Recruiting Intensity over the Business Cycle

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Abstract

We investigate how recruiting behavior changes with labor market tightness, using data from a national survey of employers who hire recent college graduates. We find that employers are more likely to increase recruiting intensity when they believe the labor market will be tight, even if their firm is not increasing hires. Employers are more likely to reduce recruiting intensity when they believe the labor market will be slack, even if their firm intends to increase hires. We also see these patterns in recruiting intensity, and intensity per vacancy, when looking at changes by year rather than subjective beliefs. We find the primary margins of adjustment are the number of on-campus career fairs, the choice of where to post jobs, internet advertising, starting salary increases, and the use of signing bonuses. We see suggestive evidence that employers adjust the length of time between interviews and making an offer. We find that vacancy yields are relatively stable in the 2011-2016 period, suggesting that employers effectively adjust recruiting measures to keep the flow of hires close to the number of vacancies. The fact that employers appear to adjust recruiting intensity in response to labor market tightness could partly explain the sluggish recovery of hiring in the aftermath of the Great Recession.

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1 Introduction

In the aftermath of the Great Recession, the core relationship between vacancies, unemployment, and hires appeared to break down (Elsby, Michaels, & Ratner, 2015). Despite many job seekers per vacancy, the hiring rate did not increase as much as standard theory would predict, suggesting a disruption in the process of matching job seekers to open positions. Using establishment-level hiring and vacancy data, Davis, Faberman, and Haltiwanger (2013) find indirect evidence that firms reduced recruiting intensity during and after the Great Recession, and show this behavior can partially explain the slow recovery in the aftermath of the recession.

Using novel survey data of employers who recruited new college graduates from 2006 to 2016,[1] we provide direct evidence that employers reduced their overall and per vacancy recruiting intensity during and after the Great Recession, and increased intensity along some dimensions during the recovery. In particular, we see that firms adjust the number of career fairs they attend, where they post vacancies, internet advertising, and the use of signing bonuses and starting salary increases. We also see suggestive evidence that firms adjust the length of time between interviews and offers.

A key advantage of these data is that employers are asked their subjective beliefs about labor market tightness. We find that employers are more likely to reduce recruiting intensity when they believe the labor market in their industry will be slack (e.g. many applicants per vacant position), even if they plan on increasing hires. Employers are more likely to increase recruiting intensity when they believe the labor market will be tight, even if they do not plan on increasing hires. This indicates employers adjust not only overall recruiting, but recruiting per vacancy.

For a limited subset of the data, we can directly measure the number of hires, vacancies, and unfilled vacancies. We find that over 60% of firms hire exactly as many positions as they report vacancies, and the number of hires per vacancy is quite stable from 2011 to

[1] National Association of Colleges and Employers Recruiting Benchmarks and Job Outlook Surveys

2016. Thus, despite the fact that the labor market was tightening during this time period, employers appeared to be able to maintain their vacancy yield. Although this suggests employers were able to effectively manage vacancy yields using recruiting intensity, we are unable to directly confirm this conjecture due to data limitations.

Although the labor market for new college graduates is a specific and unique market, our results provide direct evidence of the hypotheses that employers reduced recruiting intensity during the Great Recession.

2 Matching Functions and Vacancy Yields

In the workhorse search and matching models based on the Diamond-Mortensen-Pissarides framework, the hiring process takes the following steps. First, a firm chooses to open a vacancy. Second, vacancies are matched with job seekers via a matching function, which depends on labor market tightness, that is, the number of vacancies per job seeker in the relevant market. Third, matched vacancies and job seekers agree to a wage either via bargaining or some other mechanism, and the new match proceeds to produce until it dissolves.

Matching functions are typically assumed to be constant returns to scale, and a decreasing function of labor market tightness. Accordingly, during recessions, the drop in the number of vacancies and increase in the number of job seekers means that firms can fill vacancies more quickly than during economic expansions. This reduces the cost of posting a vacancy, because the expected duration of an unfilled vacancy falls. Thus, most standard search and matching models predict the labor market should quickly return to equilibrium after recessions. The fact that standard models are unable to match cyclical patterns in unemployment and vacancies has presented a challenge to the DMP framework (Shimer (2005), Elsby et al. (2015)).

Several refinements of the standard model have been proposed to explain the slow-down

in hiring after recessions. One strand of the literature has focused on rigidities, such as sticky wages, which prevent firms from lowering wages enough to clear the market (see for instance Pissarides (2009)). Other papers have investigated structural explanations, including geographic and sectoral mismatch (Rothstein (2012), Sahin, Song, Topa, and Violante (2014)).

A third channel proposed by Davis et al. (2013) is that firms may alter their recruiting intensity in response to labor market tightness. In this context, instead of passively waiting for the matching function to match workers to a vacancy, firms may actively manage their matching probability. These actions may include advertising, search intensity per vacancy, faster screening, lower standards, and better wages or working conditions (Davis et al., 2013). When the labor market is slack and there are many applicants per position, firms may be able to reduce their investments in recruiting intensity. However, as the labor market tightens, firms are likely to increase their recruiting intensity. Recent theoretical contributions by Wolthoff (2017) and Gavazza, Mongey, and Violante (2018) show how this dynamic plays out in directed and random search frameworks, respectively.

By directly measuring the actions that firms undertake to recruit, we are able to shed light on how employers modify their recruiting process both over the Great Recession and recovery, as well as in response to their stated beliefs about labor market tightness. We present some of the first evidence in this area. Recent studies have shown that employers adjust skill requirements over the business cycle, which is one particular dimension of recruiting intensity (Sasser Modestino, Shoag, and Ballance (2016b), Sasser Modestino, Shoag, and Ballance (2016a), Hershbein and Kahn (2018)). Older work by Malm (1954) included interviews of employers in the San Francisco area about their recruiting efforts. Approximately half of the employers responded that there was a change in where or how they recruited when there were changes in the tightness of the labor market.

3 Recruiting Recent College Graduates

While our paper concentrates on the labor market for recent college graduates, this focus has several advantages. First, it is an important labor market. In 2008, among the firms in our sample for multiple years, approximately 43% of full-time entry-level professional hires were new college graduates.[2] While this is a selected sample of firms who respond to a survey from the National Association of Colleges and Employers, it is also a sample of very large firms in the economy.

