46	Fixed amount of R$1,163.76	$\geq$ 1,817.56	Fixed amount of R$1,235.91
January-2014 to December-2014		*January-2015 to December-2015*	
$\leq$ 1,151.06	80% of the mean income	$\leq$ 1,222.77	80% of the mean income
1,151.07 to 1,918.62	50% of the mean income plus R$920.85	1,222.77 to 2,038.15	50% of the mean income plus R$978.22
$\geq$ 1,918.63	Fixed amount of R$1,304.63	$\geq$ 2,038.16	Fixed amount of R$1,385.91

Note: UI denotes "unemployment insurance" (*Seguro Desemprego*) which is financed by the Worker Protection Fund (*Fondo de Amparo al Trabajor - FAT*). Mean Income brackets are nominal amounts in reals (R$).

C.2 SuperSimples: Additional Tables

Table C.5: SuperSimples: Services Categories and Sub-Activities

Category	Sub-Activities
Services I	Day care and preschool teaching, outsourced post office, travel agency, driving school, lottery agency, vehicle (including motorcycles) repair and maintenance, vehicle accessories installation, computer installation, repair and maintenance, residential and business establishment repairs and household appliances repairs, installation and maintenance of air conditioning, cooling system, ventilation, heating, air treatment, and vehicles for broadcasting and media.
Services II	Construction, municipal transportation services, fairs planning companies, linguistic, arts and technical schools, cultural and artistic production, and film and scenic arts production.
Services III	Management and leasing of real estate, academies for dance, capoeira, yoga and martial arts, academies destined for physical activities, sports, swimming and sports school, development of computer programs (included video games), computer programs licensing, website design and maintenance, accounting offices, and surveillance, cleaning and conservation services.
Service IV	Inter-municipal and interstate transportation services.

Table C.6: Choice of Treatment Variable: Selection of Non-Treated and Treated Activities

Sector of Activity	Non-Treated Activities	Treated Activities
Agriculture		Agriculture and livestock Forestry and forest exploration
Fishing		Fisheries and related activities
Extraction Industries		Extraction of coal Extraction of petroleum Extraction of radioactive minerals Extraction of metallic and non-metallic minerals
Transformation Industry	Manufacture of food and beverages Manufacture of smoking products (cigarettes)	Manufacture of textiles Manufacture of clothing and accessories Leather preparation and manufacture (leather and travel articles, and footwear) Manufacture of wood products Manufacture of paper and related products Editing, printing and reproduction of engravements Coke industrial plants (coal) Manufacture of chemical products Manufacture of rubber and plastic products Manufacture of non-metallic minerals products Metallurgy Manufacture of metal products excluding machinery and equipment Manufacture of machinery and equipment Manufacture of machinery and equipment of electric systems for data processing Manufacture of electrical machinery, equipment and materials Manufacture of electronic and communications equipment Manufacture of hospital, precision and optical instruments, watches and automation equip. Manufacture and assembly of automotive vehicles, trailers Manufacture of other transportation equipment Manufacture of furniture and miscellaneous industries
Production and distribution of electricity, gas and water	Production and distribution of electricity, gas and water	Water collection, treatment and distribution
Construction		Construction
Retail and repairment of vehicles	Retail and repair of automotive vehicles and motorcycles and fuels	Commercial (retail) intermediaries of trade, retail and repair of personal and domestic objects
Lodging and food		Lodging and food
Transportation, storage and communication	Ground transportation Water transportation Air transportation	Related activities to transportation and travel agencies Postal services and communications
Financial Intermediaries, Insurance and related services	Financial intermediation, exclusive of insurance and private pension Insurance and private pension Activities related to financial intermediation	
Real estate, rental and services provided to firms	Real estate	Rental of vehicles, machinery and equipment Information technology and related activities Research and development Services provided mainly to firms
Public Administration and Defense	Public administration, defense and social security	
Education		Education
Health and social services	Health and social services	
Other collective, social and personal services	Associative activities Recreational activities, cultural and sports Personal services	Urban and sewage cleaning
International organizations and other foreign institutions	International organizations and other foreign institutions	
Other Activities		Recycling

C.3 Matching Process: Balancing Tests for Singles

Table C.7: Balancing Test: Time of Policy (Singles by Gender)

	Pre-Matching			Post-Matching		
	Mean Before	**Mean After**	**P-Value Difference**	**Mean Before**	**Mean After**	**P-Value Difference**
			Single Women			
Age	43.65	44.43	0.000	43.66	43.66	0.976
Family Size	2.69	2.47	0.000	2.67	2.67	0.848
Young Kids	0.37	0.29	0.000	0.36	0.36	0.702
Old Kids	0.64	0.55	0.000	0.63	0.63	0.907
White	0.55	0.53	0.000	0.55	0.55	0.435
Black	0.10	0.12	0.000	0.10	0.10	0.973
Asian	0.01	0.01	0.633	0.01	0.01	0.637
Brown	0.34	0.34	0.576	0.34	0.34	0.359
Indigenous	0.00	0.00	0.000	0.00	0.00	0.957
Recife	0.10	0.09	0.000	0.10	0.10	0.853
Salvador	0.15	0.13	0.000	0.15	0.15	0.906
Belo Horizonte	0.17	0.19	0.000	0.17	0.17	0.895
Rio de Janeiro	0.20	0.20	0.355	0.20	0.20	0.841
Sao Paulo	0.22	0.23	0.000	0.22	0.22	0.614
Porto Belo	0.15	0.17	0.000	0.16	0.16	0.368
Less than Highschool	0.43	0.34	0.000	0.43	0.43	0.116
Highschool	0.28	0.34	0.000	0.28	0.28	0.550
Some College	0.06	0.08	0.000	0.06	0.06	0.993
College	0.20	0.23	0.000	0.20	0.20	0.922
Employee	0.73	0.76	0.000	0.73	0.73	0.578
Self-Employed	0.23	0.21	0.000	0.23	0.23	0.551
Employer	0.04	0.03	0.000	0.04	0.04	0.979
Work Status T-1	0.95	0.95	0.858	0.95	0.95	0.515
Extraction	0.16	0.14	0.000	0.16	0.16	0.962
Construction	0.01	0.01	0.211	0.01	0.01	0.119
Retail	0.18	0.18	0.613	0.18	0.18	0.973
Financial Serv.	0.13	0.16	0.000	0.13	0.13	0.695
Public Adm.	0.32	0.31	0.000	0.32	0.31	0.584
Other Serv. And Act.	0.20	0.20	0.161	0.20	0.20	0.484
			Single Men			
Age	40.77	42.50	0.000	40.83	40.87	0.515
Family Size	1.85	1.71	0.000	1.84	1.84	0.813
Young Kids	0.13	0.08	0.000	0.12	0.12	0.992
Old Kids	0.20	0.16	0.000	0.20	0.20	0.957
White	0.52	0.51	0.001	0.52	0.52	0.354
Black	0.11	0.12	0.000	0.11	0.11	0.800
Asian	0.00	0.01	0.000	0.00	0.00	0.939
Brown	0.36	0.36	0.509	0.36	0.36	0.258
Indigenous	0.00	0.00	0.000	0.00	0.00	0.924
Recife	0.08	0.07	0.000	0.08	0.08	0.695
Salvador	0.16	0.13	0.000	0.16	0.16	0.685
Belo Horizonte	0.16	0.18	0.000	0.16	0.16	0.964
Rio de Janeiro	0.23	0.23	0.654	0.23	0.23	0.737
Sao Paulo	0.22	0.23	0.000	0.23	0.22	0.603
Porto Belo	0.14	0.16	0.000	0.14	0.14	0.692
Less than Highschool	0.52	0.42	0.000	0.52	0.52	0.795
Highschool	0.23	0.29	0.000	0.23	0.23	0.730
Some College	0.06	0.07	0.000	0.06	0.06	0.768
College	0.16	0.20	0.000	0.16	0.17	0.591
Employee	0.65	0.68	0.000	0.65	0.65	0.744
Self-Employed	0.29	0.27	0.000	0.29	0.29	0.796
Employer	0.06	0.05	0.000	0.06	0.06	0.872
Work Status T-1	0.96	0.97	0.000	0.96	0.96	0.800
Extraction	0.16	0.16	0.016	0.16	0.16	0.794
Construction	0.15	0.15	0.155	0.15	0.16	0.000
Retail	0.20	0.18	0.000	0.20	0.20	0.825
Financial Serv.	0.16	0.18	0.000	0.16	0.16	0.885
Public Adm.	0.14	0.14	0.000	0.14	0.14	0.858
Other Serv. And Act.	0.19	0.19	0.091	0.19	0.19	0.000

