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"Jobs, News and Re-offending after Incarceration"

Roberto Galbiati, Aurélie Ouss and Arnaud Philippe

Toulouse School of Economics

Jobs, News and Re-offending after Incarceration[*]

Roberto Galbiati
(Department of Economics, Sciences Po-CNRS)
Aurélie Ouss
(University of Pennsylvania)
Arnaud Philippe
(Institute for Advanced Study in Toulouse and Toulouse School of Economics)

ABSTRACT

We study how local labor market conditions and information about jobs affect recidivism among former inmates. Our identification strategy exploits daily variations on new job vacancies and news coverage of job openings and closings at the county level, merged with individual-level administrative data on inmates released from French prisons. Overall job creations do not affect recidivism, but inmates released when more jobs in manufacturing are created are less likely to recidivate. We also show that media coverage of job creation reduces recidivism, beyond actual employment opportunities, suggesting implications for crime-control policies: information about employment contributes to reduce recidivism.

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1. Introduction

Theoretically, labor markets are considered to be an important determinant of crime. The standard economic model of criminal behavior (Becker, 1968; Ehrlich, 1973) implies that potential offenders should decrease criminal activities when they face an increase in job availability. All else equal, the opportunity cost of time spent both in criminal activity and in prison if apprehended and convicted rises when labor market conditions improve.[2] However, for this prediction to hold, potential offenders would have to respond to variations in incentives created by changing labor market conditions. Although intuitive, this may not be a relevant margin for people who are most likely to offend, and in particular for people who are just released from prison. People entering prison tend to not have been employed in the formal sector (Western and Pettit, 2005; Loeffler, 2013), and post-release, they might be screened out by employers in legal labor markets (Agan and Starr, 2016), or they may be opting for informal jobs (Western et al, 2015). They may also lack relevant human capital or information about job availability, or incarceration could have increased the returns to crime beyond that of any legally accessible job. Understanding how former inmates' recidivism responds to factors that might affect their probability of finding a job is crucial when designing effective crime control policies. In this paper, we ask how job availability and information about employment affects reoffending.

We focus on the relevant but overlooked role that local labor markets play in re-offending. This exercise poses empirical challenges, due to confounding factors correlated with both labor markets and offending. For example, people with better jobs might elect to move out of higher crime areas, leading to a non-causal correlation between crime and lower job availability. We address these major identification challenges by using granular data on releases from prison and on job availability, and exploiting daily variations in labor markets upon release from prison.

For our study, we combine three administrative data sources. The first source is administrative data on all inmates released from France in 2009-2010, provided by the

[2] Job-search models of labor markets and crime also predict, from another angle, that more job opportunities for individuals just released from prison would reduce recidivism (Engelhardt, 2010).

French Ministry of Justice. The second source is high-frequency administrative data on new job vacancies in French firms provided by the French agency for employment (*Pôle emploi – PE henceforth*). Finally, we use data on media coverage of employment collected on a daily basis at the county level. These data, collected by a private firm, include newspaper and Internet coverage of job openings and closings. For each former inmate, we construct two indexes relative to their county of residence in the thirty days following their release from prison: the number of PE job vacancies; and the number of news stories on job openings and cuts. Our identification strategy exploits daily variations in the flow of information about job openings and closings within counties. The high frequency of our data coupled with spatial variation allows us to control both for fixed and time-dependent unobserved heterogeneity. We exploit as good as random variations in daily announcements and in exact timing of release from prison to identify the effect of news about job flows on recidivism. We define recidivism as re-entering prison within 6 months of one's release.

This exercise allows us to document empirical facts and to provide policy-relevant interpretation. First, we find no effect of general local labor market conditions on recidivism. However, we find that relevant labor markets do affect recidivism. An increase in manufacturing sector job vacancies in one's county of residence just after their release from prison reduces recidivism.

We then document that, conditional on existing job vacancies, media coverage of job creations affects former inmates' propensity to re-offend. Holding constant the number of jobs, former inmates are less likely to recidivate when there is more media coverage of available jobs. Conversely, an increase in the number of announcements on future job cuts does not affect the probability of re-offending. Our preferred interpretation of these results is that media coverage of job creations provides useful information to former inmates in search of legitimate employment opportunities. This interpretation is supported by further evidence. News about job creations covered in the thirty days before an inmate's release has no effect on recidivism. Moreover, news published in pure player digital media outlets (that is, outlets that only publish content online and not in print), which are less popular than newspaper websites have no effect on the probability of re-offending. Thus, our results indicate that both the probability of finding a legal job and media coverage about the availability of jobs

can help reduce reoffending.

Prior studies have looked at the aggregate relation between labor market conditions and crime, to explore the theoretical prediction of a positive relation between unemployment and crime. The evidence provided by these studies is mixed. Most studies find little effect of labor market conditions on property crimes and mixed evidence for violent crime rates when using linear regressions (Raphael and Winter-Ebmer, 2001; Machin and Meghir, 2004; Oster and Agell, 2007; Lin, 2008). Instrumental variable estimates find an increase in property crimes with higher unemployment (Gould et al., 2002; Raphael and Winter-Ebmer, 2001; Oster and Agell, 2007; Fougere, et al., 2009).

Only a few papers focus on the effect of labor market conditions on offending of former inmates or specifically of individuals at higher risk to offend. Summer jobs for at-risk youth have been shown to reduce violence and victimization (Heller, 2014; Gelber et al., 2016), and targeted job opportunities for former inmates reduce recidivism in the short run (Redcross et al., 2011). We know very little about whether and how these findings carry over to a broader population of adults; moreover, we know very little about how they carry over to those who are more involved in the criminal justice system. A few recent papers examine the relation between labor market opportunities and recidivism for adults. Schnepel (2017) uses data on parolees released from prison in California and examines the effects of variations in local unemployment rates among unskilled individuals, finding that an increase in *relevant* industries' unskilled unemployment is associated with higher recidivism. Also looking at parolees from California, Raphael and Weiman (2007) find moderate effects of county unemployment rates on the likelihood that paroled offenders will return to custody. Finally, Yang (2017) uses quarterly and county-level data from the US to study the effect of employment and wages on recidivism, and finds a negative relation between local labor market conditions and recidivism.

Relative to these studies, we study all former French inmates, not people released from federal prisons, or parolees, the latter being generally selected for good behavior or other positive qualities which may make them particularly responsive to labor market conditions. Moreover, our identification strategy includes variations in job

flows. While most studies on crime and the labor market use unemployment levels, we can look at the effect of both job openings and cuts. Our identification strategy exploits within county variations in job openings at the daily level, thus overcoming the major identification challenges without needing an instrumental variable design.