Second, this is often a fairly structured labor market, with recruiting activity concentrated in the fall and spring of each year as students prepare to graduate. This implies there is a natural period over which to measure vacancies and hires, and also a natural period over which to measure recruiting intensity.

Third, recruitment often involves reaching applicants on their college campuses, presenting a number of natural dimensions over which to measure recruiting intensity. Colleges often play an important role in facilitating the market, including through sponsoring career fairs, providing technological platforms for job postings and applications, providing space for information sessions and on-campus interviews, and helping employers to reach students with potential interests in the firm, including through advertising opportunities.

Further reflecting the importance of this market, many firms have university relations and recruiting departments. Of the nearly 300 survey respondents in 2008, 60% had a department whose main responsibility was university relations and recruiting. Of the firms in our sample for multiple years, and which had a college relations and recruiting department in 2008, the average department had six full-time employees.

Despite the importance of this market, it remains a largely unexplored area of research. Weinstein (2018a) and Weinstein (2018b) study the firm's choice of which campuses to target

[2]In each year except 2008, firms report the percent of full-time entry-level professional hires who were new college graduates. In 2008, firms report the percent of full-time entry-level hires who were new college graduates, but it appears firms interpreted the question the same in 2008 and in later years since there is little within-firm change in the response.

for recruiting using data from up to 70 prestigious finance and consulting firms. Oyer and Schaefer (2016) study the relationship between law schools and law firms. Rivera (2011) and Rivera (2012) study screening and hiring at professional services firms recruiting on campus, using interviews and observation of a hiring committee. Kuhnen and Oyer (2016) and Kuhnen (2011) study the labor market for MBA students.

4 Data and Methodology

The National Association of Colleges and Employers (NACE) focuses on the development and employment of college-educated individuals. Its members include over 8000 college career services professionals from over 2000 colleges and universities in the United States, and over 3000 university relations and recruiting professionals from over 900 employers. To provide information to its members and other interested groups, NACE conducts multiple surveys of its members each year. We use data from the Recruiting Benchmarks (2008-2016) and Job Outlook (2006-2016) surveys to study recruiting intensity.

The Recruiting Benchmarks survey is administered each year between May and July to members who are university relations and recruiting professionals at their employer. The survey focuses on the firm's recruiting activity over the past academic year. The Job Outlook survey is administered each year between August and September, and recruiting professionals describe hiring plans for the coming academic year, as well as hiring outcomes in the past academic year. We generally refer to the surveys by survey year, and so 2008 for the Recruiting Benchmarks survey refers to recruiting practices over the past academic year (2007-2008). For the Job Outlook survey, depending on the variable 2008 may refer to the previous year or the coming year. We restrict our sample to respondents with non-missing firm names so we can use firm-level fixed effects. There are between 169 and 276 respondents per year to the Job Outlook survey (Appendix Table A.1), with 1,153 unique employers represented (Appendix Table A.2). Of these, a little less than half have responded to the survey

at least twice. There are between 148 and 299 respondents per year with nonmissing name in the Recruiting Benchmarks survey, representing 1,015 employers.

Table 1 shows characteristics for the firms in each of the two samples. We present summary statistics for firms reporting in at least two surveys because the firm fixed effects empirical strategy will rely on these firms. The first column reports data from the Benchmarks survey, with one observation for each firm with nonzero career fairs reported in at least two surveys, while the second column reports data for the Outlook survey. For both surveys, we see that the largest sectors are manufacturing and services. Firms in the sample are large, with 80 to 90% of firms having more than 500 employees. The largest proportion of firms are located in the Midwest and South.

4.1 NACE Recruiting Benchmark Survey

The NACE Recruiting Benchmarks surveys contain multiple measures of recruiting intensity on college campuses. We break these into three groups: pre-interview recruiting, interviewing, and post-interview recruiting. Our measures of pre-interview recruiting reflect company choices that affect how intensely they reach potential applicants, including through career fairs, location of job postings, and advertising. Most of these measures capture recruiting activity on the extensive margin, and whether companies have adopted particular recruiting methods or strategies. Given that the vast majority of these firms report nonzero hires in any given year, abandoning particular methods can be interpreted as a decline in recruiting per vacancy.

While for many of these pre-interview measures we observe the extensive margin, for career fairs we also observe the intensive margin. Companies provide the number of career fairs they attended in the last school year, in each survey from 2007-2008 to 2015-2016. Unfortunately, this question was not asked in a consistent way in 2009-2010, and so we drop that year from the analysis. Career fairs help to encourage applications, conduct initial/preliminary screening, and build brand recognition. However, they may require substantial travel and

Table 1: Firm Characteristics

	Benchmark Survey	Outlook Survey
% by Industry:		
Agriculture	1%	1%
Natural Resources	4%	4%
Construction	4%	5%
Manufacturing	38%	33%
Transportation/Utilities	7%	6%
Wholesale Trade	6%	11%
Retail	0%	0%
FIRE	11%	11%
Services	30%	29%
% by Company Size:		
Under 500	10%	19%
501 to 1000	8%	10%
1001 to 2500	12%	13%
2501 to 5000	15%	14%
5001 to 10,000	14%	14%
Over 10,000		30%
10,001 to 20,000	15%	
Over 20,000	25%	
% by Census Region:		
Northeast	19%	21%
Midwest	32%	30%
South	34%	35%
West	15%	15%
Firms with at least 2 Years of Data	343	545

One observation per firm in the survey. Firm size in the Outlook survey is measured using size at the time the employer first responds to the survey.

employee time, and so they may be an important dimension along which firms adjust intensity.

Companies are also asked whether they use various recruiting methods in their college recruiting process. This is asked consistently from 2008 to 2015. The format of the question changes in 2016, and so we drop this year from the analysis. We obtain additional measures of pre-interview recruiting intensity from these questions, in particular whether the firm uses internet job postings on campus web sites, internet job postings on commercial career web sites, internet job postings on the firm's site, internet advertising, company blogs, and an applicant tracking system. Applicant tracking systems can be used both to screen and engage applicants.

Our final measure of pre-interview recruiting is the number of staff in the firm's college relations and recruiting department. From 2008 to 2013, the survey asks whether the firm has a college relations and recruiting department. Firms with these departments are then directed to report the department's full-time employees in various categories (directors, managers, recruiters, coordinators, and other). We use the total full-time staff reported across these categories, for firms with college relations and recruiting departments.