Note: Clustered (Region) Standard Errors in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$. *Controls:* Demographics include age, age-squared, family size, number of young/old children, race, region. Human capital includes completed education, weekly hours worked, work type (employee, employer, self-employed) and dummy employment status at $t-1$. Spouse's Characteristics include their completed education, current employment status and income.

Table C.8: Balancing Test: Treatment (Singles by Gender)

	Pre-Matching			Post-Matching		
	Mean Treated	**Mean Non-treated**	**P-Value Difference**	**Mean Treated**	**Mean Non-treated**	**P-Value Difference**
			Single Women			
Age	43.63	43.67	0.599	43.89	43.99	0.223
Family Size	2.72	2.64	0.000	2.69	2.69	0.887
Young Kids	0.39	0.35	0.000	0.36	0.35	0.626
Old Kids	0.65	0.61	0.000	0.62	0.62	0.391
White	0.54	0.57	0.000	0.56	0.55	0.745
Black	0.10	0.10	0.010	0.10	0.10	0.874
Asian	0.01	0.01	0.776	0.01	0.01	0.784
Brown	0.35	0.32	0.000	0.33	0.33	0.690
Indigenous	0.00	0.00	0.477	0.00	0.00	0.937
Recife	0.10	0.10	0.517	0.10	0.10	0.449
Salvador	0.15	0.15	0.221	0.16	0.16	0.991
Belo Horizonte	0.17	0.16	0.000	0.18	0.18	0.422
Rio de Janeiro	0.19	0.21	0.000	0.20	0.20	0.717
Sao Paulo	0.23	0.21	0.000	0.21	0.21	0.609
Porto Belo	0.15	0.16	0.003	0.15	0.15	0.431
Less than Highschool	0.48	0.36	0.000	0.40	0.40	0.956
Highschool	0.26	0.32	0.000	0.26	0.26	0.677
Some College	0.06	0.07	0.000	0.07	0.07	0.550
College	0.18	0.24	0.000	0.25	0.25	0.343
Employee	0.70	0.79	0.000	0.80	0.79	0.000
Self-Employed	0.26	0.18	0.000	0.16	0.18	0.000
Employer	0.04	0.03	0.000	0.03	0.03	0.999
Work Status T-1	0.95	0.96	0.000	0.96	0.96	0.881
Extraction	0.22	0.07	0.000	0.08	0.08	0.942
Construction	0.02	0.00	0.000	0.03	0.00	0.000
Retail	0.27	0.02	0.000	0.03	0.03	0.934
Financial Serv.	0.15	0.11	0.000	0.14	0.14	0.706
Public Adm.	0.20	0.51	0.000	0.43	0.43	0.662
Other Serv. And Act.	0.14	0.30	0.000	0.28	0.31	0.000
			Single Men			
Age	40.73	40.85	0.250	40.52	40.69	0.144
Family Size	1.85	1.86	0.229	1.86	1.86	0.733
Young Kids	0.13	0.13	0.640	0.13	0.13	0.807
Old Kids	0.21	0.20	0.036	0.20	0.20	0.861
White	0.50	0.56	0.000	0.54	0.55	0.171
Black	0.12	0.10	0.000	0.11	0.10	0.360
Asian	0.00	0.01	0.439	0.01	0.01	0.922
Brown	0.38	0.34	0.000	0.35	0.35	0.402
Indigenous	0.00	0.00	0.275	0.00	0.00	0.920
Recife	0.08	0.09	0.003	0.08	0.08	0.680
Salvador	0.17	0.16	0.021	0.16	0.16	0.325
Belo Horizonte	0.17	0.16	0.035	0.16	0.16	0.547
Rio de Janeiro	0.22	0.25	0.000	0.24	0.25	0.743
Sao Paulo	0.23	0.21	0.000	0.22	0.22	0.565
Porto Belo	0.14	0.14	0.651	0.13	0.13	0.354
Less than Highschool	0.56	0.44	0.000	0.49	0.49	0.974
Highschool	0.21	0.27	0.000	0.25	0.25	0.653
Some College	0.05	0.07	0.000	0.06	0.07	0.691
College	0.15	0.20	0.000	0.17	0.18	0.482
Employee	0.59	0.77	0.000	0.73	0.73	0.901
Self-Employed	0.34	0.18	0.000	0.22	0.22	0.916
Employer	0.07	0.05	0.000	0.05	0.05	0.956
Work Status T-1	0.95	0.97	0.000	0.97	0.97	0.891
Extraction	0.21	0.07	0.000	0.08	0.08	0.754
Construction	0.22	0.00	0.000	0.24	0.00	0.000
Retail	0.23	0.13	0.000	0.16	0.15	0.304
Financial Serv.	0.16	0.18	0.000	0.21	0.21	0.376
Public Adm.	0.06	0.29	0.000	0.15	0.15	0.759
Other Serv. And Act.	0.12	0.34	0.000	0.17	0.41	0.000

Note: Clustered (Region) Standard Errors in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$. *Controls:* Demographics include age, age-squared, family size, number of young/old children, race, region. Human capital includes completed education, weekly hours worked, work type (employee, employer, self-employed) and dummy employment status at $t-1$. Spouse's Characteristics include their completed education, current employment status and income.

