The Perverse Effect of Flexible Labor Regulation on Informality

WORK IN PROGRESS, NOT TO BE CITED

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Abstract

Several developed countries are introducing more flexible work arrangements—with a multitude of different contracts—ranging from Germany’s mini-jobs, to UK’s zero-hours contracts. Back in 2008 Italy introduced what is arguably the most flexible alternative work arrangements (AWA), called “labor vouchers.”

Apart from allowing for quick labor demand adjustments, such contracts were seen as a way to fight undeclared work. 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 went up from 500,000 (less than 1 per 100 inhabitants) to almost 300 million vouchers (5 times the Italian population). Using random timing in labor inspections as well as the abolition of labor vouchers we document a perverse effect of badly designed AWAs: they lead to more rather the less undeclared work. The reason is that when inspected firms use vouchers to hide any undeclared work, which we define as gray work.
1 Introduction

Alternative labor arrangements (AWAs) are becoming more and more widespread, both, in the US (Katz and Krueger 2019) and in many European countries (Adams et al. 2018). Since there are no guaranteed working hours, these contracts are seen as a way for firms to quickly adjust labor demand and for workers to have more flexible work schedules.

These work arrangements lower bureaucracy and push hiring and firing costs towards zero. Policy makers see these flexible labor contracts as a way to lure undeclared work out of the shadow. But alternative labor arrangements may lead to the exploitation of workers, to dead-end jobs, and to more job insecurity. This is why labor unions have traditionally been against these labor arrangements. Their main argument has been that firms may use the flexibility to exploit workers. And labor unions have also hinted at the possibility that extremely flexible labor contracts may actually hide undeclared work. Hence, policy makers have set legal constraints to limit the use of such contracts. In many countries, firms are not allowed to sign alternative labor arrangements with their regular employees. Work has to be casual. Sometimes firms are not allowed to pay flexible worker more than a given amount per year.

The empirical evidence on alternative labor arrangements is still scarce, and one of the main obstacles is the lack of data. Labor force surveys contain too little detail to identify such contracts (Katz and Krueger 2019), while administrative data from the social security systems often do not contain any information on these arrangements. On top of this, undeclared work is by definition hard to measure. These limitations make it almost impossible to understand whether AWAs increase or decrease legitimate labor relationships.

Italy is well-suited for this research question. It is one of the European countries with the largest amount of undeclared work\footnote{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} and about 10 years ago, in an attempt to incentivize
firms to regularize such workers, it introduced what is arguably the most flexible work arrangement: labor vouchers.

Employers can purchase 10 euro vouchers from the Italian Social Security Administration, or from banks or tobacco shops, fill in the worker’s name, and use it to pay for work without the need of a proper labor contact. The worker can exchange vouchers for money. For every 10 euro paid by the employer the worker receives 7 euro and 50 cents. 1 euro and 30 cents cover the social security contributions, 70 cents cover the health insurance, and 50 cents are the commission fee that is paid the administration. Compared to the common Italian labor contracts, vouchers simplify the bureaucracy considerably, and this is believed to encourage employers to reduce the use of undeclared work.

The most comprehensive study about Italian AWA is a study commissioned by the Italian Social Security Administration (Anastasia et al., 2016). The authors’ describe the evolution of AWA, which in Italy are called labor vouchers. Indeed, at the regional level a negative correlation emerges between the average number of vouchers per employer and the fraction of irregular workers, which may suggest that vouchers reduce the amount of undeclared work. However, vouchers are widespread in the wealthier and more economically active northern part of Italy, which historically has suffered less from illegality. This may cast some doubts on interpreting as causal these simple correlations.

We develop a model showing that whenever AWA do not interfere with labor inspections, more flexible jobs lead to a reduction in hiring and/or firing costs, which is expected to reduce the amount of undeclared work (see Albrecht et al. (2009), Bosch and Esteban-Pretel (2012), and Ulyssea (2018)).

But the literature has overlooked that flexible labor arrangements may also complicate the 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 health care providers (with only Malta and Cyprus doing worse in Europe).
work of labor inspectors, whose main job is to uncover undeclared work. If contracts are allowed to be very flexible, firms may simply underreport the number of hours worked by their “casual” employee. For example, in the UK where causal workers may work under “Zero Contract Hours” workers may only appear to work close to 0 hours. In Italy, Workers paid with vouchers may receive a single voucher, so as to justify their physical presence in the workplace, and be paid the rest of their work under the table. We add these features to our model in Section 2.