To the best of our knowledge, our paper is the first documenting the impact of news coverage of labor market opportunities on reoffending. We show how alternative sources of information about job flows (i.e., media coverage) can be useful to grasp some of the mechanisms underlying individual responses to labor market conditions. In the same vein, recent work has used data from Careerbuilder.com to look at worker mobility (Marinescu and Rathelot, 2014) and general equilibrium effects of increased unemployment benefits (Marinescu, 2014). Using online news on jobs as a finer-grained proxy for unemployment could have applications to many topics in labor studies, both to improve identification, and to capture the exact timing of events.

Finally, our paper is also, to the best of our knowledge, the first focusing on the impact of local labor market conditions on re-offending outside the US. Because incarceration rate is uniquely high in the United States, it is likely that the marginal person released from prison in the US is very different from the marginal person being released from prison in continental European countries or the UK. It may be difficult to generalize results found in recent papers suggesting a protective effect of good local labor markets outside the US. While legitimate labor opportunities are effective on the relatively less crime-prone former inmates released from American facilities, they might not be effective on European inmates who have relatively more severe criminal histories (Buonanno and Raphael, 2013). In our study, we recover results similar to the US case for inmates with shorter sentences and stronger links to legitimate labor markets before incarceration: an increase in available jobs in some sectors reduces reoffending. Conversely, for inmates who spend longer time in prison, a simple increase in job availability does not affect recidivism; media coverage about job availability becomes crucial in order to reduce re-offending. These inmates are likely to have weaker connections to networks providing access to legal job opportunities and hence higher job search costs. Media coverage about future job openings can provide crucial information about available jobs that would be hard to access otherwise.

The paper is organized as follows. Section 2 presents institutions and data; Section 3 exposes our empirical strategy, Section 4 presents the effect of labor markets, captured by official statistics on recidivism, Section 5 documents the importance of information on labor markets, and section 6 concludes.

2. Institutions and Data

2.1. Incarceration in France

As of January 2013, there were 66,572 inmates in France, amounting to an incarceration rate of about 110/100,000.[3] While smaller than that of the United States, which was around 910/100,000 in 2014 (Glaze and Kazble, 2014), this incarceration rate is close to the median for Europe. Sentences in France tend to be short: thirty-six percent of sentences are shorter than one year and sixty-six percent are shorter than three years. A corollary of that is that there is a high turnover rate in French prisons. There were 87,958 releases from prison in 2012. Fifty-one percent (ninety-one percent respectively) of inmates released respectively had spent less than six months (one year) in custody.[4] People released from prison in France are comparable, in terms of length of incarceration, to people released from jails in the US.

There are different kinds of detention facilities in France. "Maison d'arret" (101 facilities) are for pre-trial detention and sentences less than 1 year. Post-sentencing, inmates either serve their time in a low-security "centre de détention" (62 facilities), or a high-security "maison centrale" (11 facilities). Inmates have access to work and training. Out of the 82,000 persons incarcerated in 2010, 24,000 worked at least one hour and 23,900 benefited from some training while in prison, but only 4,400 were enrolled in degree-bearing courses. 18,000 persons benefited from job search

[3] Statistics on French and European incarceration can be found at http://www.justice.gouv.fr/art_pix/Chiffres_cles_2013_opt.pdf

[4] All figures in this paragraph are calculated by the authors using official statistics on overall outcomes of trials from the Ministry of Justice (Ministère de la Justice (2012), pp. 211-217).

assistance, but only 5,400 found employment or training before release.[5] Information about job opportunities may be hard to come across while in prison, since Internet access is forbidden. Cell phones could be smuggled into jails, but our data is from 2009-2010 when smartphones were not widely used in France. In 2008, only 12% of people used their smartphones to go on the Internet, compared to 40% of people in 2012. So while some people might have had Internet access while in prison in 2010, this was plausibly a rare occurrence.[6] Newspapers are available in prison but mainly through prison libraries, that are generally accessible in lieu of outdoor activities.

Most inmates in France are released without supervision. In order to obtain sentence adjustments such as parole, electronic monitoring, or access to a halfway house, prisoners must explain their post-release plan to a judge, who assesses their ability to reintegrate. In practice, a job or training is needed to obtain a supervised early release. In 2009, there were 84,442 releases, out of which 7,871 were paroles (9%), 6,038 were electronic monitoring (7%) and 5,472 were to halfway houses (6%). The remaining 77% of inmates were released without supervision.[7]

Relevant to our study of jobs and recidivism, criminal background checks are generally illegal for employment purposes in France. Convicted people are barred from fewer professions than in the US. However, they are barred from nearly all public-sector jobs, which represent roughly 20% of France's labor force.[8] Criminal records can also be checked for sensitive jobs (for instance, law enforcement, or working with children or the elderly). There are also no rules barring convicted people from living anywhere. They may have restraining orders, but most former inmates can return to live where they were prior to incarceration.

[5] Figures in this paragraph reflect official statistics from January 1st, 2011. Source: http://www.justice.gouv.fr/art_pix/chiffres_cles_2011.pdf
[6] Source: http://www.insee.fr/fr/themes/document.asp?reg_id=0&ref_id=ip1452
[7] Calculated by the authors using official statistics on overall outcomes of trials from the Ministry of Justice (Ministère de la Justice (2012), pp. 217, 221 and 223).
[8] The list of jobs for which one must have a clear criminal background can be found here: http://www.cidj.com/sites/default/files/liste_des_metiers_pouvant_donner_lieu_a_la_consultation_directe_du_b2.pdf

2.2. Individual Incarceration Records

France has a centralized prison system. The French Department of Prisons Administration (DAP) runs all prisons and jails. We obtained an administrative dataset on all inmates in French prisons in 2008 – 2010. A penal file is created upon each inmate's incarceration in France, and updated throughout the incarceration period. The file contains penal and socio-demographic data, and information on transfers within and across prisons, disciplinary incidents, and sentence reductions. All of this data populates the National Inmate File and the Numeric File of Management of Inmates under Custody File,[9] which are centralized in the DAP. These files are maintained for internal accountability and security purposes, and the French Ministry of Justice uses them for statistical purposes. The French Department of Prisons Administration generously provided administrative data on all inmates incarcerated in France between February 1st, 2009 and January 31st, 2011.

