The Perverse Effect of Flexible Labor Regulation on Informality: Evidence from the Timing of Labor Inspections

PRELIMINARY DRAFT, NOT TO BE CITED

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Abstract

Italy is one of the European countries with the largest amount of undeclared, irregular work. In order to lure undeclared work out of the shadows, in recent years the legislator has considerably de-bureaucratized some labor relationships. The most extreme example of unregulated labor contract are so called labor vouchers.

Until recently labor vouchers could be purchased online and from mom and pops stores to pay for all sorts of occasional work, with little to no additional paper work. Between 2008 and 2016 the use of labor vouchers has gone up from 500,000 (less than 1 per 100 inhabitants) to 277,193,002 vouchers (500 per 100 inhabitants!). The massive use of vouchers has not been interpreted as a positive signal, and the legislator has recently abolished them. Using INPS inspections as well as changes in the legislation we find that vouchers have indeed encouraged rather than discouraged the use of undeclared work.

1 Introduction

According to the Italian Statistical Office (ISTAT) the value added of the shadow or underground economy is worth about 12 percent of the Italian GDP and is on the rise (ISTAT, 2015). Approximately half of it is driven by undeclared economic activity, one third by irregular work, and the large part of the rest by unlawful activities. For example, according to the Eurobarometer (2014), 23 percent of Italians have purchased undeclared goods and services from healthcare providers (with only Malta and Cyprus doing worse in Europe).

It is well known that some sectors, mainly construction work, professional services, retail, and other services, have a larger incidence of undeclared economic activity, while agriculture and domestic work have a large number of irregular workers. It is also well known that the Italian shadow economy is unevenly spread across the country, and is much more present in the South than in the North.

Over the years, the Italian government has tried to contrast undeclared work and economic activity using several policy tools: predicting economic activity (the so-called "studi di settore"), using labor inspections "ispezioni del lavoro," and simplifying labor contracts. The focus of this project is labor contracts. One such type of contracts is called "vouchers," and has recently been in the spotlight.

Employers who want to pay a worker for an occasional job can buy vouchers from the Italian Social Security Administration (INPS). Part of the value of the vouchers pays for the social security contributions and the rest is paid to the worker. Compared to the common labor contracts in Italy, vouchers simplify the bureaucracy considerably, and this was believed to incentivize employers who might pay some of their workers under the table to stop doing so. A potential drawback of vouchers is that it might interfere with labor inspections. Instead of using fully undeclared work, employers might buy a single voucher to justify their physical presence in the workplace, and pay the rest of their work under the table. The voucher would marginally increase their labor cost but it would also lower the probability that undeclared work is detected, which typically comes with very hefty fines (including the risk of a complete shutdown of production).

Which mechanism prevails and whether vouchers help or hurt undeclared work to come out of the shadow is still an open question. This project aims at answering this question. Even though the Italian government has recently decided to abolish vouchers altogether, some form of flexible labor contracts is likely to show up again in the future. Regulatory detail about vouchers, for example, rules about who can use them and for which kind of work, have changed over time and across sectors. This variation can be used to highlight what works and what does not, and can hopefully lead to a more data-driven policy recommendation about vouchers and similar labor contracts.

The most comprehensive study about vouchers is a recent study by Anastasia, Bombelli and Maschio (2016). While the authors' main purpose is to describe the evolution of vouchers, they also show that Italian regions where the average number of vouchers per employer is negatively correlated with the fraction of irregular workers (Fig. 2 on page 16). One possible driver of such correlation is that employers who use a small number of vouchers are paying

for most of the work under the table. Vouchers become a tool for hiding such illegal practice. Additional (this time anecdotal) evidence is based on the evolution of labor injuries. Workers paid with vouchers are not eligible for sickness leave, while the sole exception of work injuries. In an event of a work injury workers receive for as long as they are injured about 30 euro per day for the first 3 months, and about 40 euro per day for the subsequent months. Recent newspaper articles have mentioned that the Italian disability administration (INAIL) fears that vouchers may be used to cover irregular work in the event of work injuries. According to La Repubblica (2016), most injuries happen for the very first day at work for workers paid of vouchers.