In 2014 and 2015, it was less obvious from the survey whether firms should report total HR staff or only those staff engaged in campus recruiting. We omit these years from the analysis. In 2016, firms are no longer asked if they have a college relations department, but they are asked to report the number of university relations and recruiting full-time staff in the same categories as earlier (except the other category).

We have several measures of company choices that affect interaction with applicants during the interview. In particular, companies report whether they typically participate in formal on-campus interviews, and whether they use video interviewing in the college recruiting process. Unlike our measures of pre-interview recruiting, these less clearly map into measures of intensity. Participating in on-campus interviews is likely more costly, and also may yield stronger relationships with applicants that could translate into higher offer

acceptance rates. However, video interviews may allow the firm to interview many more applicants, reducing the likelihood that a vacancy goes unfilled.

We have several measures that describe the post-interview period. Our first two are company choices that may affect the vacancy yield. In every year from 2008 to 2015, firms are asked in a consistent way for the average number of days between interviewing a college graduate and making an offer or notifying them they will not be considered for the position. Delaying on making an offer after an interview may reduce the vacancy yield by increasing the probability the applicant accepts another firm's offer. On the contrary, these delays may not affect yield if they occur when applicants have fewer alternatives. In either case, the delay reflects a change in recruiting effort during a recession.

Firms are also asked for the average number of days they give an inexperienced college graduate to accept an offer once it is made. The mapping of this measure into recruiting intensity is somewhat ambiguous. Putting more pressure on applicants to accept an offer could reflect greater intensity in recruiting and greater costs of unfilled vacancies. However, increased pressure on applicants may also reflect lower applicant bargaining power, making applicants willing to accept more quickly. Firms may exploit their greater bargaining power and require quicker decisions to reduce their recruiting effort, by reducing the number of offers needed to fill a vacancy.

For both of these measures of timing, we omit responses that are 365 days or more, which results in omitting only one observation for time from interview to offer, and no omissions for the acceptance deadline.

Our last measures of the post-interview period are better described as outcomes of the process. These are likely influenced both by firm inputs into the recruiting process as well as general labor market tightness. Unlike our pre-interview recruiting measures, they should not be seen solely as measures of recruiting intensity.

In each year from 2008 to 2016, firms provide the average percent of new inexperienced college graduates interviewed who receive job offers, and the average percent of offers to this

group that are accepted. These will both be affected by general labor market tightness. When applicants have fewer job opportunities, the offer acceptance rate should rise, reducing the need to extend further offers to other interviewees. However, the proportion of interviewees receiving offers will also be affected by how many people the firm chooses to interview for a given vacancy, a measure of recruiting intensity. Similarly, while the offer acceptance rate should increase in weaker labor markets, this might be muted if the firm is recruiting less intensely for a given vacancy.

Finally, firms provide the number of hires in the last year. There are two responses over 30,000 which we set to missing. However, neither of these is from a firm with more than one observation in the sample, so this will not affect fixed effects estimation results.

When firms respond to the survey, the firm's name is identified, and the respondent denotes whether they are replying for the entire firm or for a division of the firm. It would be problematic if in some years responses are for the entire organization, and in others just for the division. We identify firms using both the name and whether they are replying for the entire organization or a division. As a result, we may have two identifiers for company A in the dataset, one for when this company responds for the organization and one for the division. In most cases, companies always respond for the same unit.

Table 2 shows the mean for our recruiting measures in 2008 (the base year of our regressions), for firms with nonmissing values for the given measure in at least two of the survey years.

4.2 NACE Job Outlook Survey

We use data from the NACE Job Outlook Survey from 2006 through 2016. Each year, respondents are asked about their plans to recruit new college graduates in the upcoming year, as well as a limited set of questions about the previous year's recruiting.

Table 2: Summary Statistics: Recruiting Benchmarks Survey, 2008

# Career Fairs Attended Last Year	42.56
	[51.69]
Do you use these methods in your recruiting?	
Post Jobs on Campus Website	0.99
	[.09]
Post on Commercial Site	0.66
	[.48]
Post on Own Site	0.91
	[.29]
Internet Advertising	0.54
	[.5]
Blogs	0.06
	[.23]
Applicant Tracking System	0.83
	[.38]
On-Campus Interviews	0.87
	[.34]
Video Interviews	0.02
	[.15]
# College Relations and Recruiting Staff	6.04
	[8.84]
Days Between Interview and Offer	18.76
	[14.01]
Days Between Offer and Deadline	17.54
	[13.07]
% Interviewees Receiving Offers	0.39
	[.24]
% Offers Accepted	0.67
	[.16]

Notes: This table shows means and standard deviations of recruiting measures in 2008, for firms in the regression sample in at least two survey years when the given variable is the dependent variable. See text for details on variable construction and sample.

4.2.1 Recruiting Intensity Measures

The Outlook Survey asks respondents several questions that can be used to measure how intensely they plan to recruit in the coming season. Through the whole sample period, the NACE survey asks respondents if the firm plans on offering a hiring bonus to new college graduates in the coming recruiting season, and if so, what the size of that bonus would be. In addition, respondents are asked by what percent they plan on increasing starting salaries for new bachelor's degree recipients. Unfortunately, this question is posed as an increase, so we may be missing observations for employers that plan to decrease the nominal starting salary. Thus this should be interpreted as an upperbound. These variables are summarized in Table 3.

Beginning in 2011, the NACE survey also began asking respondents more specific questions about how they intend to modify their recruiting behavior in the coming year. In particular, they are asked if they plan to increase or decrease the number of career fairs, if they plan to increase or decrease the amount of travel, if they plan on changing their brand, if they plan on using more technology, and if they plan on using more social networks.

Finally, the survey also asks a few questions about the previous year: did they offer a hiring bonus? Do they screen on GPA, and if so, what is the GPA cutoff? These variables are summarized in Table 3.

