

PRICE-SETTING BY ONLINE PLATFORMS:
EVIDENCE FROM ONLINE JOB BOARDS AND RESUME BANKS*

BY

VERA BRENČIČ
Department of Economics
University of Alberta

Abstract: Websites that host job boards and resume banks are platforms that facilitate interactions between two sides of the labor market. In this respect, their survival depends on how successful they are in attracting both job searchers and employers to their sites. We use data on websites that hosted job boards and resume banks from 2000 to 2011 in the US to examine whether the websites take into account the two-sided nature of the market that they serve when setting their prices. Our analysis reveals asymmetry in the websites' treatment of employers and job searchers; i.e., compared to job searchers, the websites are more likely to charge employers for the use of their sites. However, changes in the relative scarcity of job searchers and job vacancies affect how accommodating the websites are to their users; e.g., while the websites charge employers less for the use of a job board when job searchers are scarcer, they charge employers more for the use of a resume bank when job vacancies are scarcer.

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I. INTRODUCTION

Websites that host job boards and resume banks are platforms that facilitate interactions between two sides of the labor market. An important feature of these websites is that their survival depends on how successful they are in attracting both job searchers and employers to their sites. For example, in order for an online resume bank to be successful, many job searchers must submit their resumes to the bank and many employers must access the bank to review the posted resumes. Similarly, a successful online job board must ensure that many employers post job ads on its board and that many job searchers visit the board to review the ads. When setting prices and imposing participation restrictions, these websites must take into account that their decisions affect participation and usage of their sites by both sides of the market; the employers and the job searchers.

We use data from the Weddle's surveys of employment websites that were conducted from 2000 to 2011 in the US to examine whether the websites take into account the two-sided nature of the market that they serve when setting their prices. The data contain information about the prices that the websites charged employers and job searchers for the use of their sites and any restrictions that the websites imposed on the duration of use. For each year, we assigned to each website data on the unemployment rate and job creation rate for the labor market that the website served. On the basis of this assignment, we can assess whether the websites' decisions about the prices and participation restrictions were affected by the relative scarcity of job searchers and employers - prospective visitors to websites that host job boards and resume banks - in the labor market that the websites served.

Our analysis of the data reveals that employers were more likely to be restricted access and charged for the use of online job boards and resumes banks than job searchers. However, the number of potential participants on one side of the market had an effect on how accommodating the websites were to the other side of the market. For example, online job boards kept job postings online for longer and charged a lower fee for a day of posting when job searchers were scarcer and the gains of posting a job ad were lower. While an increase in relative scarcity of job vacancies did not affect the fee that the websites charged for a CV posting, it did prolong the length of time the CV postings were kept online. Changes in the relative scarcity of job vacancies (job searchers) had no effect on the fee charged for access and restrictions imposed on the duration of access to postings on a job board (in a resume bank).

While sensitive to alternative specifications, we find some evidence that the websites also reacted to changes in rivalry when setting prices and restricting the duration of use of a resume bank. Specifically, when job vacancies were plenty and as a result rivalry among employers with job vacancies was fierce, online resume banks lengthened the duration of employers' access to the CV bank and

charged a lower fee for the access. Similarly, when job searchers were plenty and as a result rivalry among them was fierce, online resume banks lengthened the duration of storage of a CV posting in the CV bank and charged a lower fee for the storage. However, we find that the websites did not react to changes in the extent of rivalry when setting prices and restricting the duration of use of a job board.

In our analysis, we exploit both within-website variation across time and variation across websites at a point in time. We also check whether the estimates change when we control for changes in: occupation- and region-specific factors, available infrastructure for Internet access, prevalence of Internet use, online search, market concentration, costs of maintaining a website, and type of services offered by the websites. Our main findings hold up to these additional controls. The estimates are smaller in magnitude or become insignificant when - instead of assigning labor market conditions to websites on the basis of the labor market that they served - we assign them on the basis of the state of the websites' headquarters. We cannot replicate all of our findings when - in place of unemployment rate and job creation rate - we use alternative measures of scarcity of job searchers and job openings.

Price-setting by platforms in two-sided markets has received a great deal of attention in the industrial organization literature (e.g., Rochet and Tirole, 2003, 2006; Armstrong, 2006; Weyl, 2010). Whereas existing studies propose theoretical frameworks that differ in terms of their underlying assumptions (for a review, see Evans and Schmalensee, 2007), these studies have two predictions in common that are consistent with our findings: a) asymmetry in prices whereby participants on one side of the market (job searchers, in our case) are subsidized by participants on the other side (employers) and b) the presence of network effects whereby the number of potential participants on one side of the platform affects the gains of participating on the platform and therefore how accommodating the platform must be to participants on both sides of the platform; in terms of the fee charged for a day of participation and restrictions regarding the duration of participation on the platform.

Three comments are warranted with regards to our reliance on the theory of price-setting in two-sided markets for our empirical analysis. First, we argue that employment websites charge for the use of their sites in order to manage job searchers' and employers' participation on their sites and hence ensure their survival. If this claim is correct, we should observe two patterns. The number of job postings and resume postings on these websites should not be affected by the change in the job creation rate and the unemployment rate, respectively, if websites manage participation on their sites. In addition, according to our explanation, decisions by websites that had headquarters in the US but provided services to participants in labor markets abroad should not be affected by conditions in the US labor market. Further analysis of the data yields results that are consistent with these two predictions.

The second comment echoes a remark by Jin and Rysman (2012) in their analysis of pricing by organizers of sports-card conventions; i.e., in contrast to the existing theoretical studies that examine price-setting by at most two competing platforms, our empirical analysis pertains to a market with over 800 different platforms. In this regard, our findings suggest that two key theoretical predictions extend to markets with many competing platforms. Third, business cycle models with endogenous markups offer a competing theoretical framework for the interpretation of the effect of labor market conditions on price-setting by employment websites (Bils, 1987; Domowitz et al., 1986). However, according to these models, *all* prices are expected to be either pro- or counter-cyclical. In other words, these models cannot account for our finding that websites react differently to a change in the unemployment rate (job creation rate) when setting prices for employers than when setting prices for job searchers.

Our study is not the first empirical examination of decision-making by platforms in two-sided markets. However, the distinguishing features of our study are its focus on: a) online platforms in the labor market, and b) decisions that pertain to prices and participation restrictions. Other empirical studies have focused on price-setting in their evaluation of: a) the size of the network effect in the market for magazines (Kaiser and Wright, 2006), yellow pages directories (Rysman, 2004), spreadsheets (Gandal, 1994), and DVD players (Gowrisankaran et al., 2010)¹ and b) the impact of market structure on prices in the market for sports-card conventions (Jin and Rysman, 2012), newspapers (Chandra and Collard-Wexler, 2009; Fan, 2009; Seamans and Zhu, 2011), academic journals (Dubois et al., 2007), yellow pages directories (Busse and Rysman, 2005), and local TV stations (Gil and Riera-Crichton, 2011).