C.4 Matching Process: Balancing Tests for Married

Table C.9: Balancing Test: Time of Policy (Married by Gender)

	Pre-Matching			Post-Matching		
	Mean Before	**Mean After**	**P-Value Difference**	**Mean Before**	**Mean After**	**P-Value Difference**
			Married Women			
Age	38.79	39.63	0.000	38.87	38.90	0.364
Family Size	3.70	3.44	0.000	3.66	3.66	0.882
Young Kids	0.60	0.49	0.000	0.58	0.58	0.298
Old Kids	1.05	0.89	0.000	1.03	1.03	0.737
White	0.55	0.54	0.000	0.55	0.56	0.089
Black	0.08	0.09	0.000	0.08	0.08	0.777
Asian	0.00	0.00	0.008	0.00	0.00	0.486
Brown	0.36	0.36	0.104	0.36	0.36	0.088
Indigenous	0.00	0.00	0.000	0.00	0.00	0.852
Recife	0.10	0.08	0.000	0.10	0.10	0.730
Salvador	0.13	0.11	0.000	0.13	0.13	0.978
Belo Horizonte	0.18	0.20	0.000	0.18	0.18	0.940
Rio de Janeiro	0.19	0.20	0.467	0.19	0.20	0.683
Sao Paulo	0.22	0.23	0.000	0.22	0.22	0.239
Porto Belo	0.17	0.18	0.000	0.18	0.18	0.216
Less than Highschool	0.46	0.33	0.000	0.45	0.45	0.114
Highschool	0.34	0.41	0.000	0.35	0.35	0.590
Some College	0.06	0.07	0.000	0.06	0.06	0.610
College	0.12	0.18	0.000	0.13	0.13	0.564
Employee	0.71	0.75	0.000	0.72	0.71	0.782
Self-Employed	0.26	0.21	0.000	0.25	0.25	0.950
Employer	0.03	0.03	0.029	0.03	0.03	0.585
Work Status T-1	0.93	0.94	0.000	0.93	0.93	0.882
Spouse's Work Status	0.89	0.91	0.000	0.90	0.89	0.287
Spouse's Income	237.30	248.77	0.000	238.72	238.42	0.551
Spouse's LHS	0.54	0.42	0.000	0.53	0.54	0.005
Spouse's HS	0.30	0.38	0.000	0.30	0.30	0.622
Spouse's SCOL	0.05	0.06	0.000	0.05	0.05	0.668
Spouse's COL	0.09	0.12	0.000	0.09	0.09	0.728
Extraction	0.19	0.16	0.000	0.19	0.19	0.517
Construction	0.01	0.01	0.032	0.01	0.01	0.004
Retail	0.22	0.22	0.000	0.22	0.22	0.822
Financial Serv.	0.11	0.14	0.000	0.11	0.11	0.565
Public Adm.	0.28	0.28	0.689	0.28	0.28	0.671
Other Serv. And Act.	0.19	0.19	0.000	0.19	0.19	0.266
			Married Men			
Age	41.63	43.09	0.000	41.89	41.92	0.118
Family Size	3.85	3.58	0.000	3.79	3.79	0.161
Young Kids	0.72	0.54	0.000	0.67	0.67	0.152
Old Kids	1.19	0.96	0.000	1.13	1.13	0.942
White	0.52	0.50	0.000	0.52	0.52	0.038
Black	0.09	0.11	0.000	0.10	0.10	0.712
Asian	0.00	0.00	0.214	0.00	0.00	0.579
Brown	0.38	0.38	0.000	0.38	0.37	0.045
Indigenous	0.00	0.00	0.000	0.00	0.00	0.906
Recife	0.11	0.10	0.000	0.11	0.11	0.418
Salvador	0.11	0.10	0.000	0.11	0.11	0.608
Belo Horizonte	0.17	0.19	0.000	0.18	0.18	0.217
Rio de Janeiro	0.21	0.21	0.006	0.21	0.21	0.222
Sao Paulo	0.24	0.24	0.000	0.24	0.24	0.034
Porto Belo	0.16	0.16	0.000	0.16	0.16	0.208
Less than Highschool	0.58	0.47	0.000	0.57	0.57	0.000
Highschool	0.25	0.33	0.000	0.26	0.26	0.702
Some College	0.04	0.05	0.000	0.04	0.04	0.668
College	0.10	0.13	0.000	0.11	0.11	0.428
Employee	0.70	0.73	0.000	0.71	0.71	0.051
Self-Employed	0.23	0.21	0.000	0.22	0.22	0.197
Employer	0.07	0.06	0.000	0.07	0.07	0.171
Work Status T-1	0.97	0.97	0.000	0.97	0.97	0.970
Spouse's Work Status	0.56	0.63	0.000	0.57	0.57	0.840
Spouse's Income	108.68	127.28	0.000	111.93	112.01	0.810
Spouse's LHS	0.57	0.44	0.000	0.56	0.56	0.437
Spouse's HS	0.27	0.35	0.000	0.28	0.28	0.901
Spouse's SCOL	0.04	0.05	0.000	0.04	0.04	0.590
Spouse's COL	0.10	0.14	0.000	0.10	0.10	0.313
Extraction	0.21	0.21	0.000	0.21	0.21	0.268
Construction	0.15	0.15	0.000	0.14	0.16	0.000
Retail	0.20	0.19	0.000	0.20	0.20	0.291
Financial Serv.	0.14	0.15	0.000	0.14	0.14	0.590
Public Adm.	0.11	0.11	0.002	0.11	0.11	0.374
Other Serv. And Act.	0.19	0.19	0.000	0.19	0.18	0.000

Note: Clustered (Region) Standard Errors in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$. *Controls:* Demographics include age, age-squared, family size, number of young/old children, race, region. Human capital includes completed education, weekly hours worked, work type (employee, employer, self-employed) and dummy employment status at t-1. Spouse's Characteristics include their completed education, current employment status and income.

Table C.10: Balancing Test: Treatment (Married by Gender)