The identification of the effects of vouchers on undeclared work rest on the many policy changes that have taken place over the last 10 years. The 2003 the Berlusconi government introduced "vouchers" (the Biagi law, decreto legislativo 276/2003) to pay for occasional work. But only 5 years later employers were finally allowed to use this new type of labor contract. In 2008 the Prodi government set major limits to the use of vouchers: employers could only spend a maximum of 5000 euro in vouchers for each employee; only students and retirees were allowed to receive vouchers, and only in the agricultural sector. A few months later, the new Berlusconi government extended vouchers to all workers in the agricultural sector, not just students and retirees. More changes followed.

In 2009 (legge 33/2009) vouchers became available in the retail sector, tourism and service sector, and for house keepers. In 2010 vouchers were completely liberalized, and became open to all sectors and all workers. With the Fornero law (legge 92/2012) the 5000-euro limit became more stringent, as the sum of vouchers for a single worker across employers was not allowed to exceed 5000 euro. Since the "Jobs Act" labor reform of the Renzi Government, vouchers do not have to be related to occasional work anymore, and the limit increased to 7000 euro. But an important novelty is that employers must signup workers online before the work related to a voucher starts (with the decreto legislativo 185/2016 they also need to send an SMS at least 60 minutes before the job).

Identifying the ill-use of vouchers is by no means easy. The main issue is that by nature undeclared work is unobserved, with the only exception of labor inspections. In the case of vouchers, however, as already mentioned, labor inspections may become less likely to uncover undeclared work, limiting their efficacy and biasing the corresponding picture about vouchers.

Our first approach is to exploit the random timing of labor inspections. Under the null hypothesis that there is no misuse of vouchers, we would not expect their use to change upon an inspection. Figure 4 shows the evolution of vouchers before and after inspections.

There is a clear increase in the use of vouchers as soon as labor inspectors start their inspections.

2 Jobs, Fixed Term Jobs and Mini Jobs

2.1 The environment and the institutions

We consider a labor market for entrant workers. In each period a measure μ of workers enter the labor market and meet vacant firms at rate α. The structure of the matching model borrows from Garibaldi Violante (2005), while the modeling of temporary contracts with different duration borrows from Cahuc et al. (2005). Time is continuous and we look for a stationary environment. Firms and workers are risk neutral and discount the future at rate r. The productivity of job is homogeneous at value y. The model is solved mainly from the labor demand standpoint and we thus take the wage as fixed at ω. Yet, in the appendix we solve an equilibrium model with endogenous wage. Firms are modelled as single jobs

When the firm and the worker meet at rate α they draw an expected duration of a job $\frac{1}{\lambda}$ from a continuous distribution with cumulative density function $\Omega(\lambda)$, and support $\lambda \in [0, \overline{\lambda}]$, where possibly $\overline{\lambda} = +\infty$. Technically λ is a Poisson arrival rate of an adverse shock that terminates the job. In other words, when $\lambda = 0$ the job lasts forever while when $\lambda \to \infty$ the lasts and infinitely small amount of time. Technically, when λ strikes the productivty of the job drop from a value of y to a zero value and the job is basically dead with no possibility of returning poductive.

Firms learn the λ specific value of the job upon meeting the worker at rate α. The labor market institutions allow for three type of jobs: open ended jobs, fixed term jobs and mini jobs. The key firm decision concerns which type of job to open. Open ended jobs lasts potentially forever, and can be destroyed by a paying a firing tax equal to $-F$. The tax F is dissipated outside the match. In what follows, we shall indicate with $J^{op.e}(\lambda)$ the present discounted value to the firm of an open ended job. Fixed term jobs have an expected duration equal to ρ, and for simplicity, and can not be converted into open ended job. When a firm opens a fixed term job it commits to hiring the worker for an expected duration equal to $\frac{1}{\rho}$, regardless of the job specific value of λ. The advantage of a fixed term job is that the firm does not pay any firing costs when it expected duration ρ strikes. The cost associated of such job- however- is that the firm can be forced to keep the worker to expected maturity $\frac{1}{\rho}$ when λ strikes. In what follows, we shall indicate with $J^{f.t}(\lambda)$ the present discounted value to the firm of a fixed term job. Finally, the firm can open mini jobs. Mini jobs do not have any cost, but are characterized by an expected duration $\frac{1}{\rho^v}$ where ρ^v is a large and certainly $\rho^v > \rho$. In addition, mii jobs can be freely terminated also when λ strikes. In other words, mini jobs are super flexible job. In what follows, we shall indicate with $J^{m.j}(\lambda)$ the present discounted value to the firm of a mini job.