The analysis in this paper strikes us as relevant on one additional count. Despite of their popularity (Haddass, 2004; Nakamura et al., 2009; Kroft and Pope, 2010), studies of employment websites are scant. Moreover, whereas existing studies focus on documenting the impact of the employment websites' entry into the labor market (on wages and migration in Bagues and Labini, 2009; on unemployment in Kroft and Pope, 2010) or on documenting their role of facilitating contacts between job searchers and employers (Stanton and Thomas, 2010; Brenčič and Norris, 2012; Marinescu and Wolthoff, 2012), ours is the first study to focus on their decision-making. In part because of this difference in focus, the existing studies focus on a single employment website (e.g., craigslist.org in Kroft and Pope, careerbuilder.com in Marinescu and Wolthoff, and monster.com in Brenčič and Norris). In contrast, our analysis draws on data for over 800 different websites over the period of 12 years.

¹ A related strand of the literature estimates the magnitude of network effects without relying on data on prices. For evidence in the markets for ATM machines, magazines, credit cards, a B2B website see, respectively, Saloner and Shepard (1995), Rysman (2007), and Tucker and Zhang (2010). See Birke (2009) for a literature review.

The remainder of the paper is organized as follows. In Section II, we review theoretical framework that we use in our analysis of the results. In Section III, we describe the data and descriptive statistics. We review the results in Section IV. Concluding remarks are delegated to Section V.

II. THEORETICAL FRAMEWORK

Online job boards and resume banks are platforms that facilitate interactions among participants in the labor market. Employers turn to online job boards to advertise their jobs. Job searchers submit their resumes to online resume banks. The net gains that each side incurs by joining a platform depend on the number of participants with whom they can interact through the platform. For a resume bank to be successful many job searchers must submit their resumes to the bank and many employers must review the resumes. A successful job board must ensure that many employers post job ads on their boards and that many job searchers review the job postings. When setting prices, these online sites must take into account that the prices that they charge to one side affect participation and usage of the platform by both sides of the market, the employers and the job searchers.

Characterization of optimal price-setting in two-sided markets has received a great deal of attention; e.g., Rochet and Tirole (2003, 2006), Armstrong (2006), Weyl (2010). While these studies differ in terms of their underlying assumptions, they have two features in common (Evans and Schmalensee, 2007). First, a distinguishing feature of two-sided markets is price asymmetry whereby participants on one side of the platform are charged less in order to establish a large enough base to attract participants on the opposite side. Several factors can determine the nature of this asymmetry; a) a higher price is charged for access to the side that single-homes or participates on only one platform (Caillaud and Jullien, 2003); or b) a side that - by participating on the platform - causes a larger positive externality for the opposite side or is more price-sensitive is charged less (Armstrong, 2006; Bolt and Tieman, 2008). The second feature has to do with the presence of network effects whereby the number of potential participants on one side of the platform affects the net gains of participants on both sides of the market. In this regard, several remarks are relevant (for a summary, see Table 1).

The first two remarks have to do with the implications of *cross*-side network effects for pricing. Specifically, in two-sided markets, relative scarcity of potential participants on *one* side of the market affects participation decisions on the *other* side of the market. In our setting, a decrease in unemployment rate, for example, is expected to decrease the number of job searchers who might review postings on an online job board and thus decrease the net gains of posting a job ad on an online job board. To ensure employers' participation, an online job board can decrease the costs of job posting

either by decreasing the job posting fee or by lengthening the duration of time that a job posting remains available for review online. Hence, in the presence of cross-side network effects, *a decrease in unemployment rate increases the duration of job posting or/and decreases the job posting fee.*

Similarly, with a decrease in the rate of job creation the number of employers who review online CV postings declines, which decreases the gains of submitting a CV to an online resume bank. In order to ensure job searchers' participation and its survival, an online resume bank can decide to decrease the costs of a CV submission by either decreasing directly the CV submission fee or by increasing the length of time a CV posting remains stored in an online resume bank. To the extent that the CV posting fee is constrained to zero, we expect labor market conditions to have no effect. In the presence of cross-side network effects and non-zero prices, *a decrease in the job creation rate is expected to either increase the length of time a CV posting remains available for review online or/and decrease the CV posting fee.*

Given the nature of transactions on these websites, the net gains of a participant on one side are not affected by the number of participants on the same side of the platform; i.e., a review of a job posting by a job searcher does not preclude another job searcher from viewing that same posting. In other words, there are no rivalry effects or *same-side* network effects; at least as far as the review of postings on these websites is concerned. However, rivalry and same-side network effects might be present if greater interest in a posting reduces one's chances of a job interview or a job offer. Hence, *if rivalry effects are important, then an increase in unemployment rate and job creation rate results in: a) an increase in the duration of a CV and job posting, respectively, and b) a decrease in the fee charged for a day of CV and job posting, respectively. In the absence of rivalry, no effects are expected.*

Labor market conditions also affect the fees and restrictions that regard *access* to postings on a job board or in a resume bank. For example, as unemployment rate decreases, fewer job searchers submit a resume to an online resume bank. As a result, the employers' gains of accessing the bank decrease. To ensure their participation, an online resume bank can either decrease the access fee or increase the duration of access. Hence, in the presence of cross-side network effects, *a decrease in unemployment (job creation) rate increases the duration of access to a resume bank (job board) or/and decreases the access fee.* However, this effect might be ameliorated if resumes are kept in online resume banks indefinitely. In this case, resume banks offer access to passive job searchers, which can be particularly valuable when job searchers are harder to find (i.e., when unemployment rate is low).

In the presence of rivalry effects, an increase in unemployment rate is expected to increase the number of potential visitors to a job board thereby reducing a job searcher's chances of securing a job interview or a job offer. In order to ensure survival, a job board can react by decreasing the fee for

access to a job board or by prolonging the duration of access. Similarly, as job creation increases, more employers compete for the job searchers whose resumes are stored in the resume bank. A resume bank can react by decreasing the fee it charges for access or by prolonging the duration of access. Hence, in the presence of same-side network (or rivalry) effects: *an increase in unemployment (job creation) rate increases the duration of access to the job board (resume bank) or/and decreases the access fee.*

Two comments are warranted with regards to the relevance of theoretical framework on price-setting in two-sided markets for our empirical analysis. The first comment echoes a remark by Jin and Rysman (2012) in their analysis of pricing by organizers of sports-card conventions. Namely, the existing theoretical studies focus on markets with at most two platforms. In contrast, our analysis focuses on a market with many competing platforms. Second, business cycle models with endogenous markups offer a competing framework for the interpretation of the effects of labor market conditions on price-setting. According to these models, prices are countercyclical. The reasoning for this pattern is as follows. As new firms enter the market during expansion, prices fall on account of fiercer competition. By contrast, as more firms exit the market in recession, prices increase due to increased market concentration.

That is, this alternative explanation stipulates that *all* prices (posting fee, access fee) increase and that *all* participation restrictions (duration of access, duration of posting) become more stringent in periods of economic downturn (i.e., high unemployment rate and low job creation rate). This prediction contrasts with the explanation provided by the theory of pricing by platforms in two-sided markets which suggests that the effect of unemployment rate and job creation rate on prices and participation restrictions is different for the two sides of the market (see Table 1). For example, while an increase in unemployment rate is expected to *increase* the fee that the employers must pay for posting a job on an online job board, it is expected to *decrease* the fee that the job searchers are charged for a CV posting.