The data contains information on gender, date of birth, nationality, place of birth, place of residency, marital status, number of children, educational attainment, job status (all of which are reported by the inmates themselves, and reflect their situation upon incarceration), offenses leading to incarceration, length of sentence for each offense, date of trial, type of prison, date of release, and sentence reductions. Each individual can be tracked over time with a unique encrypted identifier.[10] Our outcome of interest is recidivism, which is measured as a person reappearing in the prison dataset six months after having been released from prison.[11] In order to have a six-month observation window for all people released from prison, our main observation sample is people released from prison between February 1st, 2009 and July 31st, 2010.

Table 1 presents descriptive statistics on our sample. 96% of people released from prison are male, 86% are French, and they are on average 32 years old upon release. The most frequent offenses are theft (36%), assault (35%), driving under influence

[9] Fichier National des Détenus, FND, and Gestion Informatisée des Détenus en Etablissement, GIDE
[10] These are unique identifiers, based on first name, last name, and date of birth. For confidentiality purposes, the encrypting was done at the Ministry of Justice.
[11] While we don't have the data to observe all new sentences, incarceration is the most frequent sentence for people who are released from prison. Kensey and Benaouda (2011) find that 59% of people released from prison have a new conviction within 5 years, and 46% have a new prison sentence; so three quarters convictions after release from prison are new prison sentences.

DUI (28%), and drug offenses (22%). Relevant to our study, 39% reported being unemployed before entering prison, demonstrating thin ties with the official labor market. Most defendants have low levels of educational attainment (38% have a middle school degree, and 10% have no schooling at all). 7% of defendants were released on parole, and 93% were released without any supervision. 6% had returned to prison in the following six months.

2.3. Labor Market Data

2.3.1 Job Vacancies Data

The French governmental agency for unemployment, "pole emploi" (PE), operates all unemployment policies. It registers unemployed people, manages unemployment benefits and provides job search assistance. It registers about one third of job vacancies in France (Skandalis and Philippe, 2017). These vacancies are publicly available on the website, and anyone can apply for the position, with or without formal registration as job seeker.

We obtained data on the number of vacancies published on the PE website, per county and per day in 2009 and 2010. For 2010, we obtained more detailed data on vacancies per type of job. Since we have data on recidivism for inmates released before July 31st, 2010, in our main sample, we focus on February 2009 – July 2010. On average, 72 vacancies are published each day, with large variations across counties – on average 7 per day in the smallest county, and 316 per day in Paris – and across days – there are almost no vacancy published during the weekend.

We use this dataset to create our main measure of local labor market conditions. For each day and county (*département*) in France, we compute the number of job openings published on the PE website within the next 30 days. By matching this information to each person's release date, we thus obtain a measure of labor market conditions in the former inmate's county, for the first 30 days after release from prison. This measure varies from 0 to 15,940 with an average of 2,205 (table 1).

Since the effect of each additional vacancy depends on the size of the labor market, we standardize this measure within county.[12] By doing so, we make sure to compare similar dynamics within each county.

2.3.2 News and Job Posting Data

Our final data source compiles publicly accessible online information on news stories about job openings and cuts posted online. The data was collected for commercial purposes by a private firm, the *Observatoire de l'Investissement*. It assembles information from about 4,000 Internet sources, which include local newspapers (43%), national newspapers, and websites covering job announcements. Note that this data source does not contain actual job postings or classified ads; it contains news articles on economic events, such as plant closures or openings. We used a pre-compiled version of this online data, but this information could also be collected by scraping job announcement websites and searching local and national newspapers for stories on labor markets.

This data contains one line per mention of job-related news story. We classify as "positive announcements" stories on opening of new plants or increases in the number of perspective employees. We classify as "negative announcements" stories on plant closures or downsizing.[13] We use this dataset to create our measures of news about local labor market conditions. For each day and each county (*département*), we build measures of the number of news stories on job creations and cuts that appeared on any source listed in the dataset in the following 30 days. By matching on release date and county of residence, we obtain a measure of job openings and cuts that occur in the county each former inmate lived in, for the first 30 days after their release from prison. Our main measure excludes news on public sector jobs, since as mentioned earlier former offenders are not allowed to hold civil servant positions.[14]

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[12] In practice, for each day, we compute the following variable:

$$Vacancies_{ct}^{norm} = \frac{Vacancies_{ct} - Mean(Vacancies_c)}{SD(Vacancies_c)}$$

where $Vacancies_{ct}$ is the number of vacancies in the 30 days following *t* in county *c*.

[13] Also for simplicity, we refer jointly to positive and negative stories and announcements as "news stories about jobs."

[14] Public sector announcements represent 2.2% of the 22,545 announcements. While we know who the employer is (and so we can easily identify public sector jobs), we do not have information on the

We distinguish between two types of sources: newspaper websites and pure-players, the latter being less popular (see appendix figure B1). In our analyses of the effect of information, we focus on news covered by newspapers' websites. While news published on pure-players' website can be a proxy for the local job labor conditions, since they have low audiences, it is less likely that they would change former inmates' knowledge or perception of labor market conditions.

Descriptive statistics of the news are presented in table 1. There are, on average, 1.4 positive news stories and 1.7 negative news stories in journal websites per county in a 30-day time window. There are fewer stories on job creations and cuts in pure-player media, with, on average, 1.2 news stories on job creations and only 0.23 news stories on job cuts per county in a 30-day window.

We do not standardize this variable by county. Indeed, news on job creations and destructions capture information that former inmates may have access to. As opposed to job vacancies, information is a non-rival good. Regardless of the size of the labor market, all former inmates can have equal access to this information.

3. Empirical strategy

We start our analysis by focusing on the effect of job vacancies on recidivism. Our analysis is informative about how offenders respond to local employment conditions. To estimate the effect of local labor market conditions on recidivism of French former inmates, we first estimate the following linear regression model:

$$Y_{icd} = A_c + B_d + \gamma X_{icd} + \beta_V Vacancies_{cd}^{norm} + \varepsilon_{icd} \quad (1)$$

Where Y_{icd} is an indicator of recidivism within six months after release (for individual

position within the firm. For example, we cannot determine if a news story at Google is about cleaning crew jobs, or a software engineer jobs.

i, released on day *d*, and living in a county *c* before incarceration),[15] $Vacancies_{cd}$, is a forward-looking variable: capturing the normalized volume of vacancies in the thirty days after day *d* in county c. X_{icd} controls for individual characteristics; and A_c and B_d are a set of county and day fixed effects respectively.