4.2.2 Beliefs About the Labor Market

In order to measure how employers assess labor market tightness, we use a direct measure of beliefs. In particular, from years 2006 to 2016, employers were asked to rate the quality of the labor market in the next year for new graduates in their industry on a five category scale (poor, fair, good, very good, and excellent). In Figure 1, we regress an indicator for whether the employer rated the labor market as good or better on firm fixed effects and year fixed effects, with standard errors clustered at the firm level. Here we see that, compared to 2006, the share of employers who rate the job outlook as good or better fell by about 60

Table 3: Summary Statistics, Outlook Survey

	Obs	Mean	Std. Dev.	Min	Max	Base Year
Plans for Next Year:						
Hiring Bonus Next Year?	196	0.46	0.5	0	1	2006
Bonus (2016 dollars)	63	3788.21	2128.35	1187.35	11873.49	2006
% Salary Increase (Nominal)	198	3.62	3.33	0	25	2006
% Salary Increase (Real)	198	1.12	3.33	-2.5	22.5	2006
Fewer Career Fairs	244	0.2	0.4	0	1	2011
More Career Fairs	244	0.3	0.46	0	1	2011
Less Travel	244	0.13	0.34	0	1	2011
More Travel	244	0.16	0.37	0	1	2011
Change Brand	244	0.3	0.46	0	1	2011
More Technology	244	0.42	0.49	0	1	2011
More Social Networks	244	0.41	0.49	0	1	2011
Good Labor Market for Grads. Next Year	265	0.9	0.3	0	1	2006
Plan to Increase Hiring	195	0.51	0.5	0	1	2011
Plan to Decrease Hiring	195	0.12	0.32	0	1	2011
Recruiting Last Year:						
Hiring Bonus Last Year?	196	0.47	0.5	0	1	2006
Screen on GPA	198	0.66	0.47	0	1	2006
GPA Cutoff if Screen	128	2.92	0.23	2	3.5	2006
Hires Last Year	138	155.25	475.89	1	4600	2011
Vacancies Last Year	138	154.06	457.64	1	4600	2011
Unfilled Vacancies Last Year	138	8.07	29.68	0	250	2011
Hires per Vacancy	138	0.98	0.25	0.33	2.29	2011

Summary statistics for the baseline comparison year, either 2006 or 2011 depending on when the variable was added to the survey.

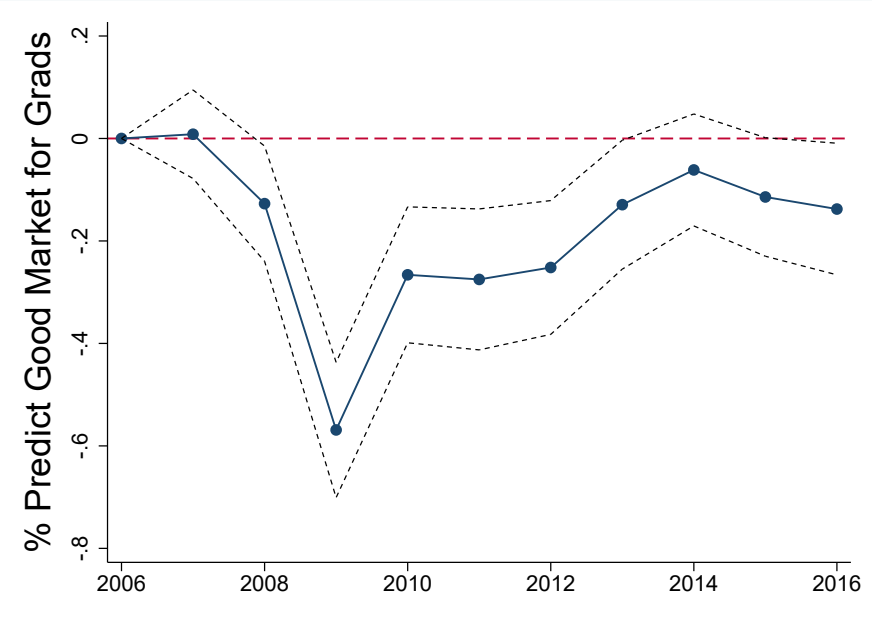

Figure 1: Coefficients from regression with firm and year fixed effects, where the dependent variable is an indicator for whether the employer believes next year's labor market for new college graduates will be good in its industry. Dotted lines represent 95% confidence intervals, using standard errors clustered at the firm level.

percentage points in 2009 relative to 2006 and 2007, and then gradually recovered. However in 2016 this continued to remain below the assessment in 2006.

We interpret this as evidence that employers' beliefs about the quality of the labor market for new college graduates is responsive to broader labor market trends, but allows for finer gradations in beliefs about labor market conditions than we can glean from year fixed effects alone.

4.2.3 Hiring Measures

Beginning in 2011, NACE began asking respondents how many individuals they intended to hire in the previous year (e.g. vacancies), how many individuals they successfully hired (e.g. hires), and how many unfilled positions they had at the end of the recruiting season. These three variables are summarized in Table 3. These variables allow us to directly measure the vacancy yield per firm, by dividing the number of hires by the number of vacancies. This

is directly analogous to the measure in Davis et al. (2013). In the Appendix, we discuss in detail how we clean these variables.

In addition, NACE also added questions about whether the employer planned to maintain hiring levels from the previous year, decrease hiring in the next year, or increase hiring in the next year. This is especially helpful for analyzing how recruiting choices vary with hiring plans at the beginning of the hiring season. In Figure 2, we plot the share of employers that report plans to increase (top) or decrease (bottom) in the coming year, after partialing out employer fixed effects. Here we see that plans to increase hiring rose through 2013 after which they began to steadily fall, while plans to decrease hiring remained close to 2011 levels through 2015, after which we find a sharp spike in 2016.

4.3 Empirical Strategy

For most specifications, we identify within-firm changes in recruiting methods over time. Specifically, we estimate:

$$RecruitingMethod_{ft} = \alpha + \gamma_t + \delta_f + \epsilon_{ft} \tag{1}$$

in which f denotes the firm, t denotes the year, and standard errors are clustered at the firm level. The omitted variable is the first year of data, which varies depending on the sample.