As anticipated, we solve the model for a fixed wage ω. In addition, the labor market is characterized by a payroll tax τ regardless of the the type of job. The tax is paid on a flow basis by the firm and we initially assume that it can not be evaded. In section 2.3 we consider the issue of the black economy. As the model is mainly concern with the job creation margin over the distribution $\Omega(\lambda)$, we follow Garibaldi and Violante (2017) and work with a fixed number of vacancies and a constant matching probability α, and let endogenous the price of

matching licences. Further, while workers enter the market at rate μ, we also assume that they die at the job specific rate λ and do not return to the market

2.2 Asset Values and the key firm decision

If we indicate with V the present discounted value of a vacant firm, and with q the price of a matching licence, its value function reads

$$rV = -q + \alpha\frac{v}{u}\left\{\int_0^\infty Max\left[J^{o.e.}(z), J^{f.t.}(z), J^{m.j.}(z), 0\right] dF(z) - V\right\} \tag{1}$$

The key firm decision concerns the choice of the type of contract, conditional on drawing an expected duration $\frac{1}{\lambda}$. The superscript to J refer- as mentioned above- to open ended jobs, fixed term and mini jobs. Equation 1 allows explicitly for the possibility that expected duration of the job is so low that the firm does not open any job. Competition among vacant firms imply that the value of a vacancy is zero, and in equilibrium the price of the licence equal to the expected value of a job, so that

$$q = \alpha\frac{v}{u}\left\{\int_0^\infty Max\left[J^{o.e.}(z), J^{f.t.}(z), J^{m.d.}(z), 0\right] dF(z)\right\} \tag{2}$$

To solve for the maximization on the right hand side, we need to specify the present discounted value of jobs. The pdv of a regular job reads of expected duration $\frac{1}{\lambda}$ or a λ type regular job as we shall indicate in the rest of the paper reads

$$rJ^{o.e.}(\lambda) = y - \tau - \omega + \lambda\left[-F - J^{o.e.}(\lambda)\right] \tag{3}$$

where F is the firing tax dissipated outside match and paid by the firm conditional on the realization of the destruction shock λ. For simplicity, in what follows we indicate with $\tilde{y}$ the net flow value of the job so that $\tilde{y} = y - \omega - \rho$. Conversely, the value of a λ type fixed term job reads

$$rJ^{f.t.}(\lambda) = \tilde{y} + \lambda\left[\tilde{J}^{f.t}(\lambda) - J^{f.t.}(\lambda)\right] - \rho J^{f.t}(\lambda) \tag{4}$$

where at rate ρ the job is destroyed at no cost. Yet, as argued above- conditional on λ striking, the firm is forced to keep open a job with 0 productivity and pay the wage until expected duration, so that $\tilde{J}^{f.t.} = -\frac{\omega+\tau}{r+\rho} = -F^{f.t.}$ represents the expected cost of terminating a fixed term job. To make the problem interesting, we assume that parameters are such that $\tilde{J}^{f.t.} > -F$ so that

$$\rho > \frac{\omega + \tau}{F} - r$$

The intuition of the restriction is that to make the model viable and interesting, the expected duration of a temporary job must be sufficiently short. Using the definition of $F^{f.t.}$, the present discounted expected value of the job reads

$$J^{f.t.} = \frac{\tilde{y} - \lambda F^{f.t.}}{r + \lambda + \rho} \tag{5}$$

The last option for the firm is to create a mini job. Mini jobs do not involve any cost of termination but have an expected duration driven by $\rho^v > \rho$. In other words, a mini job reads

$$J^{m.j.} = \frac{\tilde{y}}{r + \lambda + \rho^v} \tag{6}$$

Using equations 3, 5 and 6 the expected value of a job reads

$$E[J] = \left\{ \int_0^{\infty} Max \left[\frac{\tilde{y} - zF}{r + z + \rho}; \frac{\tilde{y} - zF^{f.t.}}{r + z + \rho}; \frac{\tilde{y}}{r + z + \rho^v}; 0 \right] dF(z) \right\} \tag{7}$$