To estimate the effect of media coverage of labor market conditions on recidivism of French former inmates, we estimate the following linear regression model:

$$Y_{icd} = A_c + B_d + \gamma X_{icd} + \beta_V Vacancies_{cd}^{norm} + \beta_1 Job_{cd}^{+} + \beta_2 Job_{cd}^{-} \varepsilon_{icd} \quad (2)$$

Equation (2) has the same structure of equation (1). We add two new variables. Job_{cd}^{+} and Job_{cd}^{-} respectively capture the number of news stories on job creations and on job cuts covered in the county of residence of a former inmate in the thirty days following her release from incarceration. In our main analyses, we focus on job announcements on newspaper websites, which are more popular, and not on online-only pure-player websites.

For both job vacancies and news, we focus on the 30 days immediately following one's release from prison (defined as 'month of release'). We focus on the period immediately following incarceration for two reasons. First, the first few weeks have been shown to be crucial in terms of successfully transitioning out of prison (Munyo and Rossi, 2015).[16] Second, access to information is limited in French penal facilities. As specified above, there is no Internet connection and limited access to newspapers. The main source of information is national TV channels, which likely do not have a lot of information about local labor market conditions.

One concern may be that people released under positive labor market conditions are different from people released in less auspicious conditions. As we stressed above,

[15] We hypothesize that the relevant labor market is the labor market in the county that an inmate reported living in upon incarceration. One may wonder how mobility could affect our estimates. First, note that among inmates who were incarcerated twice and so for whom we have two home addresses, 90% reported living in the same county both times, indicating that mobility is not frequent among people released from prison in France. Second, even if former inmates were to move, this would result in an attenuation bias of our estimates, and so our estimates would be lower bound of the true effect of local labor markets on recidivism.

[16] In France, 34% of ex-offenders have been re-convicted within three years after trial. Among them, 8% are re-convicted during the first month.

since we use *daily* variations in labor market conditions, our identification hypothesis is that, conditional on fixed county heterogeneity and common daily shocks, variations for these measures are not correlated with individual-level heterogeneity and other county-level confounding factors that may be correlated with labor market conditions. Since the exact date of release is as good as random given trial-specific timing, our identification hypothesis concerning individual-level confounding factors is plausible.

Table 2 presents the correlation between offender characteristics and our two main economic variables. In the last column, the variable of interest is predicted recidivism, which we obtain using all baseline observables, and which allows us to look at the relation between a summary of observables and recidivism. Each panel represents independent regressions – panel A is for official vacancies, and panel B is for news on jobs. As for our main estimations, these regressions include day and county fixed effects. For most covariates, differences across the board are not statistically significant, and when significant, the point estimates are small. Importantly, columns 1 and 2 show that it does not seem like releases are correlated with job market conditions: neither number of releases from prison by day nor county (column 1), nor likelihood of getting parole (column 2) are correlated with labor market conditions. Likewise, having a job pre-prison (column 5) is not correlated with labor market conditions. Some variables are correlated with labor market conditions; for example, age at release and assault are correlated with more positive journal announcements, and being French is correlated with more Pole Emploi job creations. However, in these cases, the point estimates are small and column 14 shows that predicted recidivism is not meaningfully correlated with the employment measures. Overall, this suggests that within day and county, former inmates' characteristics are not correlated to job opportunities.

4. Effect of job vacancies on recidivism

4.1. Main Results

Table 3 reports the effect of overall economic conditions on recidivism. Column 1 presents the effect of new job vacancies collected and released by *Pole Emploi* in

one's county of residence, in the 30 days after release from prison. Column 3 presents the effect of vacancies when controlling for defendant characteristics. General labor markets as measured by changes in job vacancies in one's county of residence, do not seem to affect recidivism. The coefficients are small and statistically non-significant.

In the last two columns of table 3, we present the correlation between recidivism and economic conditions as measured by unemployment levels (column 3). As with job vacancies, the coefficient is small and insignificant.

While the overall effect of vacancies does not seem to affect recidivism, it is possible that vacancies in some specific employment sectors do. As shown in table 1, former inmates are often low-skilled, so they may only respond to a subset of jobs. In this case, an aggregate indicator includes job opportunities that are irrelevant for former inmates. In table 4 we split job vacancies by sector. We find that, an increase in vacancies in the manufacturing sector significantly decreases recidivism. A one standard deviation increase in manufacturing job vacancies induces a 4% reduction in the propensity to recidivate in the first six months following release from incarceration. Vacancies in other sectors have no effect on recidivism. Our results are consistent with the findings of Schnepel (2017) who finds that in California, only relevant jobs matter to reduce recidivism.

4.2. Heterogeneity of the effect

In tables 5a and 5b we focus on differential effects. We restrict our analysis to manufacturing jobs, which, according to results presented in table 4, are the only jobs that affect recidivism. In table 5a, we divide the sample by incarceration histories, and in table 5b, by type of offense. Column 1 of table 5a presents the effect of manufacturing jobs for short-term jails, and column 2 is for longer-term prisons. In columns 3 to 6, we split the sample by quartiles of sentence length. The overall picture emerging is that new vacancies in the manufacturing sector have a negative and statistically significant effect on the propensity to re-offend for inmates who spent less time in prison.

Columns 7 and 8 of Table 5a show that both formerly employed and unemployed inmates are affected by job creations and reduce their propensity to recidivate when new job vacancies are created thirty days from their release from prison. The last part of the table reports the results for parolees versus non-parolees. Individuals on parole might be more sensitive to job creations since finding a job is often a condition to be granted parole. They are therefore more attached to the labor market. Results reported in the table confirm this intuition. It is however worth noting that being released on parole is not predicted by the employment opportunities as shown in table 2.

Table 5b presents results by type of offense upon recidivism, and shows that an increase in job vacancies reduces recidivism for all crime categories. For each crime (property crime, drug offense, DUI, assault), we compute a dummy equal to one if a defendant was re-incarcerated for that offense, which is the outcome variable. While jobs in industry do not influence economic crimes (theft or property crime), they influence recidivism for behavioral crimes, like assault and DUI. This suggests that one of the important channels through which better access to employment may be influencing future behavior is through affecting one's engagement in risky behaviors, rather than one's economic calculus of participation in crime.

5. Media coverage of local labor market conditions

In order to better understand how labor markets affect the choice to recidivate, we now turn to one particular element: job search. Specifically we study the effect of an indicator catching useful information in the job search process: news on jobs in the county of residence of a former inmate. We focus on the effect of news in local or national newspapers. The main difference between the measures of vacancies presented above is that this news measure catches the kind of information about local labor market conditions that every former inmate can easily access online or by reading the press. By contrast, in order to access PE jobs opportunities, former inmates need to sign up at the national employment agency or search for specific job offers. Conditional on the flow of local jobs, this measure catches readily available information about firms that are hiring in a former inmates' area of residence. This kind of information might impact former inmates' job search effort both by affecting

their beliefs about the probability of finding a job and by directing their search towards firms that could potentially hire them.