The main prediction is that by lowering the probability that undeclared work is detected, which typically comes with hefty fines (including the risk of a complete shutdown of production) AWAs may actually lead to more rather than less undeclared work.

We use a quasi-experimental approach to uncover the causal effect of AWAs on the demand for undeclared work, drawing from three separate Italian administrative datasets: firm level data on all firms covering the period 2008-2017, data on all individual vouchers used between 2008 and 2017, and, finally, data on the universe of labor inspections between 2008 and 2017. Since the exact moment a firm is inspected is unpredictable, the main evidence we provide in support of an ill use of AWAs is that firms tend to increase the use of these contracts by about 25 percent starting from the day they are inspected.

Moreover, when the government closed this loophole, requiring firms to announce the use of vouchers with at least a one hour notice, the daily change in vouchers upon inspections ceases. 60 minutes where believed to give inspectors enough time to uncover any undeclared work. This may not have solved the problem completely, as firms could have simply shifted towards using one voucher per worker, irrespective of labor inspections.

Having established that AWAs are use to hide undeclared work, we follow up our research documenting that AWAs displace regular work. We do this by dividing inspected firms into those that upon an inspection on average increased their use of vouchers and those that did not, and analyze what these two sets of firms do once vouchers are abolished in March 2017.
Our model predicts that firms may either revert back to informal jobs or hire fixed term or part-time workers. We do find that firms who misused vouchers hire more fixed term as well more part-time workers after vouchers were abolished.

1.1 The Italian Alternative Labor Arrangements: Vouchers

Italy’s labor regulations added AWAs in the the extreme form of vouchers in 2008, but restricted their use considerably: 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 center-right government extended vouchers to all workers in the agricultural sector, not just students and retirees. More limitations were lifted in the following years.

In 2009 vouchers became available in the retail sector, tourism and service sector, and for house keepers. One year later they were completely liberalized, opening up to all sectors and all workers. In 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. With the “Jobs Act,” the 2014 labor reform, vouchers did not have to be related to occasional work, and their annual limit increased to 7000 euro. In 2017 AWA, in the form of vouchers, were completely abolished.

These reforms have led to a steep increase in the use of AWAs. Next we develop a model that allows us to build predictions about how AWAs influence the firms’ hiring and firing decisions, as well as the decision to employ irregular workers.
2 A Model of Jobs, Temporary Jobs and AWAs

2.1 The environment and the institutions

We consider a stylized simple labor market with a measure one of workers. Jobs last one period and firms post vacancies. Workers and firms go through a round of matching for one period only. The structure of the search market is a static version of the Diamond-Mortensen-Pissarides model, while the modelling of contracts through different destruction probability borrows from Calvó et al. (2017).

Firms and workers are risk neutral and live one period. The productivity of an operational or productive job is homogeneous at value $y$. The model is solved from the labor demand standpoint and we thus take the wage as fixed at $\omega$. Yet, since the model is static, the model could also be solved with rent sharing. Firms are modelled as consisting of single jobs.

Firms meet workers by posting a vacancy. We let $\theta$ be the measure of vacancies posted by the firms. There is stochastic rationing and firms have a probability of meeting a worker that is strictly less than one. Specifically, we say that $q(\theta)$ is the firm probability of meeting a worker and $q'(\theta) < 0$ and further $\lim_{\theta \to \infty} q(\theta) = 1$. Conversely, the probability that a worker meets a vacancy is a function of $\theta$, $\mu(\theta)$ with $\mu'(\theta) > 0$. The cost of creating a job is $K$.

Each job can be productive or unproductive with some probability. When the firm and the worker meet they draw a fraction $\lambda$ of job duration from a continuous distribution with cumulative density function $\Omega(\lambda)$, and support $\lambda \in [0, 1]$. $\lambda$ can be interpreted as the probability that the job will not be productive over a unit of time. The job is productive for the period $1 - \lambda$, while it is not for the rest of the time. $\lambda$ can also be interpreted as a technological destruction rate. With probability $\lambda$ the productivity of the job drop turns out to be zero for the remaining fraction of time.