<Insert Table 1>

III. DESCRIPTION OF DATA

According to the Pew Internet and American Life Project Tracking survey, 81% of adults in the US used the Internet in 2012; 53% of them visited online job boards in their search for jobs. An online survey in 2007 reveals that over 80% of respondents visited employment-related websites; about half of them looked at job postings on online job boards and about one third submitted their resumes to online resume banks (Nakamura et al., 2009). Similar patterns are found on the employers' side. On the basis of recruiting activities of, respectively, a single firm and firms in 162 MSAs in the US, Haddas (2004) and Kroft and Pope (2010) find that employers have gradually switched from posting their job ads in

newspapers towards posting them on online job boards. The Conference Board's introduction of the online help-wanted index in 2004 signals the Board's efforts to account for employers' use of the Internet in its measurement of demand for labor. The Conference Board draws on over 16,000 online job boards in its construction of the online help-wanted index. In this regard, our analysis draws on a relatively small subset of employment websites. Nevertheless, to our knowledge, it represents the first attempt at a systematic examination of decision-making by employment websites.

We use data from the *Weddle's Guides to Employment Web Sites* that span the period from 2000 to 2011. Each year, 350 of the most popular websites were reviewed. Since 2005, the guides have been issued biennially. In the two most recent surveys in 2009 and 2011, only the 100 most popular online sites were reviewed. Of the online sites that hosted a job board, 89% also hosted a resume bank. About 40% of the websites that were surveyed changed each year to reflect new sites, sites that have discontinued operation, and sites that have improved their capabilities in an important way. Attrition is not necessarily an absorbing state. The sites that were selected were sent a questionnaire about a variety of attributes that we report in Table 2. Some attributes were reported in only some surveys.

Type and structure of prices: Most resume banks (96%) did not charge for the submission of resumes to an online resume bank.² Of the 4% that did, the sites charged anywhere from \$1 to \$99 per submitted resume. In contrast, 65% of the resume banks charged employers a fee for access to the resume bank for anywhere from three days to a year. The access fee ranged from \$1 to \$90,000. Half of the resume banks charged less than \$100, while 10% of the websites charged \$1,000 or more. Some (171) websites offered free access to their CV banks while a job ad was posted on the websites' job board. In these instances, the fee for access to the CV bank was set to equal the job posting fee.³ Usage fees were rare; i.e., four resume banks charged per search, 25 banks charged per search session, and two sites charged per view of a resume. These sites were excluded from the analysis of price-setting.

None of the job boards in our sample charged job searchers for online access to descriptions of job openings. In contrast, 84% of them charged employers for posting a job opening on an online job board. The job posting fee ranged from \$0.75 to \$5,000. Half of the job boards charged \$100 or less, while less than 5% of the websites charged more than \$300.⁴ Several online job boards pursued atypical price-setting. For example, five online job boards charged employers on the basis of the length of the

² Data on the CV postings fee are only available since 2004 onwards.

³ Excluding these observations from the sample had no effect on the paper's main findings.

⁴ Overall, 32% of the sites for which information is available offered some type of a discount for a job posting. This contrasts with 5% of the sites that offered discounts for access to a CV bank and 3% that offered discounts for CV posting. Following Jin and Rysman (2012, page 6), we do not make any adjustments for discount. The main conclusions persist once we restrict the sample to websites that do not offer any discounts.

description of a job opening; i.e., a fee per line of a job description or the number of words used in a job ad. These observations were dropped from the analysis of price-setting because they represent a different pricing strategy. We also excluded 43 online job boards that charged a membership fee.

This preliminary analysis reveals two insights. First, asymmetric pricing by online job boards and resume banks is prevalent whereby employers subsidize job searchers' use of online job boards and resume banks. This asymmetry became more pronounced over time (Figure 2). Second, online sites predominantly charge access or participation fees rather than usage or transaction fees. Such pricing is consistent with the fact that: a) access fees are preferred to usage fees when the market has not yet fully matured and participation is not yet wide-spread (Rochet and Tirole, 2006); b) the online sites incur transaction-insensitive costs; and c) it is difficult to identify if a review of a resume or a job opening results in an interview, a job application, a job offer, or employment; i.e., transactions are hard to observe and, even if observed, might not represent the main transaction of interest.

Duration of participation (posting/access to postings): In our sample, 32% of the websites kept CVs in their resume banks for indefinite period of time (Table 2). The incidence of online sites that kept CVs online indefinitely increased during the sample period (Figure 1). The sites that restricted the duration of postings kept CVs in their banks, on average, for 236 days (Table 2). The most frequent restrictions were set at one, two, three, four, six, and 12 months. Of the sites that restricted the duration of a CV posting, online sites lengthened the duration of postings during the sample period (Figure 1). 53% of the resume banks restricted the duration of access to a resume bank for anywhere from three days to a year (Table 2). The incidence of online sites that granted indefinite access declined during the sample period (Figure 1). For the banks that restricted access, the average duration of access was 1.5 months with a large fraction restricting access to one month.⁵ Of the sites that restricted the duration of access, online sites shortened the duration of access during the sample period (Figure 1).

An average online job board kept job openings online for 54 days (Table 2). The most common restrictions were set at one, two, three, and - less seldom - four months. Figure 1 reveals that, of the sites that restricted the duration of job posting, online sites shortened the duration of job postings during the sample period. In addition, 6% of the sites in the sample kept job openings online indefinitely (Table 2). The incidence of online sites that kept job openings online indefinitely decreased in the first part of the sample period and increased in the second part of the sample period (Figure 1). None of the online job boards in the sample restricted access to their job postings. Overall, as with price-setting,

⁵ Some websites (171 observations) offered free access to their CV bank whenever a job ad was posted on their job board. In these instances, the duration of access to the CV bank was set to equal the duration of job posting.

summary statistics that regard restrictions on the duration of use of websites suggest that asymmetry in the treatment of employers and job searchers is present and has increased over time.

Labor market conditions: Data on the job creation rate and unemployment rate were obtained from, respectively, the US Census Bureau and the Bureau of Labor Statistics (BLS) and were matched to the websites on the basis of the location of the websites' headquarters as long as the sites served a local market. National data were assigned to sites that served the US market.⁶ We use information about job openings and unemployed job searchers to measure the number of potential visitors to online job boards and resume banks. Figure 1 reveals that our sample period was characterized by a rise in the unemployment rate and a decline in the job creation rate. As a part of our robustness checks, we also collected data on alternative measures of the number of available job vacancies and job searchers; i.e., job separation rate and job opening rate (source: BLS), job destruction rate (source: US Census Bureau), and index that tracks changes in the number of job postings online (source: monster.com).⁷

Control variables: We observe at most five prevalent types of postings (occupation categories) that an online site hosted. We add, alternatively, both a control for the number of different types of postings as well as a set of dummy variables for the types of occupations that are most frequently represented on the website. We observe the year that an online site first appeared online and the sites' geographic focus; i.e., whether the sites' postings were specific to a particular state or the entire US. We also control for whether or not a site received the User's Choice Award, which was awarded annually to websites on the basis of online votes submitted by users to Weddle.com. As a part of our robustness checks, we add controls for the region in which the websites' headquarters were located. To allow for time-variant region effects, the region dummies are interacted with a linear trend.