	Pre-Matching			Post-Matching		
	Mean Treated	**Mean Non-treated**	**P-Value Difference**	**Mean Treated**	**Mean Non-treated**	**P-Value Difference**
			Married Women			
Age	38.71	38.96	0.000	39.17	39.25	0.150
Family Size	3.70	3.69	0.032	3.70	3.70	0.873
Young Kids	0.61	0.60	0.038	0.59	0.59	0.412
Old Kids	1.06	1.04	0.022	1.04	1.04	0.778
White	0.56	0.55	0.000	0.55	0.55	0.393
Black	0.08	0.09	0.000	0.09	0.09	0.842
Asian	0.00	0.00	0.135	0.00	0.00	0.608
Brown	0.36	0.36	0.824	0.36	0.36	0.512
Indigenous	0.00	0.00	0.530	0.00	0.00	0.479
Recife	0.10	0.11	0.000	0.10	0.10	0.433
Salvador	0.13	0.13	0.004	0.13	0.13	0.896
Belo Horizonte	0.17	0.18	0.000	0.19	0.18	0.064
Rio de Janeiro	0.19	0.20	0.000	0.20	0.20	0.989
Sao Paulo	0.23	0.22	0.000	0.21	0.22	0.198
Porto Belo	0.18	0.16	0.000	0.16	0.16	0.998
Less than Highschool	0.49	0.40	0.000	0.41	0.41	0.376
Highschool	0.32	0.38	0.000	0.33	0.34	0.119
Some College	0.06	0.06	0.021	0.07	0.07	0.010
College	0.11	0.14	0.000	0.17	0.16	0.019
Employee	0.69	0.76	0.000	0.79	0.78	0.000
Self-Employed	0.28	0.22	0.000	0.17	0.19	0.000
Employer	0.04	0.03	0.000	0.03	0.03	0.304
Work Status T-1	0.92	0.95	0.000	0.94	0.94	0.998
Spouse's Work Status	0.89	0.89	0.001	0.89	0.89	0.711
Spouse's Income	232.89	246.38	0.000	242.87	241.37	0.144
Spouse's LHS	0.57	0.49	0.000	0.51	0.51	0.364
Spouse's HS	0.28	0.32	0.000	0.30	0.30	0.433
Spouse's SCOL	0.05	0.05	0.000	0.06	0.05	0.269
Spouse's COL	0.08	0.11	0.000	0.11	0.11	0.441
Extraction	0.25	0.09	0.000	0.10	0.10	0.914
Construction	0.01	0.00	0.000	0.03	0.00	0.000
Retail	0.32	0.03	0.000	0.04	0.04	0.909
Financial Serv.	0.11	0.10	0.000	0.12	0.12	0.290
Public Adm.	0.20	0.46	0.000	0.44	0.44	0.064
Other Serv. And Act.	0.12	0.33	0.000	0.28	0.30	0.000
			Married Men			
Age	41.47	41.95	0.000	41.57	41.68	0.005
Family Size	3.87	3.82	0.000	3.83	3.82	0.561
Young Kids	0.73	0.68	0.000	0.70	0.70	0.095
Old Kids	1.20	1.15	0.000	1.18	1.17	0.378
White	0.52	0.53	0.000	0.53	0.53	0.005
Black	0.10	0.09	0.000	0.09	0.09	0.185
Asian	0.00	0.00	0.782	0.00	0.00	0.905
Brown	0.38	0.37	0.000	0.38	0.37	0.032
Indigenous	0.00	0.00	0.017	0.00	0.00	0.708
Recife	0.11	0.12	0.000	0.11	0.11	0.040
Salvador	0.11	0.12	0.000	0.12	0.12	0.052
Belo Horizonte	0.18	0.17	0.000	0.17	0.17	0.510
Rio de Janeiro	0.20	0.23	0.000	0.22	0.22	0.321
Sao Paulo	0.25	0.22	0.000	0.23	0.23	0.001
Porto Belo	0.16	0.15	0.000	0.14	0.15	0.095
Less than Highschool	0.61	0.53	0.000	0.58	0.58	0.236
Highschool	0.23	0.28	0.000	0.25	0.25	0.151
Some College	0.04	0.05	0.000	0.04	0.04	0.161
College	0.09	0.12	0.000	0.10	0.10	0.020
Employee	0.66	0.80	0.000	0.76	0.76	0.800
Self-Employed	0.26	0.15	0.000	0.18	0.19	0.252
Employer	0.08	0.05	0.000	0.06	0.06	0.154
Work Status T-1	0.96	0.98	0.000	0.97	0.97	0.683
Spouse's Work Status	0.56	0.55	0.000	0.55	0.55	0.501
Spouse's Income	104.81	116.48	0.000	108.18	109.19	0.113
Spouse's LHS	0.60	0.52	0.000	0.56	0.56	0.269
Spouse's HS	0.25	0.29	0.000	0.28	0.28	0.313
Spouse's SCOL	0.04	0.05	0.000	0.04	0.04	0.305
Spouse's COL	0.09	0.12	0.000	0.10	0.10	0.045
Extraction	0.28	0.08	0.000	0.10	0.10	0.528
Construction	0.22	0.00	0.000	0.28	0.00	0.000
Retail	0.23	0.15	0.000	0.19	0.19	0.006
Financial Serv.	0.14	0.15	0.000	0.19	0.19	0.716
Public Adm.	0.03	0.26	0.000	0.09	0.09	0.505
Other Serv. And Act.	0.10	0.36	0.000	0.16	0.44	0.000

Note: Clustered (Region) Standard Errors in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$. *Controls:* Demographics include age, age-squared, family size, number of young/old children, race, region. Human capital includes completed education, weekly hours worked, work type (employee, employer, self-employed) and dummy employment status at $t-1$. Spouse's Characteristics include their completed education, current employment status and income.

C.5 Matching Difference-in-Differences Regression Results

Table C.11: Regression Results Matching Difference-in-Differences: Policy Impact for Singles

Dep. Variable: Transition Informal to Formal	(1)	(2)	(3)	(4)
All Singles				
Time of Policy * Treated	0.0063	0.0058	0.0049	0.0045
	(0.0040)	(0.0035)	(0.0036)	(0.0038)
Constant	0.0780***	0.0419	0.0149	0.0163
	(0.0106)	(0.0214)	(0.0265)	(0.0288)
Mean Prob(IF)	0.0770	0.0770	0.0770	0.0770
Observations	334,001	334,001	334,001	334,001
R-squared	0.0010	0.0118	0.0267	0.0273
Single Women				
Time of Policy * Treated	0.0069	0.0083*	0.0082*	0.0077*
	(0.0034)	(0.0035)	(0.0033)	(0.0033)
Constant	0.0746***	0.0309	0.0078	0.0069
	(0.0075)	(0.0239)	(0.0239)	(0.0249)
Mean Prob(IF)	0.0727	0.0727	0.0727	0.0727
Observations	178,596	178,596	178,596	178,596
R-squared	0.0007	0.0096	0.0259	0.0269
Single Men				
Time of Policy * Treated	0.0064	0.0039	0.0032	0.0033
	(0.0051)	(0.0037)	(0.0039)	(0.0040)
Constant	0.0798***	0.0535*	0.0313	0.0343
	(0.0124)	(0.0250)	(0.0326)	(0.0350)
Mean Prob(IF)	0.0803	0.0803	0.0803	0.0803
Observations	155,405	155,405	155,405	155,405
R-squared	0.0011	0.0149	0.0295	0.0299
Controls Demographics	NO	YES	YES	YES
Controls Human Capital	NO	NO	YES	YES
Fixed Effects: Sector of Activity	NO	NO	NO	YES

Note: Clustered (Region) Standard Errors in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$. *Controls:* Demographics include age, age-squared, family size, number of young/old children, race, region. Human capital includes completed education, weekly hours worked, work type (employee, employer, self-employed) and dummy employment status at $t-1$.

Table C.12: Regression Results Matching Difference-in-Differences: Policy Impact for Married

Dep. Variable: Transition Informal to Formal	(1)	(2)	(3)	(4)	(5)
All Married					
Time of Policy * Treated	0.0044*	0.0051**	0.0049**	0.0051**	0.0042*
	(0.0024)	(0.0024)	(0.0023)	(0.0023)	(0.0023)
Constant	0.1280***	0.0629***	-0.0316***	-0.0350***	-0.0318***
	(0.0015)	(0.0078)	(0.0081)	(0.0081)	(0.0082)
Mean Prob(IF)	0.133	0.133	0.133	0.133	0.133
Observations	401,777	401,777	401,777	401,777	401,777
R-squared	0.0016	0.0180	0.0417	0.0437	0.0453
Married Women					
Time of Policy * Treated	0.0086**	0.0105***	0.0093***	0.0097***	0.0087**
	(0.0035)	(0.0035)	(0.0035)	(0.0035)	(0.0035)
Constant	0.1000***	0.0820***	0.0124	-0.0038	-0.0036
	(0.0023)	(0.0125)	(0.0127)	(0.0128)	(0.0130)
Mean Prob(IF)	0.110	0.110	0.110	0.110	0.110
Observations	145,308	145,308	145,308	145,308	145,308
R-squared	0.0016	0.0167	0.0483	0.0499	0.0519
Married Men					
Time of Policy * Treated	-0.0024	-0.0027	-0.0013	-0.0006	-0.0009
	(0.0032)	(0.0032)	(0.0031)	(0.0031)	(0.0031)
Constant	0.1439***	0.0368***	-0.0282***	-0.0354***	-0.0377***
	(0.0020)	(0.0103)	(0.0108)	(0.0108)	(0.0110)
Mean Prob(IF)	0.146	0.146	0.146	0.146	0.146
Observations	256,469	256,469	256,469	256,469	256,469
R-squared	0.0023	0.0211	0.0412	0.0425	0.0439
Controls Demographics	NO	YES	YES	YES	YES
Controls Human Capital	NO	NO	YES	YES	YES
Controls Spouse's Characteristics	NO	NO	NO	YES	YES
Fixed Effects: Sector of Activity	NO	NO	NO	NO	YES

Note: Clustered (Region) Standard Errors in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$. *Controls:* Demographics include age, age-squared, family size, number of young/old children, race, region. Human capital includes completed education, weekly hours worked, work type (employee, employer, self-employed) and dummy employment status at $t-1$. Spouse's Characteristics include their completed education, current employment status and income.