The maximization problem satisfies the reservation property, since all the job value are decreasing and monotonic in λ. Further, one can easily show that $J^{o.e}(0) > J^{f.t}(0) > J^{m.j}(0)$. Further, $lim_{\lambda \to \infty} J^{m.j}(\lambda) = 0 > lim_{\lambda \to \infty} J^{f.t}(\lambda) = -F^{f.t} > lim_{\lambda \to \infty} J^{o.e.} = -F$ and the firm choice satisfies can be described by two reservation values $\tilde{\lambda}^{f.t.}$ and $\tilde{\lambda}^v$ so that

$$E[J] = \left[\int_0^{\tilde{\lambda}^{ft}} \frac{\tilde{y} - zF}{r + z + \rho} \right] dF(z) + \left[\int_{\tilde{\lambda}^{f.t}}^{\tilde{\lambda}^v} \frac{\tilde{y} - zF^v}{r + z + \rho} \right] dF(z) + \left[\int_{\tilde{\lambda}^v}^{\infty} \frac{\tilde{y}}{r + z + \rho} \right] dF(z) \tag{8}$$

The intuition of this result is very strong. For given net flow productivity $\tilde{y}$, firms have a strong ordering of which type of job to open according to its expected duration, with open ended jobs suitable for jobs with long expected duration and mini jobs suitable for jobs with very low duration. In addition, mini jobs create labor demand opportunities that would not otherwise be exploited if the mini jobs were not there. In other words, mini jobs respond to firm demand of flexibility for jobs with very low expected duration.

The reservation productivity can be also characterized (see appendix for details), since the are the solution to

$$J^{o.e.}(\tilde{\lambda}^{f.t.} = J^{f.t.}(\tilde{\lambda}^{f.t.}); \qquad \text{and} \qquad J^{f.t.}(\tilde{\lambda}^v) = J^{m.j.}(\tilde{\lambda}^v); \tag{9}$$

so that $\tilde{\lambda}^{f.t.}$ is the expected duration that makes the firm indifferent between an open ended job and a fixed term job. Similarly, $\tilde{\lambda}^v$ makes the firm indifferent between a mini job and a fixed term job. The two equations read

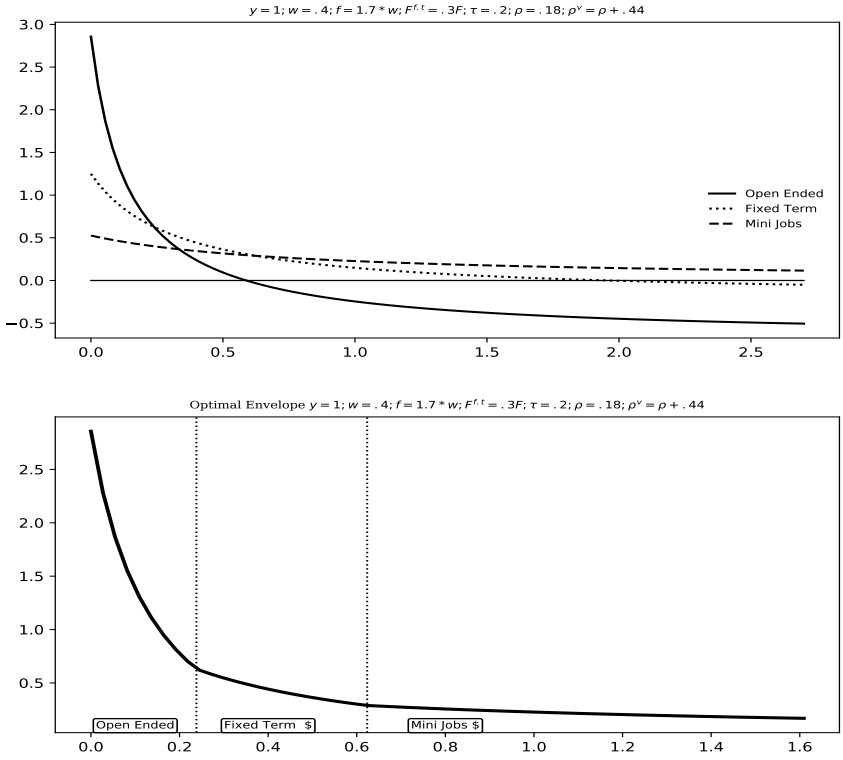
$$\begin{cases} \tilde{\lambda}^{f.t.} &= -\frac{r\Delta F + \rho}{2\Delta F} + \left[\left(\frac{r\Delta F + \rho}{4\Delta F} \right)^2 + \frac{\rho}{\Delta F} \right]^{\frac{1}{2}} \\ \\ \tilde{\lambda}^{v.} &= -\frac{(r+\rho^v)}{2} + \left[\left(-\frac{(r+\rho^v)}{4} \right)^2 + \frac{4\Delta\rho\tilde{y}}{F^{f.t.}} \right]^{\frac{1}{2}} \end{cases} \tag{10}$$