Our implicit assumption is that people have beliefs about how likely they are to find a job upon release from prison. In the absence of additional information, they would make the decision to commit a crime based on their beliefs about their likelihood of finding a job: the higher (lower) the prospects of finding a job, the lower (higher) the likelihood that they would reoffend, due to the increase (decrease) in opportunity costs of crime. But beliefs could be shifted by additional information about the labor market, which could be obtained from media coverage of local employment and classified advertisements. Information about the existence of particular jobs also lowers search costs because former inmates can target their search effort to firms with vacancies. Note that this second channel may work even keeping constant the number of actual jobs available. By decreasing search costs, news would affect the propensity to reoffend either if searching for a job prevents individuals from committing a crime (through incapacitation), or if higher search efforts, keeping all else constant, increase the likelihood of actually finding a job.

5.1. Main results

Table 6 reports the main results. Column 1 includes the number of news stories on job openings (i.e. creations) and cuts in one's county of residence, in the 30 days after release from prison. Announcements about job openings have a negative and significant impact on the probability to reoffend within six months after release. News on job cuts has no detectable effect on recidivism. Adding the full set of individual-level observables (Column 2) and controlling for the flow of job vacancies published in the same thirty days after one's release from incarceration (Column 3) does not change the magnitude of the coefficients, indirectly confirming that our variables of interest are orthogonal with respect to individual observables. Controlling for number of crimes per month and per county or unemployment also does not affect our estimates (column 4 and 5). While we cannot isolate the mechanisms, one explanation could be that news stories about job creations provide actual information about a sector or area that may be recruiting, whereas news stories on job destructions do not provide leads on how to target one's search. While this may help applicants define

what particular firm *not* to apply to, it does not provide extra information.

The last column of table 6 shows that while number of news stories affects recidivism, the number of jobs covered on each story does not – while positive for positive announcements, the magnitude is very small. This suggests that information may be especially helpful in pointing people towards sectors or companies in which to look for jobs, rather than giving exact information on what jobs are available. Those specifications suggest that the results are mainly driven by the effect of better information coupled with the effect of better labor market conditions.

5.2. Discussion and policy implications

Results reported in Table 6 suggest that information about available jobs matters. However, it is still possible that our news variables capture aspects of the economic conditions that are both different from the other economic variables and more relevant to the persons released from jail. In order to investigate this question, we run several additional analyses presented in table 7.

First, if the effect presented in table 6 is driven by information, the timing of the news is of crucial importance. In the first column of table 7, we look at the effect of job announcements that appeared 30 days before release from incarceration. Coefficients are small and non-significant. This is very much consistent with the idea that people released from prison may not have seen that news. Conversely, this is not consistent with the idea that news captures a relevant economic dimension. In column 2, we measure the effect of economic news covered by pure-player digital media sources. The main observable difference with our measure of news is that the audience for these online-only sources of information is much lower than news published on news papers' website.[17] Column 2 indicates that information from these low-audience news outlets has no effect on recidivism. Indeed, the difference with the effect observed in table 6 could come from the nature of the events covered. However, the two types of news are collected by the same private firm, following the same procedure and the

[17] News published on pure-player digital media sources are slightly less frequent (1.2 vs 1.4 in the 30 days following release). However, these differences are unlikely to explain why the coefficient would be ten times smaller.

results are very much consistent with a story based on the access to information. In column 3 we look at the effect of news on public sector jobs. Those positions, according to French law, are not accessible for former inmates, thus we do not expect them to have an effect on recidivism if former inmates correctly process the information they obtain from the media. Results reported in column 3 confirm this intuition.

We then add a further restriction to our main model by including county times calendar month fixed effects. In this specification, all the identification variation comes from within-month and within-county variation. Because the economic conditions do not evolve so rapidly, this is not a good way to identify the effect of the labor market on recidivism. However, *information* on the labor market depends on the news coverage that varies largely from one day to another. For example, if two persons release in county s at time t and t+1 face the same labor market conditions, the one released at t could potentially read news published at t that is not accessible to the other person at t+1. The effect of positive news presented in column 4 remains negative and significant.

In the last part of the table (columns 5-8) we dig into the heterogeneity of the effects of media coverage. First, we document how inmates with different incarceration histories respond to the media coverage of job creations. When we compare inmates that were formerly unemployed to those that had a job before incarceration, positive news about job creations have a negative and statistically significant effect only for the former (columns 5 and 6). In the last part of the table we report results showing that the reduction on the probability of recidivism due to an increase in news about job creations is driven by former inmates that spent time in facilities dedicated to longer detention (column 7) and that spent a relatively longer time in prison (column 8). These results are consistent with an information mechanism. Keeping constant the underlying labor market conditions, media exposure of new job creations affects former inmates with weaker ties to the legal jobs either because they were not employed before incarceration or because they spent more time in prison and were in more isolated facilities.

The information effect that we have just documented could be due both to the fact that

positive news about labor market conditions increase former inmates' optimism about the odds of finding a job the legal market and the fact that information about job creations reduces job search costs for former inmates. While we cannot tell the two channels apart, the results on negative announcements, and public sector seem to suggest that the second channel is prevalent. While negative announcements could increase one's pessimism they do not affect search costs and are not correlated with a statistically significant increase in the propensity to recidivate. Moreover, former inmates do not react to jobs in the public sector that are not available to them while they might have done so if the effect was simply driven by some optimistic reaction to a perceived improvement of labor market conditions.

There are many potential public policy levers that could be used to reduce recidivism. We then ask how job announcements contrast to other potential policies. A one standard-deviation increase in the number of positive news announcements (+ 2.1 news stories) is correlated with a 4.7% decrease in recidivism. We can contrast this to other estimates in the literature: one extra month in prison is associated with a 4% reduction in recidivism (Kuziemko, 2013); two additional weeks in prison plus one extra month on probation are associated with 5% reduction in recidivism (Philippe, 2015); one extra month in expected future sentences is associated with a 1.3% reduction in recidivism (Drago et. al., 2009). Depending on estimates, it appears that providing information to people on jobs is approximately equivalent to spending two extra months in prison, or expecting five more months in prison if re-convicted.