Table C.13: Regression Results Matching Difference-in-Differences: Policy Impact for Married (Decomposition by Household Employment Status)

Dep. Variable: Transition Informal to Formal	(1)	(2)	(3)	(4)	(5)
Married Women					
Time of Policy * Treated * Spouse: UU (stayed)	-0.0491***	-0.0402***	-0.0276***	-0.0132***	-0.0128***
	(0.0042)	(0.0043)	(0.0042)	(0.0049)	(0.0049)
Time of Policy * Treated * Spouse: U → F	-0.0576***	-0.0554***	-0.0395***	-0.0243**	-0.0244**
	(0.0109)	(0.0109)	(0.0108)	(0.0111)	(0.0111)
Time of Policy * Treated * Spouse: U → I	0.0190	0.0184	0.0286	0.0429**	0.0421**
	(0.0201)	(0.0201)	(0.0197)	(0.0199)	(0.0198)
Time of Policy * Treated * Spouse: F → U	0.0251	0.0225	0.0173	0.0129	0.0132
	(0.0191)	(0.0191)	(0.0187)	(0.0187)	(0.0187)
Time of Policy * Treated * Spouse: F → I	-0.0173**	-0.0213***	-0.0252***	-0.0243***	-0.0252***
	(0.0075)	(0.0075)	(0.0074)	(0.0074)	(0.0074)
Time of Policy * Treated * Spouse: I → U	-0.0257*	-0.0265*	-0.0294*	-0.0305**	-0.0301**
	(0.0151)	(0.0152)	(0.0150)	(0.0151)	(0.0150)
Time of Policy * Treated * Spouse: I → F	0.2412***	0.2352***	0.2245***	0.2252***	0.2234***
	(0.0085)	(0.0085)	(0.0083)	(0.0083)	(0.0083)
Time of Policy * Treated * Spouse: II (stayed)	-0.0837***	-0.0756***	-0.0690***	-0.0670***	-0.0672***
	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)
Constant	0.1000***	0.0912***	0.0196	0.0017	0.0016
	(0.0023)	(0.0124)	(0.0126)	(0.0128)	(0.0130)
Mean Prob(IF)	0.110	0.110	0.110	0.110	0.110
Observations	145,308	145,308	145,308	145,308	145,308
R-squared	0.0244	0.0372	0.0663	0.0675	0.0694
Married Men					
Time of Policy * Treated * Spouse: UU (stayed)	-0.0644***	-0.0490***	-0.0318***	-0.0257***	-0.0239***
	(0.0032)	(0.0032)	(0.0032)	(0.0037)	(0.0037)
Time of Policy * Treated * Spouse: U → F	-0.0498***	-0.0503***	-0.0321***	-0.0262***	-0.0250***
	(0.0080)	(0.0081)	(0.0080)	(0.0082)	(0.0082)
Time of Policy * Treated * Spouse: U → I	0.1735***	0.1666***	0.1782***	0.1819***	0.1826***
	(0.0165)	(0.0164)	(0.0163)	(0.0164)	(0.0164)
Time of Policy * Treated * Spouse: F → U	0.0802***	0.0718***	0.0735***	0.0701***	0.0709***
	(0.0175)	(0.0173)	(0.0173)	(0.0172)	(0.0172)
Time of Policy * Treated * Spouse: F → I	-0.0013	-0.0051	-0.0079	-0.0065	-0.0065
	(0.0118)	(0.0117)	(0.0116)	(0.0116)	(0.0116)
Time of Policy * Treated * Spouse: I → U	-0.0075	-0.0132	-0.0051	-0.0027	-0.0009
	(0.0122)	(0.0122)	(0.0120)	(0.0121)	(0.0120)
Time of Policy * Treated * Spouse: I → F	0.3318***	0.3255***	0.3171***	0.3189***	0.3181***
	(0.0103)	(0.0103)	(0.0101)	(0.0101)	(0.0101)
Time of Policy * Treated * Spouse: II (stayed)	-0.1126***	-0.0970***	-0.0880***	-0.0835***	-0.0826***
	(0.0036)	(0.0036)	(0.0035)	(0.0035)	(0.0036)
Constant	0.1439***	0.0372***	-0.0291***	-0.0369***	-0.0394***
	(0.0020)	(0.0102)	(0.0107)	(0.0107)	(0.0109)
Mean Prob(IF)	0.146	0.146	0.146	0.146	0.146
Observations	256,469	256,469	256,469	256,469	256,469
R-squared	0.0197	0.0359	0.0544	0.0553	0.0565
Controls Demographics	NO	YES	YES	YES	YES
Controls Human Capital	NO	NO	YES	YES	YES
Controls Spouse's Characteristics	NO	NO	NO	YES	YES
Fixed Effects: Sector of Activity	NO	NO	NO	NO	YES

Note: Clustered (Region) Standard Errors in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$. *Controls:* Demographics include age, age-squared, family size, number of young/old children, race, region. Human capital includes completed education, weekly hours worked, work type (employee, employer, self-employed) and dummy employment status at $t-1$. Spouse's Characteristics include their completed education, current employment status and income.