<Insert Table 2 and Figures 1 and 2>

IV. FINDINGS

Restrictions on duration of participation and labor market conditions

The dependent variable measures the duration of a posting (in number of days, indicator variable for indefinite duration) at a site i during a typical month in year t . If websites reported a minimum and a maximum duration, we used data for the minimum duration.⁸ We report separately results without control variables (columns 1 and 2 in Tables 3 and 4) and with control variables (columns

⁶ For 16 sites, information about the location was missing for some years but was available for other years. The missing location in a particular year was assigned the observed location for the same site for another year.

⁷ Information from the BLS' JOLTS data is only available for four regions; the Midwest, Northeast, West, and South.

⁸ Only 72 and 5 websites specified both a minimum and a maximum duration for job and CV posting, respectively.

3 and 4 in Tables 3 and 4). Results with website fixed effects are reported in columns 5 and 6 in Tables 3 and 4. When the dependent variable is binary, we estimate a linear probability model with website fixed effects. Standard errors are heteroskedasticity-robust and are clustered at the level of a website.

$$\text{duration of posting}_{it} = \alpha_0 + \alpha_1 \text{worker scarcity}_{it} + \alpha_2 \text{job scarcity}_{it} + \alpha X_{it} + u_{it} \quad (1)$$

We find that online job boards were more accommodating to employers when job searchers were relatively scarce; i.e., online sites lengthened the duration of a job posting by 2.8 days, on average, in response to a 1-percentage point decrease in unemployment rate (column 1 in Table 3). The average duration of a job posting was 54 days. The magnitude of the estimate is larger when we account for website-level fixed effects (column 5 in Table 3); i.e., the websites increased the duration of job posting by 3.7 days for every one percentage point decrease in unemployment rate. Similarly, once we include website-level fixed effects, we find that resume banks were more accommodating to job searchers when the number of job vacancies was relatively low; i.e., online sites lengthened the duration of CV postings by 11.3 days, on average, when the rate of job creation decreased by 1 percentage point (column 5 in Table 4). The average duration of a CV posting in our sample was 236 days.

These results suggest that websites responded to a change in the relative scarcity of potential participants on one side of the platform by changing restrictions that they imposed on the duration of use by participants on the other side of the platform. We also find some evidence that websites reacted to changes in rivalry; i.e., the websites were more accommodating to one side of the platform when the number of potential participants on the same side of the platform increased. For example, online resume banks were 3.8 percentage points more likely to keep resumes online indefinitely when unemployment rate increased by one percentage point (column 4 in Table 4). When we add website fixed effects changes in unemployment rate did not affect the length of time that the resumes remained online (columns 5 and 6 in Table 4). The same pattern applies to employers; i.e., a change in the rate of job creation had no effect on the length of time a job board kept job postings on the job board (Table 3).

The next set of results pertains to a dependent variable that measures the duration of access to online postings (in number of months, indicator variable for indefinite access) at a site i during a typical month in year t . Given that only access to the resume banks was restricted, results are reported in one table (Table 5). We report separately results without control variables (columns 1 and 2) and with control variables (columns 3 and 4). Results with website fixed effects are reported in columns 5 and 6 in Table 5. When the dependent variable is binary, we estimate a linear probability model with website fixed effects. Standard errors are heteroskedasticity-robust and are clustered at the level of a website.

$$\text{duration of access to postings}_{it} = \beta_0 + \beta_1 \text{worker scarcity}_{it} + \beta_2 \text{job scarcity}_{it} + \beta X_{it} + u_{it} \quad (2)$$

We find that an increase in the job creation rate by 1 percentage point made it 4.2 percentage points more likely that a resume bank granted indefinite access to CVs. This result is found only once control variables were included and when we accounted for website fixed effects (see columns 2, 4, and 6 in Table 5). This relationship is consistent with the idea that CV banks responded to changes in rivalry effects. That is, when a larger number of employers is expected to compete for a review of resumes online (i.e., in instances of higher job creation rate), the gains of accessing the resume bank decrease. A resume bank reacts by lengthening the duration of access to ensure the employers' participation. Websites did not change the duration of access to CVs as unemployment rate changed. Unemployment rate also had no effect on the websites' decision to grant indefinite access to a resume bank.

<Insert Tables 3 through 5>

Price-setting and labor market conditions

The dependent variable measures the fee that an online site i charged for either posting or for access to a job opening or a resume during a typical month in year t . We use both the \$ amount per day of posting or a month of access and an indicator variable for whether or not a fee was charged.⁹ If websites reported a minimum and a maximum fee, we used data for the minimum fee.¹⁰ We report separately results with no control variables (columns 1 and 2 in Tables 6 through 8) and with control variables (columns 3 and 4 in Tables 6 through 8). Results with website fixed effects are reported in columns 5 and 6. When the dependent variable is binary, linear probability model with fixed effects is estimated. Standard errors are heteroskedasticity-robust and clustered at the level of a website.

$$\text{fee per day/month of posting/access}_{it} = \gamma_0 + \gamma_1 \text{worker scarcity}_{it} + \gamma_2 \text{job scarcity}_{it} + cX_{it} + u_{it} \quad (3)$$

The analysis of results reveals asymmetry in the treatment of employers and job searchers; i.e., only online job boards were more accommodating to employers when the number of job searchers was relatively low. Online job boards, on average, decreased the fee by \$0.7 for a day of job posting for every 1-percentage point decrease in unemployment rate (column 1 in Table 6). The average fee in our sample was 4\$ for a day of job posting. The magnitude of the estimate is larger when we account for website fixed effects (column 5 in Table 6); online job boards decreased their fee for job posting, on average, by \$1 per each day of posting for a one percentage point decrease in unemployment rate. In

⁹ The difference in the sample size between these two specifications is due to missing data on the duration of posting or duration of access which is needed to calculate the fee charged for a day of posting or a day of access. The paper's conclusions remain the same when we keep the size of the sample for the two specifications the same.

¹⁰ In our sample, 33% and 2.2% of the websites offered some type of discount for job posting and CV posting, respectively. 5% of the websites offered a discount on the price of access to a resume bank.

contrast, a change in the rate of job creation had no effect on the fee charged for a resume posting. Resume banks did not change the fee for access to a resume bank when unemployment rate changed.

We find some evidence that websites reacted to changes in rivalry; i.e., websites were more accommodating to one side of the market when the number of potential participants on the same side of the market was relatively high. Specifically, resume banks were 1.8 percentage points less likely to charge a CV posting fee when unemployment rate increased by 1 percentage point (column 4 in Table 7). In the sample, 3.7% of the websites charged a fee for a CV posting. However, they did not change the \$ amount that they charged for a day of resume posting (columns 1, 3, and 5 in Table 7). A similar finding extends to the effect of the job creation rate on the fee charged for a job posting; i.e., while the job boards were 1.7 percentage points less likely to charge a job posting fee (column 4 in Table 6), they did not change the \$ amount charged for a day of job posting when the job creation rate increased by 1 percentage point (columns 1, 3, and 5 in Table 6). In the sample, 84% of the websites charged a fee for a job posting. Also consistent with the presence of rivalry effects is the finding that a 1 percentage point increase in job creation rate decreased the likelihood that the resume banks charged a fee for access to CVs by 4.5% (column 4 in Table 8) but had no effect on the \$ amount charged for the access (column 3 in Table 8). In the sample, 65% of the websites charged a fee for access to a CV bank. With website fixed effects, labor market conditions no longer had an effect on the fees that the resume banks charged.