For specifications based on beliefs about labor market tightness, we instead include a time-varying measure of the respondent's beliefs about labor market tightness in the coming year, as follows:

$$RecruitingMethod_{ft} = \alpha + \beta_1 Beliefs_{ft} + \delta_f + \epsilon_{ft} \tag{2}$$

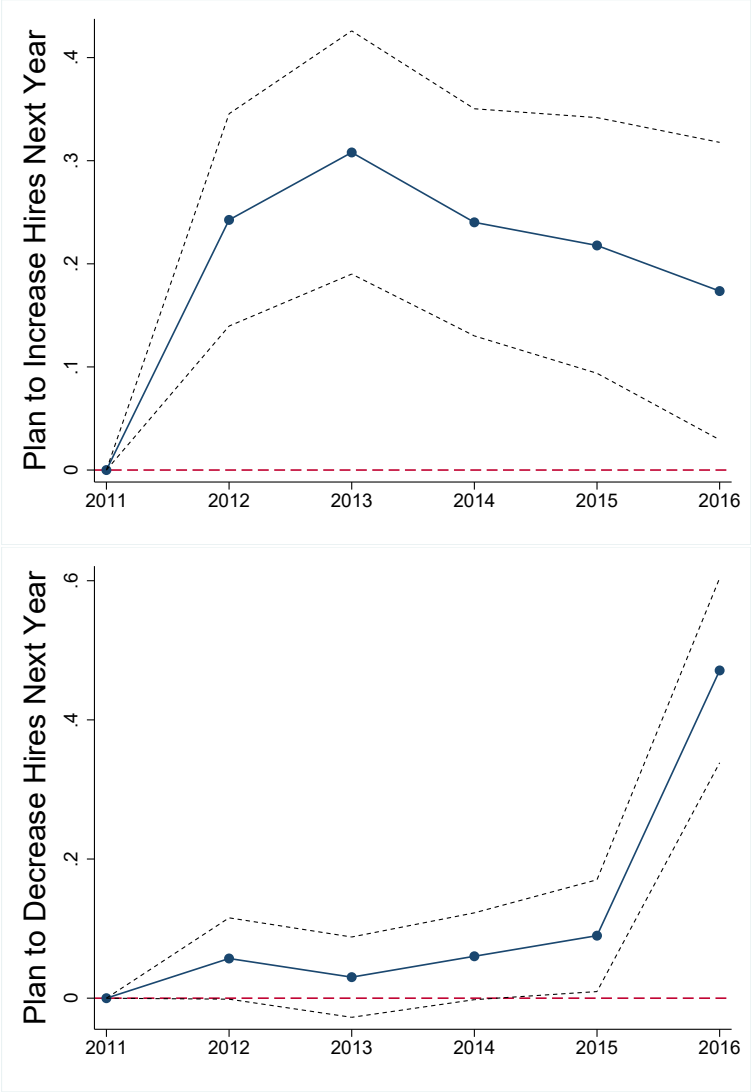

Figure 2: Coefficients from regression in which the hiring plans are regressed on firm and year fixed effects. Dotted lines represent 95% confidence intervals, using standard errors clustered at the firm level.

5 Results

We begin by investigating how recruiting intensity measures vary within-employers during and after the Great Recession. We then turn to beliefs about labor market tightness. Finally, we evaluate the firm-level vacancy yield.

5.1 Recruiting Intensity over Time

We separate the recruiting measures based on the timing in the recruiting process, first focusing on pre-interview recruiting measures, such as attendance at career fairs. Next, we focus on the measures that capture how the employer conducts interviews. We then turn to post-interview recruiting measures such as the delay between interviews and offers. Finally, we investigate two financial tools employers use: the use of signing bonuses and the magnitude of starting salary increases for new hires.

5.1.1 Pre-Interview Recruiting

Firms reduced the number of career fairs they attended during the Great Recession, and increased attendance as the economy recovered. On average, firms attend 40% fewer career fairs in 2011 relative to 2008, which is statistically significant at the 1% level (Table 4, Figure 3). After 2011, firms steadily increased career fair attendance until returning to 2007-2008 levels in 2016.

We see suggestive evidence that firms changed where they posted jobs in the recession and then again as the economy recovered. Firms are 6.5 percentage points less likely to post their jobs on campus web sites in 2010, relative to 2008 (statistically significant at the 10% level). This increases after 2010, and is no longer statistically different from 2008 (except in 2013), although it remains negative in magnitude. Posting jobs on commercial websites falls dramatically in 2009, and by 2011 firms are 18 percentage points less likely to post jobs on commercial sites (statistically significant at the 5% level). This increases after 2011,

although the magnitude is still sharply lower (but not significantly different from 2008).

The reduction in posting on campus and commercial sites does not simply reflect a lower likelihood of posting anywhere. The likelihood of posting jobs on their own corporate website does not change in the recession. This suggests firms advertised vacancies less intensely during the recession.

Firms report they are 18 percentage points less likely to use internet advertising in 2010 (statistically significant at the 5% level). This increases after 2010, but remains below the 2008 level (though not statistically significantly). While the results are not precise, the recovery of career fairs but not of internet advertising is noteworthy. One possibility is that career fairs are more effective recruiting tools than online advertising, and so companies are quicker to increase the former than the latter when vacancies increase.

Fortunately, the Recruiting Benchmarks surveys ask companies about the effectiveness of various methods in developing their image and brand on campus. In 2013, among companies using both career fairs and online advertising to develop their brand on campus, career fairs were rated more effective on average (3.8 versus 3.2 out of 5). The difference is similar among companies using both methods in 2008.

Adoption of new recruiting methods and technologies increases as the economy recovers. The use of company blogs increases in magnitude starting in 2011, and the use of applicant tracking systems increases in magnitude starting in 2012. Early applicant tracking systems were developed in the late 1990s, and so it is not the case that the technology only arrived after the Great Recession (Gold, 2013). Table 2 shows that indeed in 2007-2008, 87% of respondents in the sample were using applicant tracking systems. While we do not have a long pre-recession period in our data, this suggests adoption of applicant tracking systems was increasing leading up to the recession and then stalled until firms were recruiting more intensely for their vacancies.

The magnitudes suggest a temporary reduction in college relations and recruiting staff in 2009, that quickly adjusts. However, the sample size is much smaller here due to non-

response, and so the results are very imprecisely estimated.

In sum, we see suggestive evidence that firms reduce their use of a number of pre-interview recruiting methods during the Great Recession. In the recovery through 2015, we see they positively adjust the methods they say are more effective.

5.1.2 Interviewing

Interestingly, participation in formal on-campus interviews falls during the recession, but does not regain prerecession levels during the recovery (Table 5, Figure 4). By 2011, firms are nearly 7 percentage points less likely to participate in formal on-campus interviews, although this is not statistically significant from zero. By 2016, firms are nearly 10 percentage points less likely to participate in formal on-campus interviews.