Firms learn the value of $\lambda$ related to the job upon meeting the worker. Labor regulations allow for three type of jobs: open ended jobs, fixed term jobs and AWAs/voucher (we use
the words AWAs or vouchers interchangeably). The key decision that firms face is about the type of job to offer. For open ended jobs that are not productive firms are forced to pay a firing tax equal to $-F$. The tax $F$ is dissipated outside the match and is a multiple of the wage $F = f \omega$. In what follows, we shall indicate with $J^{op,e}(\lambda)$ the value to the firm of an open ended job. Fixed term jobs are active for a fraction $1 - \rho$ of the time. When a firm opens a fixed term job it commits to paying the worker for an expected duration equal to $1 - \rho$, regardless of the job specific value of $\lambda$. The advantage of a fixed term job is that the firm does not pay any firing costs when the expected duration $\rho$ strikes. The cost associated of such job, however, is that the firm can be forced to pay the worker even if $\lambda$ strikes and productivity drops to 0. In what follows, $J^{F}(\lambda)$ indicates the value to the firm of a fixed term job. Finally, the firm can open AWAs. AWAs do not have any cost, but are characterized by an expected duration $1 - \rho^v$ where $\rho^v$ is large, and certainly such that $\rho^v > \rho$. In addition, AWAs that come to maturity can always be freely terminated. In other words, AWAs are super flexible jobs but very low expected duration. In what follows, we shall indicate with $J^{AWA}(\lambda)$ the value to the firm of a AWA.

As anticipated, we solve the model for a fixed wage $\omega$. In addition, the labor market is characterised by a payroll tax $\tau$ regardless of the type of job. The tax is paid on a flow basis by the firm and at first we assume that the tax cannot be evaded. Later, in Section 2.3 we consider the case of tax evasion.

### 2.2 Optima Job Contracts without Tax Evasion

Indicating with $V$ the value of a newly created job, its value is

$$V = q(\theta) \int_0^1 \text{Max} \left[ J^{O}(z), J^{F}(z), J^{AWA}(z), 0 \right] dF(z)$$

(1)
The key decision is about the type of contract to offer, conditional on observing the job-specific expected destruction probability \( \lambda \). The superscript to \( J \) refers, as mentioned above, to open ended jobs, fixed term and AWAs. Equation 1 allows for the possibility that expected duration of the job is so low that the firm does not open any job. Competition among vacant firms implies that the value of a vacancy is equal to the entry cost \( K \), and in equilibrium the job creation solves

\[
\frac{K}{q(\theta)} = \left\{ \int_0^1 \text{Max} [ J^O(z), J^F(z), J^{AWA}(z), 0] dF(z) \right\} \tag{2}
\]

To solve for the maximization on the right hand side, we need to specify the expected value of different jobs. The value of an open-ended job is

\[
J^O(\lambda) = (1 - \lambda)(y - \tau - \omega) - \lambda F. \tag{3}
\]

The value of the firing tax \( F = f \omega \) has the restriction that \( f > 1 + \frac{\omega}{\tau} \). In other words, firing tax for open ended jobs must be sufficiently larger than the wage. Conversely, the value of a \( \lambda \) type fixed term job reads

\[
J^F(\lambda) = (1 - \rho) [(1 - \lambda)(y - \omega - \tau) - \lambda(\omega + \tau)] \tag{4}
\]

where at rate \( \rho \) the job is destroyed at no cost. Yet, as argued above- with probability \( \lambda(1 - \rho) \), the firm is forced pay the wage until expected duration. Finally, the value of a AWA is

\[
J^{AWA}(\lambda) = (1 - \rho^\tau) [(1 - \lambda)(y - \omega - \tau)] \tag{5}
\]

The maximization problem satisfies the reservation property, since all the job values are decreasing and monotonic in \( \lambda \). Further, one can easily show that \( J^O(0) > J^F(0) > J^{AWA}(0) \).
Further, $J^{AWA}(1) = 0 > J^F(1) = -(\omega + \tau) > J^O(1) = -F$. The maximization is thus an envelope of three downward sloping lines, and the firm’s choice can be described by two reservation values $\tilde{\lambda}^F$ and $\tilde{\lambda}^v$. The reservation probability can be characterized (see appendix for details) as the solution to

$$J^O(\tilde{\lambda}^F) = J^F(\tilde{\lambda}^F); \quad \text{and} \quad J^F(\tilde{\lambda}^v) = J^{AWA}(\tilde{\lambda}^v).$$

(6)

$\tilde{\lambda}^F$ 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 AWAs and a fixed term job.