<Insert Tables 6 through 8>

Discussion with robustness checks¹¹

Table 1 reviews all predictions and corresponding evidence. Overall, the table reveals that our results are supportive of the view that online job boards and resume banks take into account network effects in their decision-making. Specifically, the results suggest that the number of potential participants on one side of the platform affects how accommodating the platform is to participants on both sides of the platform; in terms of the fee charged for a day of participation on the platform and restrictions regarding the duration of participation. Several additional observations are worth noting. These include an alternative assignment of measures of scarcity to websites, the use of alternative measures of scarcity, a complementary test of our explanation for the paper's main findings, a falsification test, alternative sets of controls and econometrics specifications, and an examination of the role that measurement error due to misreporting might play in explaining the main results.

¹¹ To preserve space, results that are reviewed in this section are not reported in the paper. These results are available from the author.

Alternative assignment: The baseline results were obtained by assigning to each site in year t measures of labor market conditions in that year for the market that the site specialized in; i.e., national-level data were assigned if the site serviced the entire US market whereas state-level data were assigned if the site serviced a local market. In an alternative assignment, we matched to each site in year t measures of labor market conditions in the state of the site's headquarters regardless of the market that the site served. If our explanation for the main findings is correct, then we expect that the estimates should be either smaller in size, in an absolute sense, or statistically insignificant for this new assignment compared to the baseline assignment. With regards to pricing, we find that the estimates are smaller in size with the exception of statistically insignificant estimates for access fee.

The estimates that pertain to the duration of postings are also smaller in size but remain consistent with the baseline estimates. Most fixed-effects estimates are statistically insignificant. In contrast to baseline results, we find that the websites shortened the duration of access to CVs by 0.16 month, on average, for every 1-percentage point decrease in unemployment rate. Average duration of access was 1.5 months. This effect might be accounted by the fact that a large fraction of websites in the sample kept resumes online indefinitely. That is, in the presence of cross-side network effects, employers are expected to be granted longer access to a resume bank when unemployment rate is low since the resume bank is expected to host fewer resumes in periods of low unemployment rate. However, if resumes are stored in the bank indefinitely, the sites offer employers access to passive job searchers and can shorten access to the bank in periods when job searchers are harder to find.

Alternative measures of scarcity of jobs and job searchers: In place of the US Census Bureau's data on job creation rate we used data on job opening rate from JOLTS. These data are only available from 2001 onwards and for only four geographic regions rather than 51 states. We used the Monster employment index that measures changes in the number of job postings at over 1,200 online job boards. This data series is available only since 2003. In place of unemployment rate, we considered using job destruction rate and job separation rate. Statistical significance of the estimates for these new measures is sensitive to our control for website-level fixed effects. Therefore, job creation rate and unemployment rate appear to be the most successful in explaining changes in price-setting and participation restrictions. A smaller sample size due to unavailable data and reliance on region- rather than state-level variation might be responsible for statistically insignificant estimates.

A complementary test: The nature of the effects suggests that websites set prices and restrict participation (i.e., duration of access and posting) in order to manage participation on their sites and ensure their survival. The number of postings that were submitted to a website by employers and job

searchers represents one measure of participation on the website. Therefore, if websites do not manage participation, then the number of CV (job) postings will be low in periods of low unemployment (job creation). In contrast, if online sites manage participation on their sites, then we expect that changes in conditions in the labor market do not affect the number of postings (i.e., participation) on these websites. Hence, in order to corroborate our explanation for the findings, we use as the dependent variables measures of participation; i.e., the number of job and CV postings in year t .¹²

We find that labor market conditions had little effect on the size of the job boards and resume banks. Whereas in periods of a relatively high unemployment rate the number of CV postings in resume banks increased, the relationship is not statistically significant. Similarly, in periods of a relatively high rate of job creation the number of job openings on the job boards did not increase and even decreased in one specification. On their own, these findings could simply suggest that online job boards and resume banks are not widely used by participants in the labor market. However, the available evidence on the employers' and job searchers' use of online job boards and resume banks in the US suggests otherwise (see Nakamura et al., 2009; Kroft and Pope, 2010; and surveys by the Pew Institute). In addition, in combination with the findings in the preceding sections, this empirical pattern is consistent with the view that online sites set prices and restricted supply of participants (i.e., the duration of postings and access) in order to manage participation on their sites and ensure their survival.

Falsification test: We restricted the sample to websites that served labor markets abroad but had their headquarters located in the US. To the extent that the labor market in the US represents only a small fraction of the global labor market, a change in the labor market conditions in the US should have a smaller or no effect on the number of potential participants on these websites and hence should not affect price-setting and participation restrictions set by websites that cater to labor markets abroad. Our analysis confirms that labor market conditions in the US tend not to have a statistically significant effect on the price-setting and participation restrictions for websites that are located in the US but serve labor markets abroad. Some estimates that are different from zero have a sign that is inconsistent with predictions from the theory of pricing by platforms in two-sided markets.

Econometrics specifications: In our baseline specification, we assumed that the length of time that employers and job searchers could participate on a platform follows a normal distribution. Given that participation restrictions tended to be clustered at several distinct numbers (e.g., one month, six months), we also considered an alternative specification that takes into account this discrete nature of the dependent variable. When we model duration of participation either as a poisson process or as a

¹² Data on the number of job postings are not available for surveys that were conducted in 2000 and 2001.

negative binomial process, we find evidence that is consistent with the OLS estimates. Similarly, in our examination of determinants of prices, we ignored the fact that prices take only non-negative values. In an alternative specification, we took into account this characteristic and estimated a left-censored tobit model. The new estimates remain consistent with the estimates from an OLS.

Additional controls: We considered several different sets of controls. The paper's findings are robust to the inclusion of alternating sets of additional controls. We added controls for the types of postings that are most prevalent on either a job board or a resume bank (occupation, industry) and allowed for region- and occupation- specific time trends in order to account for local and occupation-specific changes in labor markets over time. During our sample period, websites might have changed the number and type of services that they offered. These changes could be reflected in the prices that the websites charged. In order to account for such changes, we added controls for whether or not: job postings can be linked to employers' websites, users receive automatic notifications of a good match, discussion forums are offered, assessment tools are offered, status ads are offered, career information is available on a site, or links to other websites with career-related information are offered.

In order to account for changes in market concentration, we added controls that identify - for each year - websites in the bottom and top 5% based on the number of online traffic (visitors, page views) that they attracted. Alternatively, we used two controls for the share of visitors and page views that each website attracted in a year. In order to control for changes in propensity to search online, we added a control for the fraction of residents who were internet users in the state of the websites' headquarters if the website served a local market (source: Census Bureau). National data were assigned to websites that served national market.¹³ In order to control for changes in how internet users searched for jobs and resumes online over time, we added state-level data on the use of words "job," "cv," and "resume" when using search engine google if a website served a local market (source: Google Insight). National data were assigned if a website served national market.¹⁴ Alternatively, we added as controls the prevalence of the use of search words "facebook" and "linkedIN" for each year.