C.6 Model Estimation: Parameter Estimates

Table C.14: Estimation Results: Arrival Rates Parameters

	Before SuperSimples							After SuperSimples						
	Single	Married (Ind Search)	Married (Household Search) Conditional on Spouse's Work Status					Single	Married (Ind Search)	Married (Household Search) Conditional on Spouse's Work Status				
			U	FNT	FT	INT	IT			U	FNT	FT	INT	IT
Women														
Arrival Rates of Offers while Unemployed														
$\lambda_U(FNT)$	0.0400	0.0211	0.0186	0.0439	0.1222	0.0817	0.2344	0.0567	0.0388	0.0313	0.0828	0.2250	0.0531	0.1984
	(0.0006)	(0.0002)	(0.0002)	(0.0005)	(0.0025)	(0.0004)	(0.0013)	(0.0008)	(0.0005)	(0.0001)	(0.0005)	(0.0049)	(0.0002)	(0.0007)
$\lambda_U(FT)$	0.0520	0.0369	0.0739	0.0417	0.1485	0.0848	0.2582	0.1238	0.0909	0.1473	0.0813	0.2973	0.0556	0.2256
	(0.0007)	(0.0005)	(0.0027)	(0.0004)	(0.0027)	(0.0003)	(0.0012)	(0.0033)	(0.0024)	(0.0051)	(0.0004)	(0.0062)	(0.0001)	(0.0009)
$\lambda_U(INT)$	0.1369	0.0716	0.0511	0.0341	0.1121	0.0843	0.3109	0.1600	0.0743	0.0368	0.0388	0.1716	0.0814	0.3058
	(0.0049)	(0.0010)	(0.0005)	(0.0007)	(0.0044)	(0.0005)	(0.0022)	(0.0060)	(0.0015)	(0.0001)	(0.0004)	(0.0056)	(0.0003)	(0.0015)
$\lambda_U(IT)$	0.1026	0.0660	0.2806	0.0270	0.0844	0.0840	0.3454	0.1084	0.0646	0.2270	0.0717	0.1274	0.0480	0.2971
	(0.0036)	(0.0014)	(0.0017)	(0.0006)	(0.0028)	(0.0003)	(0.0021)	(0.0039)	(0.0018)	(0.0011)	(0.0006)	(0.0038)	(0.0001)	(0.0012)
Arrival Rates of Offers while Employed (On the Job Search)														
$\lambda_E(FNT \to INT)$	0.0246	0.0212	0.0240	0.0221	0.0257	0.0247	0.0220	0.0253	0.0229	0.0195	0.0180	0.0242	0.0283	0.0244
	(0.0009)	(0.0003)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0009)	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
$\lambda_E(FT \to INT)$	0.0050	0.0022	0.0005	0.0032	0.0027	0.0029	0.0038	0.0035	0.0020	0.0020	0.0030	0.0018	0.0029	0.0034
	(0.0002)	(0.0000)	(0.0082)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0049)	(0.0001)	(0.0000)	(0.0001)	(0.0000)
$\lambda_E(FNT \to IT)$	0.0039	0.0030	0.0103	0.0065	0.0052	0.0053	0.0080	0.0037	0.0028	0.0032	0.0042	0.0056	0.0039	0.0073
	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
$\lambda_E(FT \to IT)$	0.0282	0.0242	0.0265	0.0321	0.0351	0.0375	0.0462	0.0199	0.0194	0.0143	0.0267	0.0244	0.0344	0.0416
	(0.0010)	(0.0005)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0007)	(0.0005)	(0.0000)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
$\lambda_E(INT \to FNT)$	0.0665	0.0547	0.0469	0.1061	0.0856	0.0514	0.0639	0.0573	0.0461	0.0500	0.1002	0.0859	0.0560	0.0591
	(0.0010)	(0.0006)	(0.0003)	(0.0009)	(0.0008)	(0.0009)	(0.0012)	(0.0008)	(0.0006)	(0.0003)	(0.0008)	(0.0007)	(0.0007)	(0.0007)
$\lambda_E(IT \to FNT)$	0.0125	0.0076	0.0099	0.0107	0.0097	0.0102	0.0039	0.0130	0.0078	0.0056	0.0107	0.0090	0.0075	0.0077
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0000)
$\lambda_E(INT \to FT)$	0.0148	0.0117	0.0078	0.0252	0.0304	0.0193	0.0163	0.0200	0.0118	0.0309	0.0268	0.0280	0.0175	0.0155
	(0.0002)	(0.0002)	(0.0003)	(0.0005)	(0.0005)	(0.0007)	(0.0005)	(0.0005)	(0.0003)	(0.0012)	(0.0007)	(0.0006)	(0.0007)	(0.0005)
$\lambda_E(IT \to FT)$	0.0630	0.0579	0.0534	0.0801	0.0776	0.0445	0.0586	0.0681	0.0673	0.0674	0.0897	0.0934	0.0573	0.0581
	(0.0009)	(0.0008)	(0.0020)	(0.0016)	(0.0014)	(0.0017)	(0.0019)	(0.0018)	(0.0018)	(0.0024)	(0.0020)	(0.0019)	(0.0019)	(0.0018)
Men														
Arrival Rates of Offers while Unemployed														
$\lambda_U(FNT)$	0.0345	0.0356	0.0179	0.0423	0.1194	0.0827	0.2382	0.0584	0.0688	0.0301	0.0805	0.2210	0.0537	0.2024
	(0.0001)	(0.0005)	(0.0001)	(0.0003)	(0.0006)	(0.0010)	(0.0033)	(0.0003)	(0.0011)	(0.0001)	(0.0004)	(0.0014)	(0.0011)	(0.0034)
$\lambda_U(FT)$	0.0861	0.1106	0.0726	0.0400	0.1448	0.0863	0.2634	0.2046	0.2223	0.1450	0.0790	0.2918	0.0567	0.2298
	(0.0002)	(0.0016)	(0.0004)	(0.0003)	(0.0008)	(0.0012)	(0.0036)	(0.0015)	(0.0063)	(0.0007)	(0.0004)	(0.0019)	(0.0013)	(0.0035)
$\lambda_U(INT)$	0.0650	0.0799	0.0509	0.0328	0.1088	0.0855	0.3129	0.0716	0.0635	0.0369	0.0376	0.1676	0.0826	0.3089
	(0.0007)	(0.0024)	(0.0006)	(0.0002)	(0.0005)	(0.0010)	(0.0053)	(0.0008)	(0.0062)	(0.0005)	(0.0001)	(0.0007)	(0.0017)	(0.0053)
$\lambda_U(IT)$	0.2769	0.3097	0.2783	0.0259	0.0819	0.0853	0.3481	0.2515	0.2733	0.2292	0.0692	0.1245	0.0488	0.3010
	(0.0037)	(0.0105)	(0.0035)	(0.0003)	(0.0005)	(0.0012)	(0.0054)	(0.0035)	(0.0208)	(0.0035)	(0.0002)	(0.0006)	(0.0010)	(0.0048)
Arrival Rates of Offers while Employed (On the Job Search)														
$\lambda_E(FNT \to INT)$	0.0286	0.0271	0.0239	0.0224	0.0262	0.0251	0.0223	0.0244	0.0255	0.0196	0.0182	0.0247	0.0287	0.0248
	(0.0003)	(0.0008)	(0.0003)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0025)	(0.0003)	(0.0004)	(0.0006)	(0.0006)	(0.0005)
$\lambda_E(FT \to INT)$	0.0041	0.0036	0.0005	0.0033	0.0027	0.0030	0.0038	0.0035	0.0024	0.0020	0.0030	0.0018	0.0030	0.0034
	(0.0000)	(0.0001)	(0.0111)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0000)	(0.0002)	(0.0145)	(0.0001)	(0.0000)	(0.0001)	(0.0001)
$\lambda_E(FNT \to IT)$	0.0083	0.0072	0.0102	0.0066	0.0053	0.0054	0.0081	0.0069	0.0047	0.0033	0.0042	0.0057	0.0039	0.0074
	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0003)	(0.0001)	(0.0004)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
$\lambda_E(FT \to IT)$	0.0459	0.0411	0.0263	0.0327	0.0358	0.0377	0.0465	0.0326	0.0296	0.0144	0.0272	0.0249	0.0347	0.0421
	(0.0006)	(0.0014)	(0.0005)	(0.0004)	(0.0004)	(0.0005)	(0.0007)	(0.0004)	(0.0023)	(0.0002)	(0.0005)	(0.0005)	(0.0006)	(0.0008)
$\lambda_E(INT \to FNT)$	0.0652	0.0806	0.0450	0.1023	0.0821	0.0493	0.0612	0.0636	0.0812	0.0481	0.0974	0.0834	0.0543	0.0570
	(0.0002)	(0.0012)	(0.0002)	(0.0004)	(0.0004)	(0.0002)	(0.0003)	(0.0003)	(0.0013)	(0.0002)	(0.0005)	(0.0005)	(0.0002)	(0.0003)
$\lambda_E(IT \to FNT)$	0.0076	0.0088	0.0095	0.0103	0.0093	0.0098	0.0037	0.0121	0.0102	0.0054	0.0104	0.0088	0.0072	0.0074
	(0.0000)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0002)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
$\lambda_E(INT \to FT)$	0.0177	0.0209	0.0076	0.0246	0.0297	0.0187	0.0158	0.0274	0.0238	0.0304	0.0264	0.0275	0.0171	0.0151
	(0.0000)	(0.0003)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0002)	(0.0007)	(0.0001)	(0.0002)	(0.0003)	(0.0001)	(0.0002)
$\lambda_E(IT \to FT)$	0.0554	0.0718	0.0524	0.0783	0.0757	0.0432	0.0568	0.0687	0.0833	0.0663	0.0881	0.0917	0.0560	0.0568
	(0.0001)	(0.0010)	(0.0003)	(0.0003)	(0.0004)	(0.0001)	(0.0003)	(0.0005)	(0.0024)	(0.0003)	(0.0006)	(0.0007)	(0.0003)	(0.0004)