Coincident with the decline in on-campus interviews, we see a dramatic rise in the use of video interviewing during the recession, that does not fall after the recession. In 2010, firms are 11 percentage points more likely to use video interviewing than in 2008 ($p \leq .1$), and in 2011 they are 24 percentage points more likely to use video interviewing than in 2008 ($p \leq .01$). By 2015, firms are still 29 percentage points more likely to use video interviewing than in 2008.

While video interviewing requires the firm to invest in new technology, traveling to campuses for formal on-campus recruiting may be more costly due to travel and time costs. This suggests firms move to lower-cost recruiting methods during the recession. However, without a longer pre-trend it is hard to know whether this trend towards video interviewing and away from on-campus interviewing was occurring before the recession, or whether the recession is responsible for this shift. The low proportion of firms using video interviewing in 2007-2008 (2%), suggests this shift was amplified during the recession.

As noted above, while on-campus interviewing may be more costly it is not clear that it is more effective at increasing the vacancy yield. Unfortunately, firms are not asked to rate the effectiveness of on-campus interviewing. However, firms do rate video interviewing, and

they rate it as more effective over time. While the sample of firms using video interviewing is small in 2008, the mean rating was 2.5 out of 5. By 2010, the mean rating was 3.3, and by 2015 it was 3.7. It is hard to know whether firms switched to video interviewing because it had become more effective, or whether video interviewing became more effective because there was greater demand for lower cost recruiting methods in the recession.

5.1.3 Post-Interview Recruiting

While the results are quite imprecise, the magnitude of the coefficients suggest an increase during the recession in the number of days between interviewing an applicant and making an offer, or informing them they will not be considered (Table 5, Figure 5). By 2010, this is 17% higher. By 2015, the magnitude suggests this cycle time had returned to pre-recession levels. While not conclusive, the pattern suggests firms work less quickly to fill vacancies in weaker labor markets.

There is also suggestive evidence that firms impose shorter deadlines on offers in weaker labor markets. By 2011, applicants have 17% fewer days to consider an offer than in 2008, statistically significant at the 10% level. By 2015, this has nearly converged in magnitude to 2008 levels. Putting more pressure on applicants to accept an offer could reflect greater intensity in recruiting and greater costs of unfilled vacancies. This would be surprising given it occurs during a recession. Instead these shorter deadlines may reflect firms exploiting weaker applicant bargaining power to reduce recruiting effort and the number of offers needed to fill a vacancy.

On average, the proportion of a firm's interviewees receiving offers declines by 6 percentage points in 2010 relative to 2008, although this is not statistically significant. This decline is only temporary, and by 2016 the proportion is over 8 percentage points higher than in 2008, again not statistically significant. The proportion of offers accepted increases five percentage points in 2009 relative to 2008, and stays elevated until dropping in 2016. As a result, this is less likely to explain the one-time drop in proportion of interviewees receiving

offers in 2010. While clearly only suggestive, it raises the possibility that firms did not adjust interviews in 2010 when vacancies dropped.

The fact that the acceptance rate stays elevated through 2015 may suggest considerable slack in this portion of the labor market even in 2015. Alternatively, it may be further evidence that recruiting adjustments kept yield high as the economy recovered.

In sum, we see evidence that firms reduce pre-interview recruiting intensity along a number of margins during the Great Recession, and they readjust some of these during the recovery. We see a dramatic shift towards video interviewing during the recession, and away from on-campus interviewing, but this may represent an increase or a decrease in intensity. Finally, we see some evidence that firms work less quickly to fill vacancies during the recession, and more quickly during the recovery than during the recession. While our other post-interview measures may certainly reflect a decrease in recruiting intensity, the case is less clear.

Finally, Figure 6 shows that hires do indeed fall for this sample of firms during the recession, and then increase. While the coefficients are imprecisely estimated, the magnitudes suggest hires do not reach 2007-2008 levels by 2015-2016. It is hard to interpret this without vacancy data, but we will address hires using the Job Outlook surveys which have both vacancy and hires data.

5.1.4 Planned Use of Bonuses and Salary Increases

While the previous measures were from the Recruiting Benchmark Survey and captured recruiting behavior in the previous year, the next two measures are from the Job Outlook Survey and capture planned changes in recruiting behavior in the coming year. We measure whether or not the employer intends to offer a signing bonus and the planned increase in the starting salary compared with the previous year. In Figure 7, we plot year coefficients from specifications that include firm fixed effects with standard errors clustered at the firm level. We include both the nominal salary increase as well as the real salary increase, deflated using

Table 4: Pre-Interview Recruiting Methods Over Time

	Ln(Career Fairs Last Year)	Post on Campus Site	Post on Commercial Site	Post on Own Site	Internet Advertising	Blogs	Applicant Tracking System	Ln(HR Staff)
2009	-0.130	-0.022	-0.153*	0.046	-0.063	0.023	0.062	-0.110
	(0.139)	(0.025)	(0.090)	(0.043)	(0.086)	(0.062)	(0.058)	(0.176)
2010	.	-0.065*	-0.180**	0.012	-0.184**	0.028	0.024	-0.003
		(0.036)	(0.090)	(0.043)	(0.088)	(0.058)	(0.052)	(0.154)
2011	-0.433***	-0.031	-0.183**	-0.004	-0.167*	0.080	0.014	0.085
	(0.114)	(0.030)	(0.089)	(0.053)	(0.096)	(0.058)	(0.057)	(0.168)
2012	-0.281**	-0.011	-0.154	-0.011	-0.095	0.100	0.052	0.143
	(0.113)	(0.022)	(0.104)	(0.052)	(0.106)	(0.074)	(0.064)	(0.183)
2013	-0.280**	-0.039*	-0.138	0.017	-0.084	0.117*	0.073	0.205
	(0.113)	(0.023)	(0.090)	(0.049)	(0.099)	(0.066)	(0.058)	(0.171)
2014	-0.117	-0.026	-0.133	0.043	-0.110	0.108*	0.092	.
	(0.124)	(0.026)	(0.096)	(0.049)	(0.099)	(0.064)	(0.062)	
2015	-0.115	-0.030	-0.155*	0.033	-0.137	0.110	0.092	.
	(0.137)	(0.024)	(0.089)	(0.059)	(0.099)	(0.073)	(0.065)	
2016	-0.032	.	.	.	.	.	.	0.429
	(0.161)							(0.278)
Observations	1,676	1,735	1,714	1,730	1,717	1,707	1,739	966
R-Squared	0.910	0.735	0.731	0.788	0.742	0.732	0.791	0.870

Notes: *** p-value $\leq$ .01, ** p-value $\leq$ .05, * p-value $\leq$ .1. Observations are at the firm, year level. Each regression includes firm fixed effects. Standard errors clustered at the firm level in parentheses. Coefficients are relative to 2008 in each column. The year 2010 is omitted from column 1, 2016 from columns 2-7, and 2014 and 2015 from column 8 because of inconsistencies in the way the question was asked in those years. In columns 2-7, the dependent variable is an indicator for whether the firm uses the given method in their recruiting process. Columns 2-4 refer to whether the firm posts job listings on campus, commercial, or their own web site. Column 8 refers specifically to university relations and recruiting staff. See text for details.