Our final set of controls includes measures of the costs of maintaining a website; i.e., available infrastructure (i.e., the number of high-speed internet providers, prevalence of business high-speed internet connections) in the state of the websites' headquarters,¹⁵ prevalence of reported online crimes

¹³ On account of limited data availability, Census data for 2010 were assigned to the 2009/2010 and 2011/2012 surveys, data for 2009 were assigned to the 2007/2008 survey, data for 2007 were assigned to the 2005/2006 survey, data from 2003 were assigned to the 2003 and 2004 surveys, and 2001 data to the 2000-2002 surveys.

¹⁴ Data were acquired from Google Insight.

¹⁵ Data were acquired from www.fcc.gov/wcb/stats and were matched to the state of the websites' headquarters.

and perpetrators of online crimes in the state of the websites' headquarters.¹⁶ We also assigned to each website a dummy variable that identifies - for each year - whether the state in which the websites' headquarters are located adopted the law that governs disposal of data that contain personally identifiable information (PII) once the data become obsolete. By the end of our sample period in 2011, 29 states had adopted the law. The second dummy variable identifies law that mandates that businesses notify individuals of any unauthorized access of their PII (Russom et al. 2011). By the end of 2011, 46 states and the District of Columbia had adopted the law.¹⁷ We stipulate that these laws increased the costs of maintaining a website and for this reason might affect the websites' price-setting.

Reporting error: In surveys conducted in 2000 and 2001, we observe whether or not the data were audited, either internally or externally. Websites with the audited data (72% of the websites) reported, on average, similar prices and restrictions regarding the duration of participation than websites whose data were not audited. However, while websites with external audits reported differently compared to other websites they did not systematically under- or over-report *all* prices that they charged or *all* restrictions that they imposed regarding the use of their platforms.¹⁸ For example, websites with external audits reported 38 days longer duration of CV postings but 1 month shorter duration of access to a CV bank compared to other websites. While websites with external audits were 10.9 percentage points more likely to report indefinite CV posting compared to other websites, they were 6.6 percentage points less likely to report indefinite duration of job postings. Nevertheless, for unbiased estimates we require that the reporting error does not change with labor market conditions.

Geographic focus: Websites might change the type of a market that they serve as conditions in the local and the national labor markets change. However, the percentage of websites with a national focus has not changed by much during the sample period. Further analysis of the data reveals that a website was more likely to serve national rather than local labor market when unemployment rate in the state of the website's headquarters was high. While no association was found between deviation in the state-level unemployment rate from the national-level and the likelihood that a website served national labor market rather than local labor market, websites in states that experienced job creation rate above the national average were 1.3 percentage points more likely to serve national rather than regional labor market. The magnitude of the estimate suggests a relatively small correlation. With website-level fixed effects, no link was found between the websites' focus and labor market conditions.

¹⁶ Data were obtained from the Internet Crime Complaint Center (<https://www.ic3.gov/default.aspx>).

¹⁷ Information was obtained from Russom et al. (2011) and the National Conference of State Legislatures.

¹⁸ In the sample, 24% of the websites conducted internal audits while 48% conducted external audits.

V. CONCLUSION

With the rapid adoption of the Internet by households and businesses in the US, websites that host job boards and resume banks have become prominent intermediaries in the labor market. An important feature of these websites is that their survival depends on how successful they are in attracting job searchers and employers to their sites. Namely, for a resume bank to be successful many job searchers must submit their resumes to the bank and many employers must review the resumes. Similarly, a successful job board must ensure that many employers post their job openings on their boards and that many job searchers review the job postings. For this reason, these online sites must take into account that their decisions affect both the employers and the job searchers.

We used a novel dataset to examine the websites' price-setting and participation restrictions, and the extent to which these decisions were affected by conditions in the labor market. Our analysis revealed: a) the presence of asymmetric pricing whereby employers subsidized job searchers and b) the existence of network effects or the fact that the number of potential participants on one side of the market had an effect on how accommodating the websites were to participants on the other side of the market; i.e., in terms of the fee charged for a day of participation and restrictions regarding the duration of participation. In lieu of existing evidence on decision-making by platforms in two-sided markets, we view the novelty of these results to be their focus on: a) online job boards and resume banks as new online platforms in the labor market, and b) decisions that regard prices and participation restrictions.

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TABLE 1
Summary of predictions and evidence

Choice	Labor market condition	Prediction	Evidence
Posting duration			
JOB	↑ unemployment rate	-	-
	↑ job creation rate	+	0
CV	↑ unemployment rate	+	+ or 0
	↑ job creation rate	-	- or 0
Posting fee			
JOB	↑ unemployment rate	+	+
	↑ job creation rate	-	- or 0
CV	↑ unemployment rate	-	- or 0
	↑ job creation rate	+	0
Access duration			
JOB	↑ unemployment rate	+	0
	↑ job creation rate	-	0
CV	↑ unemployment rate	-	- or 0
	↑ job creation rate	+	+ or 0
Access fee			
JOB	↑ unemployment rate	-	0
	↑ job creation rate	+	0
CV	↑ unemployment rate	+	+ or 0
	↑ job creation rate	-	- or 0

TABLE 2
Description of variables and summary statistics

Sample	Unbalanced panel of online sites that host job boards and resume banks (time period: 2000-2011)			
Variable name	Description	Size	Mean	SD
<i>Information about employment websites</i>				
Duration of CV posting	days CVs remain posted online	1,066	235.918	208.136
Indefinite CV posting	1 if duration of CV posting is indefinite	1,570	0.320	0.466
CV posting fee	fee charged (in \$) for 1 day of CV posting	441	0.005	0.028
CV posting fee charged	1 if CV posting fee charged and 0 otherwise	728	0.037	0.189
Duration of JOB posting	days JOB postings remain posted online	1,821	53.617	47.059
Indefinite JOB posting	1 if duration of JOB posting is indefinite	1,938	0.060	0.237
JOB posting fee	fee charged (in \$) for 1 day of JOB posting	1,719	4.103	13.018
JOB posting fee charged	1 if job posting fee charged and 0 otherwise	1,874	0.838	0.368
Duration of access to CV bank	months of access to CV bank	1,150	1.502	3.283
No restriction of access to CV bank	1 if no restrictions imposed on access to CV bank	1,343	0.466	0.499
CV access fee	fee charged (in \$) for 1 month of access to CV bank	502	943.410	11,360.09
CV access fee charged	1 if access to CV bank charged and 0 otherwise	1,309	0.648	0.478
Date activated	1 if website appeared online prior to 2000	2,064	0.724	0.447
Reputation	1 if website awarded User's Choice Award	1,486	0.055	0.228
General site	1 if website accepts all types of jobs	1,976	0.019	0.137
Number of most common job types	number of most prevalent types of jobs posted by recruiters	2,109	3.016	1.479
Number of most common CV types	number of most prevalent types of CVs posted by job searchers	2,109	2.198	1.580
<i>Information about labor market conditions</i>				
Unemployment rate	% of labor force that is unemployed	2,007	5.320	1.213
Job creation rate	# of all jobs created/average employment	2,007	16.104	1.389
Job destruction rate	# of all jobs destroyed/average employment	2,007	15.142	1.691
Job opening rate	# of job openings divided by (employment+job openings)	1,724	2.374	0.378
Job separation rate	# of total separations as a percent of total employment	1,724	3.782	0.279
Monster employment index	index based on # of job postings on over 1,500 online job boards	1,142	127.987	31.354

Source: Weddle's Guide to Employment Web Sites (information on employment websites; sample period: 2000-2011), US Census Bureau Business Dynamics Statistics (job destruction rate and job creation rate; sample period: 2000-2009), Bureau of Labor Statistics (unemployment rate, JOLTS job opening, and JOLTS separation rate; sample period: 2000(1)-2011), Monster.com (Monster employment index; sample period: 2003-2011).