C.7 Structural Policy Evaluation: Decomposition of SuperSimples Effect

Table C.15: Structural Policy Evaluation: Decomposition of *SuperSimples* Effect for Married Women

Transitions Informal to Formal	Data	Baseline	Income Tax	Social Security	Wage Distr	Arrival Rate	Proportions	Data	Baseline	Income Tax	Social Security	Wage Distr	Arrival Rate
Single Women							**Single Women**						
Informal → Formal Non-Treated	0.0077	0.0077	0.0077	0.0077	0.0265	0.0021	Formal Sector	0.0469	0.0469	0.0462	0.0469	0.0462	0.0415
Policy Effect -Significance Level	***	***	***	***	***	**	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.000	0.000	2.442	-0.733	Decomposition (Δ)			-0.015	0.000	-0.014	-0.114
Informal → Formal Treated	0.0013	0.0013	0.0011	0.0013	-0.0133	0.0056	Informal Sector	-0.0220	-0.0220	-0.0220	-0.0220	-0.0243	-0.0201
Policy Effect -Significance Level	**	**	**	**	***	***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			-0.090	0.007	-11.585	3.471	Decomposition (Δ)			0.002	0.000	0.106	-0.085
Married Women - Individual Search Model							**Married Women - Individual Search Model**						
Informal → Formal Non-Treated	0.0085	0.0085	0.0085	0.0085	0.0262	0.0023	Formal Sector	0.0297	0.0297	0.0286	0.0295	0.0282	0.0281
Policy Effect -Significance Level	***	***	***	***	***	***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.000	0.000	2.078	-0.728	Decomposition (Δ)			-0.035	-0.005	-0.050	-0.053
Informal → Formal Treated	0.0111	0.0111	0.0087	0.0117	-0.0081	0.0040	Informal Sector	-0.0229	-0.0229	-0.0223	-0.0231	-0.0227	-0.0201
Policy Effect -Significance Level	***	***	***	***	***	***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			-0.220	0.057	-1.726	-0.640	Decomposition (Δ)			-0.029	0.007	-0.010	-0.124
Household Search													
Married Women: Husband Unemployed							**Married Women: Husband Unemployed**						
Informal → Formal Non-Treated	-0.0046	-0.0046	-0.0050	-0.0046	0.0082	0.0031	Formal Sector	0.0032	0.0032	0.0031	0.0032	0.0020	0.0013
Policy Effect -Significance Level	**	**	**	**	***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.0732	0.0000	-2.7787	-1.6763	Decomposition (Δ)			-0.0255	-0.0034	-0.3850	-0.5904
Informal → Formal Treated	0.0044	0.0044	0.0113	0.0052	-0.0130	0.0026	Informal Sector	-0.0011	-0.0011	-0.0010	-0.0011	0.0001	-0.0013
Policy Effect -Significance Level			***	*	***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			1.5479	0.1698	-3.9282	-0.4105	Decomposition (Δ)			-0.0451	-0.0012	-1.1348	0.1690
Married Women: Husband Formal Non-Treated							**Married Women: Husband Formal Non-Treated**						
Informal → Formal Non-Treated	0.0024	0.0024	0.0029	0.0024	0.0228	-0.0008	Formal Sector	0.0090	0.0090	0.0086	0.0089	0.0078	0.0084
Policy Effect -Significance Level	**	**	**	**	***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.1985	0.0000	8.4918	-1.3318	Decomposition (Δ)			-0.0490	-0.0165	-0.1291	-0.0714
Informal → Formal Treated	0.0085	0.0085	0.0113	0.0088	-0.0059	0.0011	Informal Sector	-0.0014	-0.0014	-0.0014	-0.0014	-0.0020	-0.0019
Policy Effect -Significance Level	***	***	***	***	***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.3231	0.0304	-1.6927	-0.8713	Decomposition (Δ)			0.0166	0.0131	0.3917	0.3586
Married Women: Husband Formal Treated							**Married Women: Husband Formal Treated**						
Informal → Formal Non-Treated	0.0003	0.0003	0.0003	0.0003	0.0160	0.0083	Formal Sector	0.0342	0.0342	0.0328	0.0335	0.0314	0.0314
Policy Effect -Significance Level					***	***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.0042	0.3221	59.7071	30.6707	Decomposition (Δ)			-0.0400	-0.0211	-0.0825	-0.0814
Informal → Formal Treated	0.0282	0.0282	0.0113	0.0258	0.0077	0.0097	Informal Sector	-0.0092	-0.0092	-0.0082	-0.0089	-0.0078	-0.0092
Policy Effect -Significance Level	***	***	***	***	***	***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			-0.5985	-0.0847	-0.7278	-0.6552	Decomposition (Δ)			-0.1003	-0.0260	-0.1460	0.0068
Married Women: Husband Informal Non-Treated							**Married Women: Husband Informal Non-Treated**						
Informal → Formal Non-Treated	-0.0034	-0.0034	-0.0034	-0.0034	-0.0049	0.0021	Formal Sector	0.0000	0.0000	-0.0001	-0.0001	0.0003	0.0001
Policy Effect -Significance Level	**	**	**	**	***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.0051	0.0051	0.4578	-1.6161	Decomposition (Δ)			0.1822	0.3478	-6.2195	-2.7536
Informal → Formal Treated	0.0122	0.0122	0.0113	0.0122	0.0124	-0.0025	Informal Sector	-0.0015	-0.0015	-0.0015	-0.0015	-0.0016	-0.0017
Policy Effect -Significance Level	***	***	***	***	***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			-0.0719	-0.0007	0.0194	-1.2013	Decomposition (Δ)			0.0039	0.0002	0.0577	0.1297
Married Women: Husband Informal Treated							**Married Women: Husband Informal Treated**						
Informal → Formal Non-Treated	0.0085	0.0085	0.0086	0.0084	0.0090	0.0008	Formal Sector	0.0036	0.0036	0.0038	0.0037	0.0048	0.0036
Policy Effect -Significance Level	***	***	***	***	***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.0199	-0.0016	0.0671	-0.9067	Decomposition (Δ)			0.0572	0.0427	0.3557	-0.0031
Informal → Formal Treated	0.0003	0.0003	0.0113	0.0004	0.0010	-0.0040	Informal Sector	-0.0038	-0.0038	-0.0038	-0.0038	-0.0035	-0.0028
Policy Effect -Significance Level			***			***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			33.5330	0.1332	1.9646	-13.3274	Decomposition (Δ)			-0.0126	-0.0024	-0.0722	-0.2772