Given the reservation productivity, the model is closed by a level of unemployment such that $u\alpha F(\infty) = \mu$, so that $u = \frac{\mu}{\alpha F(\infty)}$. The stock of open ended jobs are simply $n^{o.e.} = vF(^{f.t.}(\tilde{\lambda}^{f.t.}$, $n^{f.t.} = v(F(\tilde{\lambda}^v) - F(\tilde{\lambda}^{f.t.})$ and $n^{m.j.} = v(1 - F(\tilde{\lambda}^v)$. The formal definition is as follows.

Definition 2.1. Equilibrium With Mini Jobs *Given a distribution of arrival rate $\Omega(\lambda)$, a labor market equilibrium with mini Jobs is a set of value functions $\{J^{o.e}(\lambda), J^{f.t}(\lambda), J^{m.j}(\lambda)\}$, a price for matching licenses q^*, two reservation productivity $\tilde{\lambda}^v, \tilde{\lambda}^{f.t.}$, and an unemployment level. that satisfy*

1. *zero profit in the vacancy market (Equation 2)*
2. *Optimal job creation (Equation 8)*
3. *reservation arrival rates (equation 10)*
4. *constant arrival rates*

Figure 1: Optimal Contracts Over the Distribution of Arrival Rates



2.3 Black Jobs and Grey Mini Jobs

The model can be extended to study informality, or the option by the firm to avoid the tax τ and go shadow. Boeri and Garibaldi (2005) propose a matching model with shadow

employment. In this section we focus mainly on the option of mini jobs and fixed term jobs to go shadow. We assume that jobs are monitored at rate γ. Conditional on monitoring, the firm faces a probability β of being found guilty. In addition, the faces a penalty C. The value of shadow mini jobs in sindicated with $\tilde{J}m.j.(\lambda)$ and thus reads

$$(r+\lambda+\rho^v)\tilde{J}^{m.j.}(\lambda) = \tilde{y}+\tau+\gamma\left\{\beta\left[J^{m.j.}(\lambda)-C\right]+(1-\beta)\tilde{J}^{m.j.}(\lambda).\right\} \tag{11}$$

The condition to stay legal is $J^{m.j.}(\lambda) > \tilde{J}^{m.j.}(\lambda)$ and simple algebra shows

$$J^{m.j.}(\lambda) - \tilde{J}^{m.j.}(\lambda) = \frac{-\tau+\gamma\beta C}{r+\lambda+\rho^v+\gamma\beta} \tag{12}$$

which implies that a mini job is legal if $\gamma\beta C > \tau$

We are also interested in defining grey job. We say that a job is grey if conditional on a monitoring, it appears as legal. If we indicate a grey job as $\hat{J}^{m.j.}(\lambda)$ we can

$$(r+\lambda+\rho^v)\hat{J}^{m.j.}(\lambda) = \tilde{y}+\tau+\gamma\left\{Max\left[J^{m.j.}(\lambda)-d;\beta\left(J^{m.j.}(\lambda)-C\right)+(1-\beta)\tilde{J}^{m.j.}(\lambda)\right]-\hat{J}^{m.j.}(\lambda)\right\} \tag{13}$$

The idea of a grey job is that conditional on an inspection the firm has the option of pretending of being legal.