The effects are smaller than those of alternatives to incarceration such as electronic monitoring, which are associated with a 25% (Ouss, 2013) to 50% (Di Tella and Schargrodsky, 2013) reduction in recidivism. Thus, avoiding incarceration altogether might be a more cost-effective way to reduce recidivism in some cases, but providing inmates information about available job opportunities at the time of their release from incarceration still appears to be very cost-effective policy.

6. Conclusion

Consistent with the economic approach to the study of crime we find that former

inmates respond to the incentives provided by variation in formal labor market opportunities. This confirms the role of incentives in the formal labor market, even though other research has shown the importance of informal employment for people when they are released from prison (Western et al, 2015). Our study adds to our knowledge about what works in reducing offending. Our results on media coverage of job creations and destructions suggest that information about local labor market conditions is valuable for inmates and reduces their propensity to recidivate, in particular for inmates that had weaker ties with the legal labor market before incarceration. Moreover, we show that the creation of legitimate labor market opportunities in some sectors also works in economies such as France where the share of inmates over the total population is lower, implying, on average, a higher dangerousness of the marginal inmate with respect to the US.

From a policy perspective, the analysis suggests that policies targeted to reduce unemployment may have positive spillovers by reducing recidivism and highlights the role of information about job availability, over and beyond the effect of unemployment reduction – which is a harder policy lever to manipulate. Improving labor market conditions is costly, and focusing efforts on people released from prison or otherwise involved with criminal justice might be perceived as unfair, or potentially create some moral hazard problems. Our finding that media coverage of job creations matter has a much more tractable policy implication: diffusing relevant job information is much less costly than increasing employment. The importance of information has been shown to play an important role in other contexts, such as investments in schooling (Jensen, 2010 and Hoxby and Turner, 2015), risky sexual behaviors (Dupas, 2011), or retirement investments (Duflo and Saez, 2003). It is not a new finding that information would play an important role in labor markets (Stigler, 1962). Some research places particular emphasis on its diffusion via social networks (Ioannides and Datcher Loury, 2004). Recent field experiments suggest that information interventions may be effective to reduce unemployment, especially among those at risk for longer streaks of unemployment – which could include former inmates (Altmann et al, 2015). Our findings suggest that improving matching through information could also impact important outcomes like offending, which might matter in particular when assessing the costs and benefits of social policies.

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		Mean	Standard Deviation
Offender characteristics (N=99,151)	**Socio-demographics**		
	Female	0.04	0.20
	Born in France	0.80	0.40
	French	0.86	0.35
	Married	0.31	0.46
	Has children	0.42	0.49
	Had a job when incarcerated	0.61	0.49
	High school	0.10	0.30
	Middle school	0.38	0.49
	Technical education	0.32	0.47
	No school	0.09	0.29
	Age upon release	32.3	10.9
	Offending		
	Theft	0.36	0.48
	Drugs	0.22	0.41
	DUI	0.28	0.45
	Assault	0.35	0.48
	Parole	0.07	0.26
	Short-term prison	0.68	0.47
	Recidivated within 6 months	0.06	0.23
	Incarceration length	213.4	349.6
Labor market characteristics	Number of jobs created per month (Pole emploi)	2205	1827
	Number of positive journal announcements per month	1.42	2.10
	Number of negative journal announcements per month	1.69	2.00
	Number of positive online announcements per month	1.21	2.10
	Number of negative online announcements per month	0.23	2.00

Table 1: Summary statistics on releases from prison and job availability. These summary statistics on offenders represent people released from prison between February 1st, 2009 and July 31st, 2010. The summary statistics on number of journal announcements represent the same period, while figures on number of jobs created exclude the month of July, 2010, when data was not available (see online appendix A). Source: Authors' calculations based on prison records, provided by the French Direction of Prison administration, employment data collected from Pole emploi, and news data collected from the *Observatoire de l'Investissement*.

	Prison characteristics				Socio-demographic characteristics					Offense				
	Number released	Parole	Short-term prison	Sentence length	Had a job pre-prison	Female	Age at release	Married	Has children	Theft	Drugs	DUI	Assault	Predicted Recidivism
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
PANEL A: Number of jobs created (Pole Emploi)														
Number of jobs created	-0.025	-0.001	0.002	-0.895	-0.003	-0.001	-0.010	0.003	0.002	0.002	-0.004*	0.004*	0.003	0.000
	(0.017)	(0.002)	(0.003)	(2.072)	(0.003)	(0.001)	(0.056)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.000)
Observations	28,102	88,194	88,194	88,194	88,192	88,194	88,167	88,194	88,114	84,872	84,872	84,872	84,872	84,359
Mean	3.153	0.0731	0.678	213.4	0.614	0.0435	32.32	0.308	0.415	0.355	0.216	0.278	0.346	0.0568
PANEL B: Journal Announcements														
Positive journal announcements	-0.0101	0.000	-0.000	0.093	0.002*	0.000	0.039***	-0.000	0.001	-0.001	-0.000	0.000	0.002***	-0.000***
	(0.00803)	(0.000)	(0.001)	(0.470)	(0.001)	(0.000)	(0.010)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)
Negative journal announcements	0.000	0.000	0.000	0.402	-0.000	-0.000	-0.032	-0.001*	-0.001	0.001	0.001	0.000	-0.000	0.000
	(0.009)	(0.000)	(0.002)	(0.734)	(0.001)	(0.000)	(0.023)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Observations	31,447	99,151	99,151	99,151	99,149	99,151	99,120	99,151	99,064	95,770	95,770	95,770	95,770	95,201
Outcome Mean	3.153	0.0731	0.678	213.4	0.614	0.0435	32.32	0.308	0.415	0.355	0.216	0.278	0.346	0.0568

Table 2: Characteristics of defendants released from prison, by labor market characteristics. The dependent variable of each regression is specified in the column header. Each Panel represent a separate set of regressions. We regress each dependent variable on the following measures of the labor market 30 days after one's release from prison: number of pole emploi announcements (normalized at the county level), for panel A; and number of positive and negative journal announcements for panel B. These regressions also include department and day fixed effects. Standard errors are clustered at the county level. Source: Authors' calculations based on prison records, provided by the French Direction of Prison administration, employment data collected from Pole emploi, and news data collected from the *Observatoire de l'Investissement*

Outcome:	Recidivism, measured as having a new incarceration within 6 months after release from		
	(1)	(2)	(3)
Number of jobs created (Pole Emploi)	0.0006	0.0005	
	(0.0012)	(0.0012)	
Unemployment flow			0.0004
			(0.0017)
Unemployment rate			
Observations	88,194	84,359	95,201
Mean Recidivism	0.0573	0.0573	0.0573
Controls	Department	All	All

Table 3: Job creations and recidivism within 6 months. Number of jobs created, unemployment rate, and unemployment flow are within county, in the 30 days following one's release from prison. The measure for "number of jobs created" is normalized at the county level. Controls in columns 2–4 are for: age, gender, nationality (French or other), place of birth (France or other), type of release (probation or not), a dummy for reporting being married, a dummy for reporting having children, type of offense, type of prison of release (short term or long term), education, day of release and county. All standard errors are clustered at the county level. Source: Authors' calculations based on prison records, provided by the French Direction of Prison administration, and data collected from Pole emploi. *Note*: *** p<0.01, ** p<0.05, * p<0.10.