Table C.16: Structural Policy Evaluation: Decomposition of *SuperSimples* Effect for Married Men

Transitions Informal to Formal	Data	Baseline	Payroll Tax	Social Security	Wage Distr	Arrival Rate	Proportions	Data	Baseline	Income Tax	Social Security	Wage Distr	Arrival Rate
Single Men							**Single Men**						
Informal → Formal Non-Treated	0.0093	0.0093	0.0093	0.0093	0.0276	0.0071	Formal Sector	0.0557	0.0557	0.0516	0.0548	0.0470	0.0503
Policy Effect -Significance Level	***	***	***	***	***	***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.000	0.000	1.970	-0.238	Decomposition (Δ)			-0.074	-0.017	-0.157	-0.098
Informal → Formal Treated	0.0022	0.0022	-0.0036	0.0033	-0.0174	0.0022	Informal Sector	-0.0460	-0.0460	-0.0425	-0.0456	-0.0376	-0.0471
Policy Effect -Significance Level	**	**	***	***	***	**	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			-2.625	0.486	-8.920	0.012	Decomposition (Δ)			-0.074	-0.007	-0.182	0.026
Married Men - Individual Search Model							**Married Men - Individual Search Model**						
Informal → Formal Non-Treated	0.0081	0.0081	0.0081	0.0081	0.0316	0.0076	Formal Sector	0.0093	0.0093	0.0093	0.0093	0.0276	0.0071
Policy Effect -Significance Level	***	***	***	***	***	***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.000	0.000	2.921	-0.060	Decomposition (Δ)			0.000	0.000	1.970	-0.238
Informal → Formal Treated	0.0039	0.0039	0.0053	0.0046	-0.0120	0.0021	Informal Sector	-0.0407	-0.0407	-0.0404	-0.0408	-0.0342	-0.0412
Policy Effect -Significance Level	***	***	***	***	***	***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.376	0.196	-4.097	-0.458	Decomposition (Δ)			-0.007	0.002	-0.158	0.011
Household Search													
Married Men: Wife Unemployed							**Married Men: Wife Unemployed**						
Informal → Formal Non-Treated	-0.0026	-0.0026	-0.0026	-0.0026	0.0084	0.0006	Formal Sector	0.0005	0.0005	-0.0007	0.0005	-0.0019	-0.0036
Policy Effect -Significance Level					***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.0000	0.0000	-4.2120	-1.2478	Decomposition (Δ)			-2.6115	0.0845	-5.1897	-8.7655
Informal → Formal Treated	0.0027	0.0027	0.0078	0.0009	-0.0060	-0.0017	Informal Sector	-0.0115	-0.0115	-0.0113	-0.0114	-0.0113	-0.0078
Policy Effect -Significance Level			***		***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			1.9593	-0.6552	-3.2655	-1.6252	Decomposition (Δ)			-0.0159	-0.0040	-0.0194	-0.3188
Married Men: Wife Formal Non-Treated							**Married Men: Wife Formal Non-Treated**						
Informal → Formal Non-Treated	-0.0013	-0.0013	-0.0012	-0.0013	0.0247	-0.0024	Formal Sector	0.0169	0.0169	0.0168	0.0169	0.0163	0.0161
Policy Effect -Significance Level					***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			-0.0365	0.0000	-20.4466	0.9269	Decomposition (Δ)			-0.0034	-0.0001	-0.0343	-0.0462
Informal → Formal Treated	0.0082	0.0082	0.0078	0.0088	-0.0066	-0.0033	Informal Sector	-0.0058	-0.0058	-0.0057	-0.0058	-0.0054	-0.0062
Policy Effect -Significance Level	***	***	***	***	***	**	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			-0.0404	0.0815	-1.8012	-1.4046	Decomposition (Δ)			-0.0152	0.0004	-0.0741	0.0606
Married Men: Wife Formal Treated							**Married Men: Wife Formal Treated**						
Informal → Formal Non-Treated	-0.0098	-0.0098	-0.0098	-0.0098	0.0084	-0.0075	Formal Sector	0.0421	0.0421	0.0411	0.0415	0.0398	0.0391
Policy Effect -Significance Level	***	***	***	***	***	***	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.0000	0.0000	-1.8556	-0.2331	Decomposition (Δ)			-0.0234	-0.0137	-0.0532	-0.0694
Informal → Formal Treated	0.0173	0.0173	0.0078	0.0167	-0.0019	-0.0005	Informal Sector	-0.0022	-0.0022	-0.0019	-0.0020	-0.0008	-0.0027
Policy Effect -Significance Level	***	***	***	***	*		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			-0.5476	-0.0360	-1.1116	-1.0275	Decomposition (Δ)			-0.1374	-0.0761	-0.6378	0.2262
Married Men: Wife Informal Non-Treated							**Married Men: Wife Informal Non-Treated**						
Informal → Formal Non-Treated	-0.0044	-0.0044	-0.0044	-0.0044	0.0097	0.0023	Formal Sector	0.0046	0.0046	0.0046	0.0046	0.0053	0.0058
Policy Effect -Significance Level	***	***	***	***	***	*	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.0000	0.0000	-3.2008	-1.5110	Decomposition (Δ)			0.0059	-0.0104	0.1613	0.2564
Informal → Formal Treated	0.0124	0.0124	0.0078	0.0117	0.0080	-0.0013	Informal Sector	-0.0107	-0.0107	-0.0107	-0.0107	-0.0105	-0.0115
Policy Effect -Significance Level	***	***	***	***	***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			-0.3679	-0.0566	-0.3562	-1.1047	Decomposition (Δ)			-0.0067	-0.0022	-0.0201	0.0685
Married Men: Wife Informal Treated							**Married Men: Wife Informal Treated**						
Informal → Formal Non-Treated	0.0087	0.0087	0.0087	0.0087	0.0230	0.0029	Formal Sector	-0.0031	-0.0031	-0.0022	-0.0029	-0.0005	-0.0015
Policy Effect -Significance Level	***	***	***	***	***	*	Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			0.0052	0.0000	1.6492	-0.6688	Decomposition (Δ)			-0.3086	-0.0664	-0.8386	-0.5172
Informal → Formal Treated	0.0020	0.0020	0.0078	0.0013	-0.0091	-0.0017	Informal Sector	-0.0130	-0.0130	-0.0129	-0.0130	-0.0124	-0.0125
Policy Effect -Significance Level	*	*	***		***		Policy Effect -Significance Level	***	***	***	***	***	***
Decomposition (Δ)			2.8365	-0.3543	-5.4526	-1.8134	Decomposition (Δ)			-0.0097	-0.0025	-0.0446	-0.0403