FIGURE 1
 Posting duration, access duration, and labor market conditions by year
 (annual average for cross-section of websites)

TABLE 3
Duration of posting and labor market conditions: Online job boards

	Unbalanced panel of websites that host job boards and resume banks (2000-2011)					
	Without controls		With controls		Website fixed effects	
	duration of an online job ad (in days)	1 if job ad posted online indefinitely	duration of an online job ad (in days)	1 if job ad posted online indefinitely	duration of an online job ad (in days)	1 if job ad posted online indefinitely
	OLS (1)	Probit (2)	OLS (3)	Probit (4)	OLS (5)	OLS (6)
Job creation rate	-0.696 (0.737)	-0.006 (0.005)	-0.822 (0.692)	0.001 (0.007)	-2.878 (1.702)*	0.011 (0.007)
Unemployment rate	-2.838 (0.919)***	0.009 (0.007)	-3.352 (0.930)***	0.013 (0.007)*	-3.744 (1.555)**	0.014 (0.007)**
Mean dependent variable	53.617	0.060	53.542	0.062	54.286	0.055
Observations	1821	1938	1677	1789	1232	1329
(Pseudo) R ²	0.00	0.05	0.02	0.08	0.03	0.03

Notes: (i) Robust standard errors clustered at the website level in parentheses. (ii) * significant at 10%; ** significant at 5%; *** significant at 1%. (iii) Job creation rate: 100 times # of all jobs created/average employment (*source:* US Census Bureau Business Dynamics Statistics). (iv) Unemployment rate (*source:* BLS). (v) In (1) through (4), we included index variable for the year of the survey. Controls: year of establishment (dummy for prior to 2000), dummy for receipt of an award, dummy for general website, count variable for # of job types posted on a site, dummy for national websites.

TABLE 4
Duration of posting and labor market conditions: Online resume banks

	Unbalanced panel of websites that host job boards and resume banks (2000-2011)					
	Without controls		With controls		Website fixed effects	
	duration of an online CV (in days)	1 if CV posted online indefinitely	duration of an online CV (in days)	1 if CV posted online indefinitely	duration of an online CV (in days)	1 if CV posted online indefinitely
	OLS (1)	Probit (2)	OLS (3)	Probit (4)	OLS (5)	OLS (6)
Job creation rate	-5.772 (4.914)	-0.017 (0.013)	1.620 (4.490)	0.009 (0.015)	-11.329 (6.411)*	-0.013 (0.016)
Unemployment rate	3.124 (7.473)	0.009 (0.012)	11.894 (9.721)	0.038 (0.014)***	-0.795 (7.785)	0.017 (0.017)
Mean dependent variable	235.918	0.320	237.351	0.314	234.962	0.290
Observations	1066	1570	995	1457	663	1030
(Pseudo) R ²	0.09	0.02	0.11	0.05	0.08	0.05

Notes: (i) Robust standard errors clustered at the website level in parentheses. (ii) * significant at 10%; ** significant at 5%; *** significant at 1%. (iii) Job creation rate: 100 times # of all jobs created/average employment (*source*: US Census Bureau Business Dynamics Statistics). (iv) Unemployment rate (*source*: BLS). (v) In (1) through (4), we included index variable for the year of the survey. Controls: year of establishment (dummy for prior to 2000), dummy for receipt of an award, dummy for general website, count variable for # of CV types posted on a site, dummy for national websites.

TABLE 5
Duration of access and labor market conditions: Online resume banks

	Unbalanced panel of websites that host job boards and resume banks (2000-2011)					
	Without controls		With controls		Website fixed effects	
	1 if		1 if		1 if	
	duration of	duration of	duration of	duration of	duration of	duration of
	access to	access to	access to CV	access to	access to CV	access to
CV bank	CV bank	bank	CV bank	bank	CV bank	
(in months)	unrestricted	(in months)	unrestricted	(in months)	unrestricted	
OLS	Probit	OLS	Probit	OLS	OLS	
(1)	(2)	(3)	(4)	(5)	(6)	
Job creation rate	-0.053 (0.079)	0.017 (0.015)	-0.075 (0.058)	0.042 (0.019)**	0.035 (0.125)	0.047 (0.020)**
Unemployment rate	0.117 (0.122)	-0.028 (0.016)*	0.083 (0.108)	-0.008 (0.019)	0.271 (0.178)	0.018 (0.022)
Mean dependent variable	1.502	0.466	1.365	0.459	1.340	0.421
Observations	1150	1343	1050	1232	653	823
(Pseudo) R ²	0.00	0.07	0.01	0.09	0.02	0.06

Notes: (i) Robust standard errors clustered at the website level in parentheses. (ii) * significant at 10%; ** significant at 5%; *** significant at 1%. (iii) Job creation rate: 100 times # of all jobs created/average employment (*source*: US Census Bureau Business Dynamics Statistics). (iv) Unemployment rate (*source*: BLS). (v) In (1) through (4), we included index variable for the year of the survey. Controls: year of establishment (dummy for prior to 2000), dummy for receipt of an award, dummy for general website, count variable for # of CV types posted on a site, dummy for national websites.