3 A Model of the Intensive Margin

A job is characterized by a productivity y per unit of time and by an idiosyncratic productive time per h drawn from a continuous distribution Ω defined over the support $\{0, H\}$. We can think of h as the amount of time per period in which the job is productive. At the time of matching the firm draws a value h. The productivity of a job is thus yh. The rest of parameters is common across firms. In particular all jobs die at the arrival rate λ and pay a fixed wage ω.

While the technological production time is continuous, the legislation has some restriction on the use of time of a job. First of all, a full time job is defined as a job having $\overline{h}$ hours. A job that is full time thus needs to pay the worker $\omega\overline{h}$. This means that jobs that have prodctive $h > \overline{h}$ will be constrained to be active only $\overline{h}$. For simplicity, we assume there is no extra time. The legislation allows also a set of part time contracts, defined as a share α_i of the full time workers. The set of allowed contract can be drawn from a sequence $\{\alpha_i\}_{i=0}^N$. In other words, there are N possible time allowed by the legislation and $\alpha_0 > 0$. The key firm decision will be thus which type of contract to offer. The value to the firm of job with productive time h and contract α_i can be written as

$$rJ(h,\alpha_i) = yh - \omega\alpha_i\overline{h} - \lambda J(h,\alpha_i); \quad \text{if} \;\; h \leq \overline{h} \tag{14}$$

The key feature of the previous equation is that the firm has to pay for a time $\alpha_i h$ regardless, the value of h. This immediately suggests that a given job $J(h,\alpha_i)$ will be potentially open

only for values h that ensure a positive value, so that each job α_i is characterized by a reservation hours h_i^* such that $J(h, \alpha_i) > 0$ if $h > h_i^*$, where h_i^* reads

$$h_i^* = \frac{w\alpha_i}{y}\overline{h} \tag{15}$$

In other words, a given contract α_i is potentially open only for sufficiently larger $h > h_i^*$. Taking into account also the limit to the maximum time, a value of a job read

$$(r+\lambda)J(h,\alpha_i) = \begin{cases} 0 & \text{if} \quad h \leq h_i^* \\ yh - \omega\alpha_i\overline{h} & \text{if} \quad h_i^* \leq h \leq \overline{h} \\ (y-\omega\alpha_i)\overline{h} & \text{if} \quad h \geq h \end{cases} \tag{16}$$

The value of a job is thus continuous spline $J(h, \alpha_i)$ in the space $[0, H]$. At the time of creation the firm faces a set of possible spline, so that for given h, the key choice of the firm is is

$$\overline{J}(h) = Max_{\{\alpha_i\}_{i=0}^N}\{.J(h,\alpha_i)\} \tag{17}$$

In other words, the optim contract for given h is the *envelope* of the spline described by equation 18. Figure 2 plots a numerical example of the envelope condition. Note that the envelops can be easily characterized. FIrst, for values of $h \leq h_0^*$ no job is open. Since the legislation has a lower minimum on part time, only job above h_0^* will be open. Next, the envelope is an increasing spline which is described by N points such that $J(\tilde{h}_i, \alpha_{i-1}) = J(\tilde{h}_i, \alpha_i)$ so that the firm uses

$$(r+\lambda)\overline{J}(h) \begin{cases} 0 & \text{if} \quad h \leq \tilde{h}_0 \\ (r+\lambda)J(h,\alpha_i) & \text{if} \quad \tilde{h}_{i-1} \leq h \leq \tilde{h}_i \\ (r+\lambda)J(h,\alpha_N) & \text{if} \quad h \geq \tilde{h}_N \end{cases} \tag{18}$$

3.1 Introducing and Prohibiting Mini Jobs

Suppose now that a new type of contract is in place. Within this framework, mini jobs can be thoughts as a set of part time jobs for very short time schedule. In other words, mini jobs are simple contracts $\{\beta_i\}_{i=0}^M$ such that $\beta_M < \alpha_0$. In this perspective, mini jobs are part time jobs with very short time. It is immediate to observe two effects of the introductin of mini jobs