The intuition of this result is very strong. For a given net flow productivity $y - \omega - \tau$, firms have a strong ordering of which type of job to open according to its expected destruction rate, with open ended jobs suitable for jobs with long expected duration and AWAs suitable for jobs with very low duration. In addition, AWAs create labor demand opportunities that would not otherwise be exploited if the AWAs were not there. In other words, AWAs respond to firm demand of flexibility for jobs with very low expected duration. For simplicity, in what follows we indicate with $\tilde{y}$ the net flow value of the job so that $\tilde{y} = y - \omega - \rho$.

The threshold $\lambda$s are:

$$\left\{\begin{array}{l}
\tilde{\lambda}^F = \frac{\rho\tilde{y}}{\rho\tilde{y} + (f\omega - \omega)} \\
\tilde{\lambda}^{AWA} = \frac{(\rho^v - \rho)\tilde{y}}{(\rho^v - \rho)\tilde{y} + \omega}
\end{array}\right.$$

(7)

Figure 1 shows the job values (upper panel) and its envelope (lower panel) against the destruction probability $\lambda$. Note that existence of two thresholds- and thus two fixed term
contracts - require that the duration of AWAs is sufficiently short, or that

\[ \rho^v > \frac{\rho_f}{f - 1}. \]

Now let is consider the stocks. Given the reservation \( \lambda_s \) and a measure one of workers, total employment is simply \( e = \mu(\theta) \) while unemployment is \( u = 1 - \mu(\theta) \). In an equilibrium with AWAs the fraction of employment with open ended contracts is simply \( n^O = F(\tilde{\lambda}^F) \), the fraction with fixed term contracts is \( n^F = F(\lambda^{AWA}) - F(\tilde{\lambda}^F) \) while the fraction with AWAs is \( n^{AWA} = (1 - F(\lambda^{AWA})) \).

**Definition 2.1. Equilibrium With AWAs** Given a distribution of arrival rate \( \Omega(\lambda) \), a labor market equilibrium with AWAs is a set of value functions \( \{J^O(\lambda), J^F(\lambda), J^{AWA}(\lambda)\} \), a market tightness \( \theta^* \), two reservation probability \( \tilde{\lambda}^v, \tilde{\lambda}^F \), and a tuple of stocks \( [u, e, n^O, n^{AWA}, n^F] \) that satisfy

1. Optimal job creation (Equation 2)
2. Reservation arrival rates (equation 7)
3. Total labor force condition \( u + e = 1 \) and distribution of employment by type of contract \( e = n^O + n^F + n^{AWA} \)

Next we can analyze what happens when AWAs are introduced. Here the model’s main predictions:

1. AWAs allow very flexible jobs to exist.
2. The introduction of AWAs increase employment (in head counts term, so that \( e \) increases).
3. While the introduction of AWAs increase total employment, they also crowd out fixed term jobs, but the share of employment covered by temporary jobs increases.
The abolition of AWAs generates opposite predictions.

2.3 Shadow Employment and the Misuse of AWA

In this section we introduce the possibility of evading taxes by underreporting jobs. A shadow job allows firms to avoid paying the tax $\tau$. In terms of the type of contract, we talk of a general $\lambda$ job, since it is difficult to argue that a black job is either open ended, fixed term or a AWA. We let $\bar{J}(\lambda)$ be the value of a representative $\lambda$ job that is shadow, or irregular. Yet, the discussion of the previous section implies that that for each $\lambda$ job there is one and only one type of contract governed by the envelope property. In other words, $J^i(\lambda)$ is the
corresponding optimal contract where \( i \) can be open ended, fixed term or AWA.

Further, \( \gamma \) is the probability of inspection, and \( C \) is fine imposed on the firm with undeclared work upon inspection.

The decision to go shadow is simply

\[
\hat{J}^i(\lambda) = (1 - \gamma)(J^i(\lambda) + \tau) + \gamma(J^i(\lambda) - C) > J^i(\lambda) \quad i = \{O; F; AWA\}
\]

which implies the standard conditions found in most of the shadow employment literature.

\[
\frac{(1 - \gamma)\tau}{\text{expected tax evaded}} > \frac{\gamma C}{\text{expected fine}}
\]

In real life, different firms may face different probabilities of inspection \( \gamma \), and also different fines \( C \).