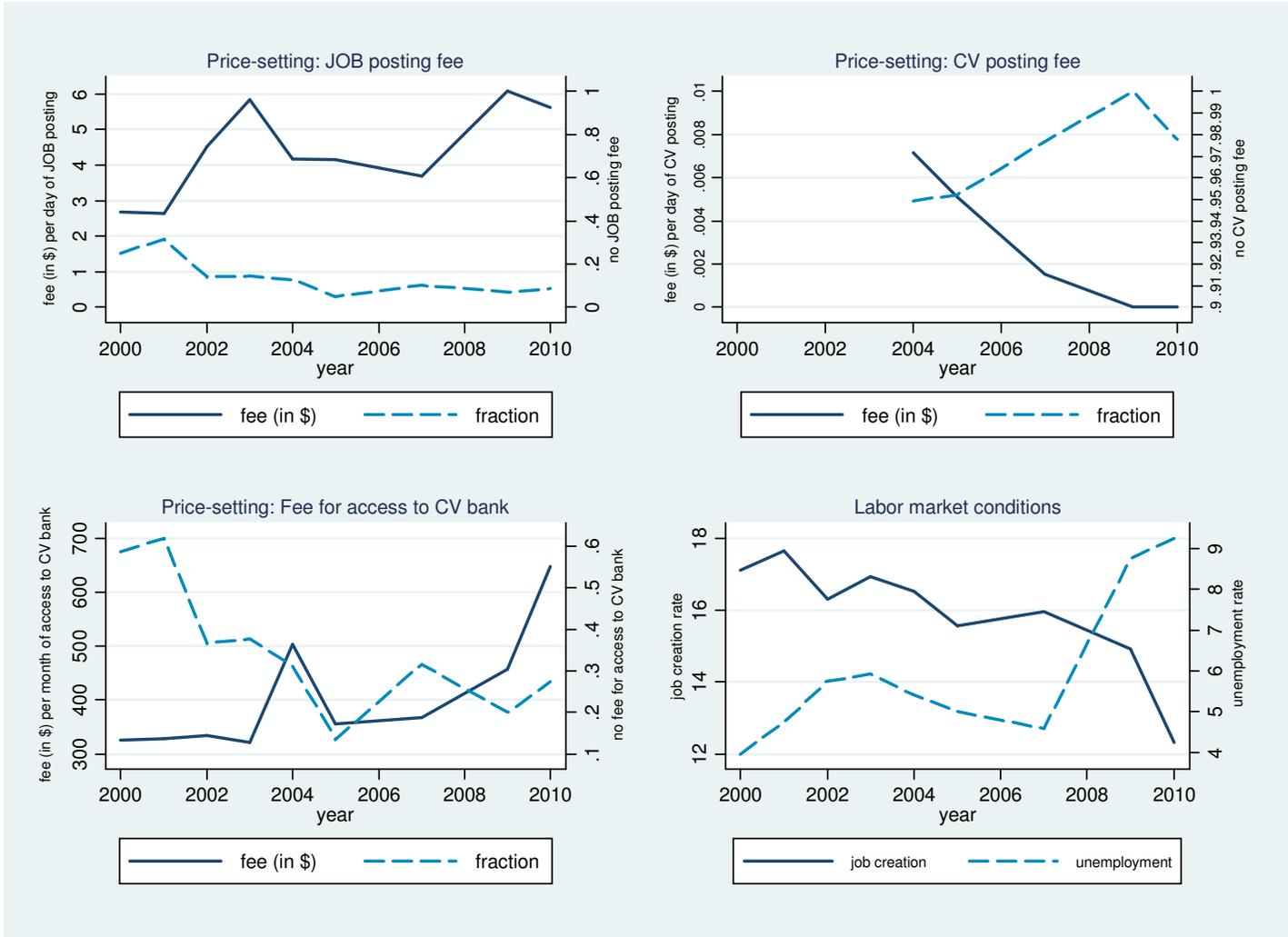


FIGURE 2
Price-setting and labor market conditions by year
 (annual average for cross-section of websites; 0s are included in the calculation of average fee)

TABLE 6
Posting fee and labor market conditions: Online job boards

	Unbalanced panel of websites that host job boards and resume banks (2000-2011)					
	Without controls		With controls		Website fixed effects	
	1 if	1 if	1 if	1 if	1 if	1 if
	job posting fee per day of posting	job posting fee charged	job posting fee per day of posting	job posting fee charged	job posting fee per day of posting	job posting fee charged
OLS	Probit	OLS	Probit	OLS	OLS	
(1)	(2)	(3)	(4)	(5)	(6)	
Job creation rate	0.316 (0.201)	0.001 (0.008)	0.099 (0.202)	-0.017 (0.010)*	0.579 (0.469)	0.005 (0.010)
Unemployment rate	0.669 (0.260)**	0.001 (0.010)	0.586 (0.246)**	-0.016 (0.011)	1.025 (0.648)*	0.000 (0.011)
Mean dependent variable	4.103	0.839	4.109	0.840	4.107	0.855
Observations	1719	1874	1597	1740	1166	1285
(Pseudo) R ²	0.00	0.04	0.01	0.05	0.01	0.04

Notes: (i) Robust standard errors clustered at the website level in parentheses. (ii) * significant at 10%; ** significant at 5%; *** significant at 1%. (iii) Job creation rate: 100 times # of all jobs created/average employment (*source*: US Census Bureau Business Dynamics Statistics). (iv) Unemployment rate (*source*: BLS). (v) In (1) through (4), we included index variable for the year of the survey. Controls: year of establishment (dummy for prior to 2000), dummy for receipt of an award, dummy for general website, count variable for # of job types posted on a site, dummy for national websites.

TABLE 7
Posting fee and labor market conditions: Online resume banks

	Unbalanced panel of websites that host job boards and resume banks (2000-2011)					
	Without controls		With controls		Website fixed effects	
	1 if		1 if		1 if	
	CV posting fee per day of posting	CV posting fee charged	CV posting fee per day of posting	CV posting fee charged	CV posting fee per day of posting	CV posting fee charged
	OLS	Probit	OLS	Probit	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
Job creation rate	-0.000 (0.002)	0.003 (0.004)	-0.000 (0.002)	0.002 (0.004)	0.001 (0.001)	0.009 (0.015)
Unemployment rate	-0.001 (0.002)	-0.017 (0.006)***	-0.001 (0.002)	-0.018 (0.006)***	0.000 (0.001)	-0.012 (0.014)
Mean dependent variable	0.005	0.037	0.005	0.038	0.003	0.043
Observations	441	728	422	652	251	438
(Pseudo) R ²	0.01	0.02	0.02	0.11	0.01	0.03

Notes: (i) Robust standard errors clustered at the website level in parentheses. (ii) * significant at 10%; ** significant at 5%; *** significant at 1%. (iii) Job creation rate: 100 times # of all jobs created/average employment (*source:* US Census Bureau Business Dynamics Statistics). (iv) Unemployment rate (*source:* BLS). (v) In (1) through (4), we included index variable for the year of the survey. Controls: year of establishment (dummy for prior to 2000), dummy for receipt of an award, dummy for general website, count variable for # of CV types posted on a site, dummy for national websites.

TABLE 8
Access fee and labor market conditions: Online resume banks

	Unbalanced panel of websites that host job boards and resume banks (2000-2011)					
	Without controls		With controls		Website fixed effects	
	CV access fee per month of access	1 if CV access fee charged	CV access fee per month of access	1 if CV access fee charged	CV access fee per month of access	1 if CV access fee charged
	OLS	Probit	OLS	Probit	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
Job creation rate	194.817 (284.269)	-0.006 (0.014)	-8.417 (76.709)	-0.045 (0.018)**	1,808.114 (1,686.916)	-0.023 (0.019)
Unemployment rate	401.301 (442.181)	0.029 (0.016)*	162.561 (163.626)	-0.007 (0.018)	985.956 (970.588)	0.003 (0.021)
Mean dependent variable	943.410	0.648	977.215	0.649	1429.600	0.671
Observations	502	1309	467	1202	231	791
(Pseudo) R ²	0.00	0.06	0.00	0.08	0.05	0.07

Notes: (i) Robust standard errors clustered at the website level in parentheses. (ii) * significant at 10%; ** significant at 5%; *** significant at 1%. (iii) Job creation rate: 100 times # of all jobs created/average employment (*source*: US Census Bureau Business Dynamics Statistics). (iv) Unemployment rate (*source*: BLS). (v) In (1) through (4), we included index variable for the year of the survey. Controls: year of establishment (dummy for prior to 2000), dummy for receipt of an award, dummy for general website, count variable for # of CV types posted on a site, and dummy for national websites.