Outcome:	Recidivism, measured as having a new incarceration within 6 months after release from prison	
Normalized number of jobs created 30 days after release from prison, in the employment sector of…	Agriculture	0.0001
		(0.0016)
	Communications	0.0001
		(0.0009)
	Services	0.0005
		(0.0006)
	Finance	-0.0003
		(0.0014)
	Manufacturing	-0.0041**
		(0.0017)
	Transportation	-0.0021
		(0.0016)
	Construction	0.0014
		(0.0019)
	Observations	37,841
	Mean Recidivism	0.0573

Table 4: Job creations and recidivism within 6 months, by type of job created. Each measure for "number of jobs created" is normalized at the county level. Each line represents a separate regression. Information on type of job is only available in 2010 and not in 2009, and so the sample is smaller than in table 3. Controls are for: age, gender, nationality (French or other), place of birth (France or other), type of release (probation or not), a dummy for reporting being married, a dummy for reporting having children, type of offense, type of prison of release (short term or long term), education, day of release and county. Standard errors are clustered at the county level. Source: Authors' calculations based on prison records, provided by the French Direction of Prison administration, and data collected from Pole emploi. *Note*: *** p<0.01, ** p<0.05, * p<0.10.

Outcome:	Recidivism, measured as having a new incarceration within 6 months after release from prison									
	Type of prison of release		Quartile of Sentence Length				Employment status before incarceration		Type of release from prison	
	Short-term	Long-term	Quartile 1	Quartile 2	Quartile 3	Quartile 4	Unemployed	Employed	Parole	No Parole
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Number of Pole Emploi	-0.0047**	-0.0029	-0.0091**	-0.0012	-0.0049	-0.0012	-0.0035	-0.0041**	-0.0042**	-0.0024
Manufacturing jobs	(0.0020)	(0.0035)	(0.0040)	(0.0035)	(0.0031)	(0.0035)	(0.0032)	(0.0017)	(0.0018)	(0.0065)
Observations	25,079	12,762	9,580	9,001	9,275	9,985	14,637	37,841	35,059	2,782
Mean Recidivism	0.0576	0.0568	0.0658	0.0468	0.0497	0.0667	0.0731	0.0474	0.0590	0.0364

Table 5a: Heterogeneity in the effect of manufacturing jobs on recidivism. The measure of "jobs created in manufacturing" is normalized at the county level. Each regression includes controls for: age, gender, nationality (French or other), place of birth (France or other), type of release (probation or not), a dummy for reporting being married, a dummy for reporting having children, type of offense, type of prison of release (short term or long term), education, day of release and county. Standard errors are clustered at the county level. Source: Authors' calculations based on prison records, provided by the French Direction of Prison administration, and data collected from Pole emploi. *Note*: *** p<0.01, ** p<0.05, * p<0.10.

Outcome:	Recidivism by type of offense, measured as having a new incarceration within 6 months after release from prison, for the offense specified in the header			
	Property offense	Drug offense	DUI	Assault
	(1)	(2)	(3)	(4)
Number of Pole Emploi	-0.0012	-0.0005	-0.0030***	-0.0032***
Manufacturing jobs	(0.0012)	(0.0008)	(0.0007)	(0.0011)
Observations		37,841		
Mean Recidivism after 6 months, for each offense	0.0276	0.0116	0.0158	0.0211

Table 5b: Heterogeneity in the effect of manufacturing jobs on recidivism (continued). The dependent variable is a dummy equal to 1 if the defendant recidivated for the offense specified in the column header. The measure of "jobs created in manufacturing" is normalized at the county level. Each regression includes controls for: age, gender, nationality (French or other), place of birth (France or other), type of release (probation or not), a dummy for reporting being married, a dummy for reporting having children, type of offense, type of prison of release (short term or long term), education, day of release and county. Standard errors are clustered at the county level. Source: Authors' calculations based on prison records, provided by the French Direction of Prison administration, and data collected from Pole emploi. *Note*: *** p<0.01, ** p<0.05, * p<0.10.

Outcome	Recidivism, measured as having a new incarceration within 6 months after release from prison					
	(1)	(2)	(3)	(4)	(5)	(6))
Positive news	-0.00083***	-0.00069**	-0.00080***	-0.00083***	-0.00069**	-0.00106***
	(0.00029)	(0.00028)	(0.00028)	(0.00028)	(0.00028)	(0.00030)
Negative news	0.00003	0.00011	-0.00011	-0.00009	0.00011	-0.00003
	(0.00043)	(0.00043)	(0.00047)	(0.00048)	(0.00043)	(0.00050)
Number of jobs created			0.00054	0.00041		0.00001***
(Pole Emploi)			(0.00117)	(0.00115)		(0.00000)
Average number of jobs						0.00000
Per positive news story						(0.00000)
Average number of jobs						0.00054
Per negative news story						(0.00117)
Crime Rate				-0.00000		
				(0.00000)		
Unemployment Flow					0.00041	
					(0.00176)	
Observations	99,151	95,201	84,359	95,201	95,201	84,359
Controls	Department	All	All	All	All	
Mean recidivism			0.0573			

Table 6: News coverage of jobs and recidivism. Number of jobs created, unemployment rate, and unemployment flow are within county. The measure for "number of jobs created" is normalized at the county level. Controls in columns 2–5 are for: age, gender, nationality (French or other), place of birth (France or other), type of release (probation or not), a dummy for reporting being married, a dummy for reporting having children, type of offense, type of prison of release (short term or long term), education, day of release and county. All standard errors are clustered at the county level. Source: Authors' calculations based on prison records, provided by the French Direction of Prison administration, data collected from Pole emploi, and data collected from the *Observatoire de l'Investissement*. *Note*: *** p<0.01, ** p<0.05, * p<0.10.