In this section we are mostly interested in what happens to the option to go shadow, when vouchers are available and can potentially be activated at the moment of inspection. We can imagine that- once the labor inspectors are at the door- firms have the option to declare that the job is covered by a voucher. We thus formalize the idea that firms use vouchers as an insurance mechanism. Let \( \hat{J}^i(\lambda) \) be the value of an irregular job that has the option to activate the voucher conditional on inspection, or the the value of a shadow job that has the option to misuse vouchers. Formally, the existence of vouchers adds an extra decision from the firm stand-point, or an extra option value in the firm decision regarding shadow employment.

The decision to go shadow with misuse of vouchers solves

\[
\hat{J}^i(\lambda) = (1 - \gamma)(J^i(\lambda) + \tau) + \gamma \left( \text{Max}[J^i(\lambda) - C; J^{AWA}(\lambda)] \right) > J^i(\lambda)
\]
We thus have that if
\[ J^{AWA}(\lambda) > J^i(\lambda) - C, \] (8)

firms activate vouchers upon inspection.

Let us assume that for a subset of firms equation 8 is satisfied. This, in turn, implies that
\[
\frac{(1 - \gamma)\tau}{\text{expected tax evaded}} > \frac{\gamma(J^i(\lambda) - J^{AWA}(\lambda))}{\text{expected cost of misusing voucher}}
\] (9)

Yet, since from equation 8 we know that \( J^i(\lambda) - J^{AWA}(\lambda) < C \), the possibility of misusing voucher makes it more profitable to exercise the option to go shadow.

Three results follow from equation 8.

1. Some firms may misuse vouchers.
2. The amount of shadow work (through the misuse of vouchers) increases.
3. Regular employment increases if vouchers are prohibited.

Next we test the predictions of our model.

3 Data

We merge 10 years firm level data from the social security administrative records (2008-2017) with the universe of labor inspection and with the universe of vouchers used by individual firms. The data on vouchers are at the daily level, while the firm level employment and wage data are at the monthly level.
4 Empirical Model and Identification

4.1 The Misuse of AWAs: Evidence from Labor Inspections

From the point of view of a firm, labor inspections are random events; and inspections are hard to predict as the likelihood of inspection in a given year is fairly low. (Yet, our model predicts a fairly simple test for the misuse of vouchers. Upon being inspected firms should exercise the option to use vouchers in an attempt to avoid to be fined for employing irregular workers. Our detailed daily data allows us to compare the daily use of vouchers just before and after an inspections, following firms for many days.

We analyze the use of AWAs (in the extreme form of vouchers) by firm $j$ 180 days pre and 90 days post an inspection that happens starting day $\tau_j$. Since a single voucher would be sufficient to avoid the fine, we use an event study approach, where the main outcome is the use of at least one voucher by firm $j$ on day $t$ ($DV_{j,t} = 1\{\#Vouchers_{j,t} > 0\}$):

$$DV_{j,t} = \sum_{k=-90}^{90} \beta_{t-\tau_j+k} D_{t-\tau_j+k} + \alpha_j + f(t) + \epsilon_{j,t}. \quad (10)$$

$D_{t-\tau_j+k}$ is a dummy variable equal to one for day $t - \tau_j + k$ and zero otherwise. The reference days are between -180 and 91 days from the day of inspection. The function of time $f(t)$ controls for year, month, day of the month, and day of week fixed effects. The results are also robust to using date fixed effects.

Figure 2 plots the coefficients $\beta_{t-\tau_j+k}$, that is the difference in the use of vouchers between event date $t - \tau_j + k$ and days between 90 and 180 prior to the inspection.

There is a clear increase in the use of vouchers as soon as labor inspectors start their inspections. The likelihood of using at least one voucher in the pre-SMS period is 4.9 percent, meaning that the average increase of 0.88 (SE 0.16) percentage points represents an 18 percent increase in the likelihood of using at least one voucher. The largest effects are on
the day of the inspection and the day after, respectively 1.5 and 1.4 percentage points. If we consider that firms may also have the option to put “gray” jobs on hold these are large effects. Moreover, the figure shows that these effects persist for at least 90 days, which implies that the average 18 percent increase in the use of vouchers is likely to be distributed over the large share of firms.