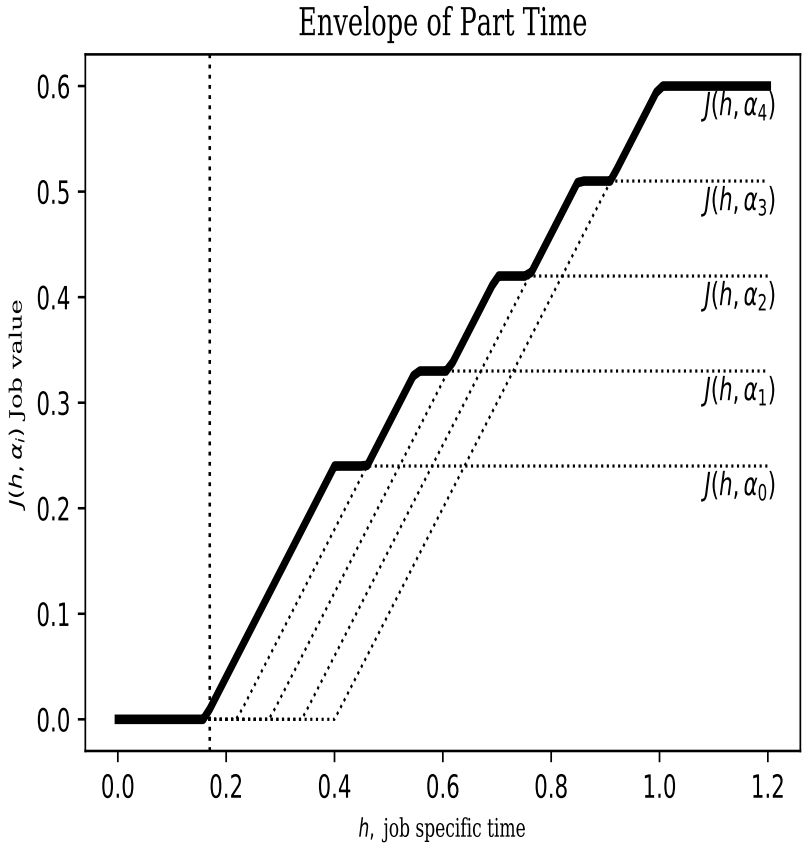
1. Mini jobs increase flexibility and allow firms to open up jobs that otherwise would not be observed in the market

2. Mini jobs crowed out part time jobs.

This effect can be clearly seen in Figure 3

3.2 Grey Jobs

Figure 2: Optimal Part Time Job Specific Time



4 Conclusions

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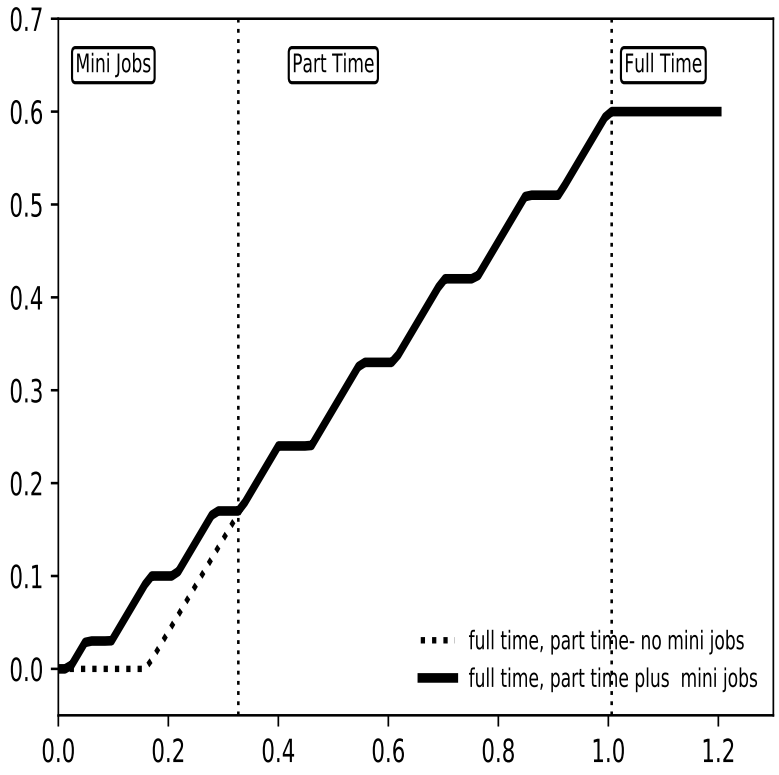
Figure 3: Optimal Mini Jobs with Part time over Job Specific Time