Table 5: Interview and Post-Interview Recruiting Methods Over Time

	On-Campus Interviews	Video Interviews	Ln(Days Between Interview and Offer)	Ln(Days Between Offer and Deadline)	% Interviewees Receiving Offers	% Offers Accepted
2009	0.009	0.059	0.099	-0.123	0.008	0.055
	(0.053)	(0.057)	(0.166)	(0.107)	(0.058)	(0.035)
2010	-0.021	0.111*	0.171	-0.140*	-0.055	0.056*
	(0.048)	(0.060)	(0.144)	(0.084)	(0.046)	(0.033)
2011	-0.067	0.241***	0.156	-0.174*	-0.017	0.066**
	(0.054)	(0.070)	(0.162)	(0.099)	(0.052)	(0.033)
2012	-0.076	0.148**	0.187	-0.310	0.008	0.060*
	(0.052)	(0.072)	(0.190)	(0.189)	(0.050)	(0.036)
2013	-0.033	0.251***	0.114	-0.248**	0.028	0.059*
	(0.056)	(0.070)	(0.182)	(0.107)	(0.049)	(0.035)
2014	-0.064	0.255***	0.113	-0.229**	0.042	0.045
	(0.054)	(0.076)	(0.200)	(0.108)	(0.057)	(0.040)
2015	-0.075	0.286***	0.052	-0.048	0.013	0.067*
	(0.065)	(0.088)	(0.245)	(0.292)	(0.056)	(0.038)
2016	-0.099	.	.	.	0.085	0.019
	(0.067)				(0.071)	(0.055)
Observations	1,955	1,704	1,519	1,556	1,446	1,547
R-Squared	0.854	0.713	0.767	0.728	0.749	0.765

Notes: *** p-value $\leq$ .01, ** p-value $\leq$ .05, * p-value $\leq$ .1. Observations are at the firm, year level. Each regression includes firm fixed effects. Standard errors clustered at the firm level in parentheses. Coefficients are relative to 2008 in each column. The dependent variables in columns 1 and 2 are indicators for whether the firm uses the given method in their recruiting process. The year 2016 is omitted from columns 2-4 because of inconsistencies in the way the question was asked. See text for details.

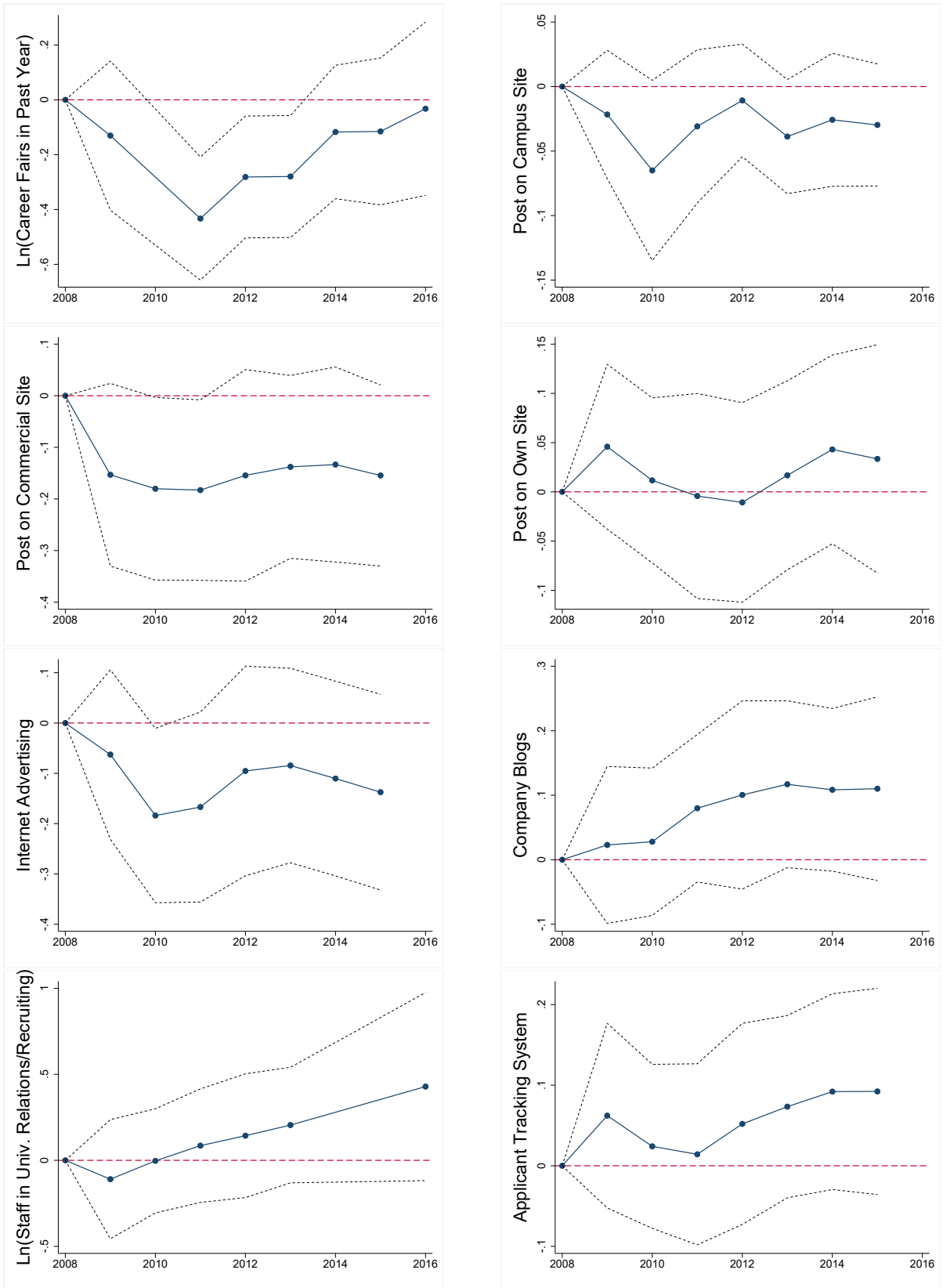

Figure 3: Within Firm Changes in Pre-Interview Campus Recruiting Strategies

Notes: This figure shows the coefficients on the year fixed effects from the within-firm regressions in Table 4. Dotted lines show 95% confidence intervals, with standard errors clustered at the firm level. Coefficients are relative to 2008. See text and notes to Table 4 for details.