As mentioned earlier, at one point the government introduced the requirement of sending an SMS at least 60 minutes before using a voucher. That would break the on the spot insurance mechanism (firms would still be able exercise the option on a daily level, buying at least one voucher per workers).

Figure 3 shows that once the SMS was introduced there is no more jump in the use of vouchers when the inspections start. But firms may still be able to hide undeclared work buying vouchers every day.

The data contain a great deal of detail about firms. We look at whether pre-SMS effects are heterogenous across economic sectors and across firm’s characteristics. Given that the parallel trend assumption is clearly satisfied, we simply present the difference in difference results, where \( \sum_{k=-90}^{90} \beta_{t-j+k} \) is set to be a constant difference.

Table 1 shows that the jump is about the same in the retail sector, the tourism sector and the manufacturing sector. For the for the “Other sectors” the jump is slightly lower, while it is completely absent in the construction sector. This is likely to depend on the fact that in the construction sector work injuries are very common. As a consequence firms have a strong incentive to always use at least one voucher per worker per day, to be insured against job accidents.

In Table 2 we perform additional heterogeneity regressions. Column 1 to 4 show that the jump is fairly constant across Italian regions, although it is slightly larger in the more

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2The reason why the whole figure is shifted below zero is that the SMS requirement led to a reduction in the use of vouchers, which implies that in the control period (90 and 180 prior to the inspection) there is a larger chance of using vouchers.
productive North than in the South, with the Center of Italy being in between. Columns 6 to 8 show that medium aged firms (those that started between 5 and 14 years earlier) are more likely to use vouchers to cover undeclared work compared to young and old ones. Firm size is highly predictive of the size of the effects, with large firms (more than 15 employees) being the ones with larger jumps. Finally, the last column shows that the jump is about 40 percent larger for firms whose share of part-time workers is above the median. This is inline with the common opinion that part-time work is sometimes used to hide what are truly full-time workers, as it lowers the social security contributions as well as the tax burden.

4.2 The Effect of Vouchers on Regular Employment

Section 4.1 has show that vouchers are being misused to hide undeclared work. The next relevant question is whether vouchers crowd out regular work, or whether they simply hide work that would otherwise be completely undeclared (black rather than gray).

We shed light on this question combining the results from the previous section with the March 2017 abolition of vouchers. Our model predicts that firms who misuse AWAs would either fall back into signing cheaper part-time or fixed term contracts, or simply revert back to hiding work altogether. We use the previous results to identify firms who are likely to misuse vouchers: for each inspected firm we compute their average use of vouchers before and after the inspections and classify firms into those who on average increase their use and those who do not. Since the classification may be subject to error we test whether the results are robust to the choice of more stringent cutoffs than 0.

The empirical model is a difference-in-difference, before and after March 2017 for firms who presumably misused AWAs and those who did not. In order to test for the parallel trend assumption we estimate differences for up to 8 monthly lags and 10 leads. The number of lags are constrained by the period spanned by the data, and we exclude January 2017, that
is two months before the abolition.

We have 6 different outcomes \((m = 1, \ldots, 6)\) measured at the monthly level: total number of workers, part-time workers, full-time workers, fixed term workers, indefinite term works, and seasonal workers. We also control for firm fixed effects and time (year/month) fixed effects:

\[
L_{j,t}^m = \sum_{k=-10}^{8} \beta_k D_k + \lambda_j + \lambda_t + \varepsilon_{j,t}.
\]  

(11)

The results are shown in Figures 4 and 5. The difference in the total number of employees is fairly flat in the months leading to abolition of the vouchers and then starts to immediately go up in March 2017. The average effects are close to 1.5 additional workers. Considering that the average number of workers is 21 this is a fairly small 7 percent increase. But this masks much larger relative effects for temporary workers. The first panel in Figure 5 shows that for temporary workers the effects reach almost 2 and settle down at about 1.5. But given that firms employ on average just 4.8 temp workers, the relative effect is above 30 percent. There are no effects on open-ended contracts (upper right panel).

As for part-time workers versus full-time ones, both groups show similarly sized effects, indicating that firms seek flexibility with respect the duration of the labor contracts and not the duration of a working day.