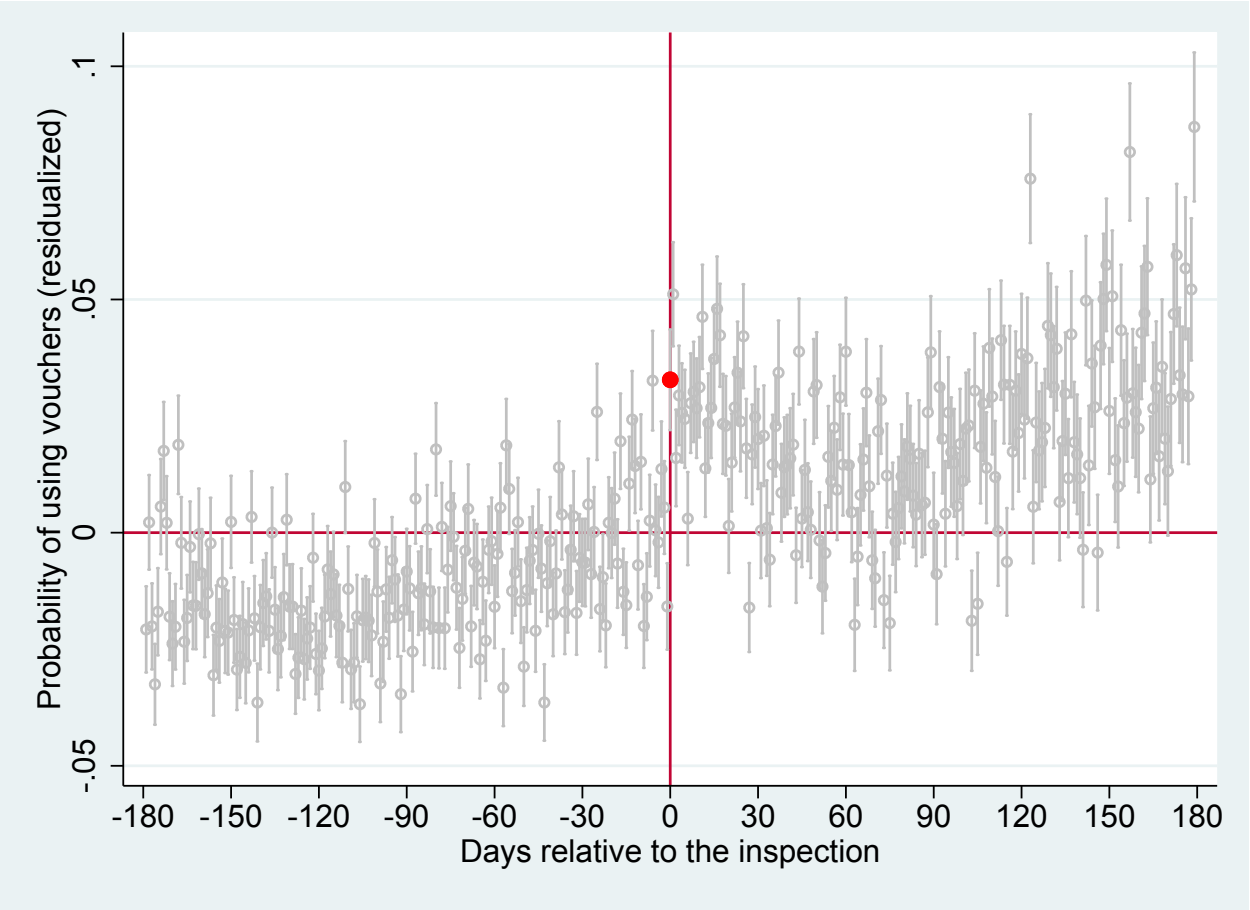


Figure 4: Event Study

Notes: ...