Outcome:	Recidivism, measured as having a new incarceration within 6 months after release from prison							
	News before release	News on the internet	News on public sector jobs	Month* County FE	Employment status before incarceration		Type of prison of release	
					Unemployed	Employed	Short-term	Long-term
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Positive news				-0.00165**	-0.00104**	-0.00062	-0.00005	-0.00170***
				(0.00079)	(0.00046)	(0.00039)	(0.00046)	(0.00062)
Negative news				-0.00014	-0.00014	0.00001	-0.00014	-0.00039
				(0.00085)	(0.00077)	(0.00048)	(0.00069)	(0.00071)
Number of jobs created	0.00059	0.00056	0.00065	-0.00529**	0.00010	0.00063	-0.00059	0.00311
(Pole Emploi)	(0.00118)	(0.00118)	(0.00117)	(0.00222)	(0.00225)	(0.00140)	(0.00141)	(0.00227)
Positive news,	0.00041							
30 days pre-release	(0.00035)							
Negative new,	0.00069							
30 days pre-release	(0.00060)							
Positive web news		-0.00009						
		(0.00046)						
Negative web news		-0.00022						
		(0.00095)						
Positive news,			0.00248					
Public sector jobs			(0.00240)					
Negative news,			0.00125					
Public sector jobs			(0.00188)					
Observations	84,359	84,359	84,359	84,359	32,527	51,832	57,601	26,758
Mean Recidivism	0.0573	0.0573	0.0573	0.0573	0.0731	0.0474	0.0571	0.0568

Table 7: News coverage of jobs and recidivism: mechanisms. The measure for "number of jobs created" is normalized at the county level. Regressions include controls for: age, gender, nationality (French or other), place of birth (France or other), type of release (probation or not), a dummy for reporting being married, a dummy for reporting having children, type of offense, type of prison of release (short term or long term), education, day of release and county. All standard errors are clustered at the county level. Source: Authors' calculations based on prison records, provided by the French Direction of Prison administration, data collected from Pole emploi, and data collected from the *Observatoire de l'Investissement*. *Note*: *** p<0.01, ** p<0.05, * p<0.10.

Appendix A: Data sources and availability period.

In our paper, we use three main data sources, each of which is available for a different time period. In this appendix, we synthesize data availability for each source, and what time period is used for each analyses.

Prison Records Data. This data was provided by the French Department of Prison Administration. We use this data for two purposes: to get information about people released from prison, and to measure recidivism, defined as "returning to prison 6 months after release". We obtained this from February 1st, 2008 to January 31st, 2011. In order to have a 6-months time window for all inmates released from prison, we have a full sample of people released from prison between February 1st, 2009 and July 31st, 2010.

Job Vacancies Data. This data was provided by the French governmental agency for unemployment, "pole emploi". We obtained aggregate data on job availabilities for 2009 and 2010. The data is missing for the month of June 2010. Since we compute our labor market measures for the 30 days after one's release for prison, this means that our main analyses on job vacancies does not include people released in May and June 2010.

In some of our analyses, we also include information on types of jobs. This information is available in November and December 2009, and in 2010, except for the month of June 2010.

News and Jobs Posting data. This data was compiled by the by a private firm, the *Observatoire de l'Investissement*. We obtain information between January 2009 and December, 2010.

Given availability of these different data sources, our main analyses cover inmates released from prison between February 1st, 2009 and April 30th, 2010, and in July 2010.

Tables 4, 5a and 5b focus on types of jobs available. These analyses are for inmates released from prison between November 1st, 2009 and April 30th, 2010, and in July 2010.

Appendix B: Google searches per week, by media sources

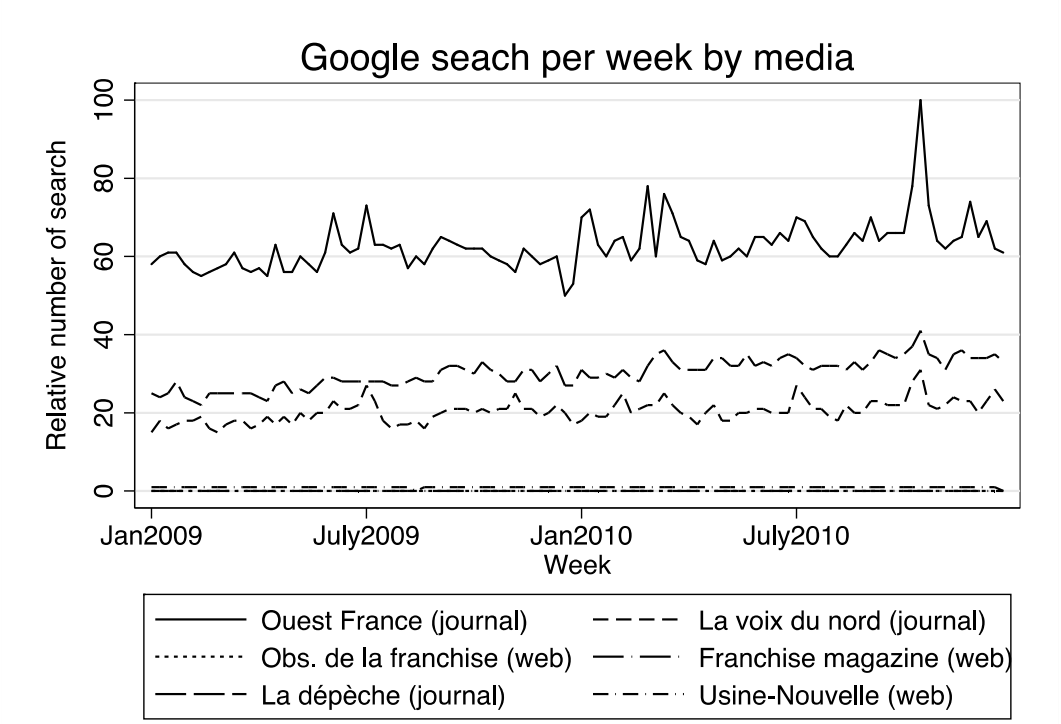

Table B1: Google search per week in 2009-2010, for the six most frequent news sources in the *Observatoire de l'Inverstissement* job announcement dataset. These sources represent 25% of all announcements (positive or negative). Three of these sources are newspaper websites: Ouest France, La voix du nord, La dépêche. The three others are pure players: L'observatoire de la franchise, Franchise magazine, Usine Nouvelle.