5 Conclusions

TO BE ADDED
References


Figure 2: Event Study pre-SMS

Notes: The figure plots event study coefficients, where the event is a labor inspection. The excluded time period is between 180 and 90 days prior to the inspection. Standard errors are clustered by individual firm.
Figure 3: Event Study post-SMS

Notes: The figure plots event study coefficients, where the event is a labor inspection. The excluded time period is between 180 and 90 days prior to the inspection. Standard errors are clustered by individual firm.

Figure 4: Event Study around the Abolition of Vouchers

Notes: The figure plots differences in the number of workers employed at firms who on average “mis-used” vouchers and those who did not, 10 months before and 9 months after the abolition of vouchers. Standard errors are clustered by individual firm.
Figure 5: Event Study around the Abolition of Vouchers

Notes: The figure plots differences in the number of workers employed at firms who on average “mis-used” vouchers and those who did not, 10 months before and 9 months after the abolition of vouchers. Standard errors are clustered by individual firm.
Table 1: Event Study Regressions by Sector

<table>
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<th>Sector</th>
<th>(1) Manufacturing</th>
<th>(2) Construction</th>
<th>(3) Retail</th>
<th>(4) Tourism</th>
<th>(5) Other Services</th>
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<tr>
<td>Post-Inspection</td>
<td>0.013***</td>
<td>-0.002</td>
<td>0.012**</td>
<td>0.011***</td>
<td>0.006*</td>
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<td></td>
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<td>(0.003)</td>
<td>(0.006)</td>
<td>(0.002)</td>
<td>(0.003)</td>
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<tr>
<td>Constant</td>
<td>0.032***</td>
<td>0.021***</td>
<td>0.030***</td>
<td>0.054***</td>
<td>0.051***</td>
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<tr>
<td></td>
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<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.004)</td>
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<tr>
<td>Observations</td>
<td>157,329</td>
<td>98,087</td>
<td>208,194</td>
<td>614,758</td>
<td>255,718</td>
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<td>R-squared</td>
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<td>0.013</td>
<td>0.010</td>
<td>0.022</td>
<td>0.016</td>
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<tr>
<td>Mean dep. var.</td>
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<td>0.0201</td>
<td>0.0352</td>
<td>0.0592</td>
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</table>

Notes: Clustered standard errors (by MSA) in parentheses: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. 
Table 2: Event Study Regressions

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<thead>
<tr>
<th>Subsample</th>
<th>(1) South</th>
<th>(2) Center</th>
<th>(3) North-East</th>
<th>(4) North-West</th>
<th>(5) Young firms</th>
<th>(6) Medium-aged f.</th>
<th>(7) Small firms</th>
<th>(8) Medium-sized f.</th>
<th>(9) Large firms</th>
<th>(10) Above-median use of PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Inspection</td>
<td>0.009**</td>
<td>0.008**</td>
<td>0.010***</td>
<td>0.011***</td>
<td>0.009***</td>
<td>0.011***</td>
<td>0.006**</td>
<td>0.008***</td>
<td>0.012***</td>
<td>0.014***</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.047***</td>
<td>0.046***</td>
<td>0.047***</td>
<td>0.043***</td>
<td>0.045***</td>
<td>0.048***</td>
<td>0.044***</td>
<td>0.035***</td>
<td>0.044***</td>
<td>0.058***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Observations</td>
<td>255,262</td>
<td>256,735</td>
<td>409,649</td>
<td>347,459</td>
<td>581,120</td>
<td>414,932</td>
<td>273,053</td>
<td>461,643</td>
<td>373,953</td>
<td>446,903</td>
</tr>
<tr>
<td>Rsquared</td>
<td>0.0504</td>
<td>0.0496</td>
<td>0.0512</td>
<td>0.0478</td>
<td>0.0485</td>
<td>0.0529</td>
<td>0.0478</td>
<td>0.0381</td>
<td>0.0482</td>
<td>0.0637</td>
</tr>
<tr>
<td>Mean dep. var.</td>
<td>0.0504</td>
<td>0.0496</td>
<td>0.0512</td>
<td>0.0478</td>
<td>0.0485</td>
<td>0.0529</td>
<td>0.0478</td>
<td>0.0381</td>
<td>0.0482</td>
<td>0.0637</td>
</tr>
</tbody>
</table>

Notes: Clustered standard errors (by MSA) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.