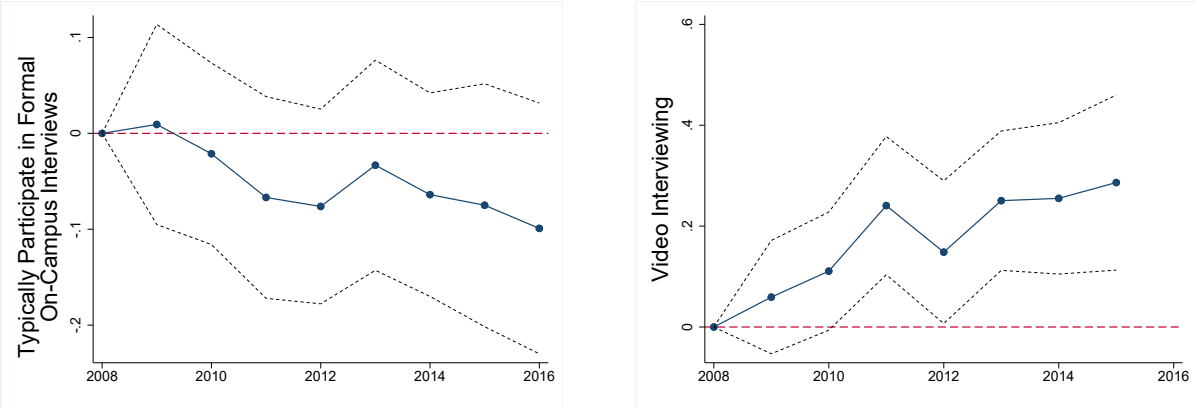

Figure 4: Within Firm Changes in Interviewing

Notes: This figure shows the coefficients on the year fixed effects from the within-firm regressions in Table 5. Dotted lines show 95% confidence intervals, with standard errors clustered at the firm level. Coefficients are relative to 2008. See text and notes to Table 5 for details.

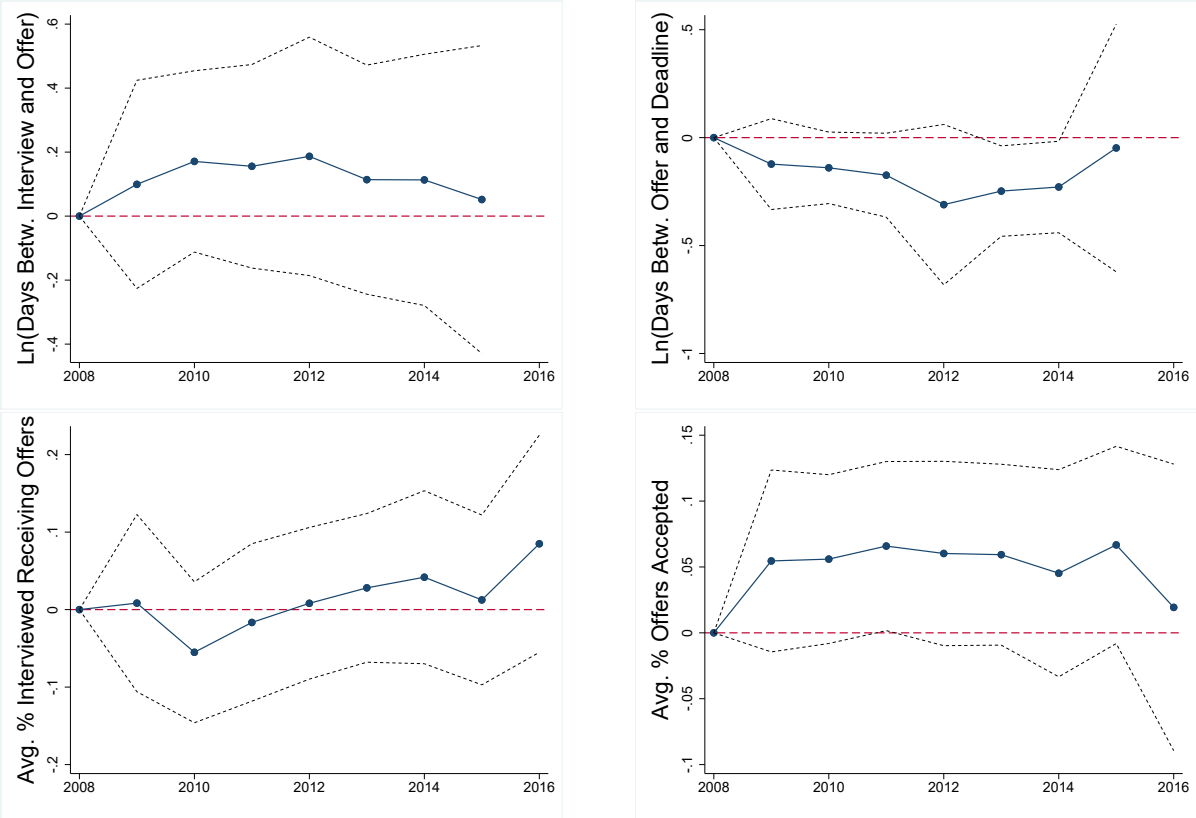

Figure 5: Within-Firm Changes in Post-Interview Recruiting

Notes: This figure shows the coefficients on the year fixed effects from the within-firm regressions in Table 5. Dotted lines show 95% confidence intervals, with standard errors clustered at the firm level. Coefficients are relative to 2008. See text and notes to Table 5 for details.

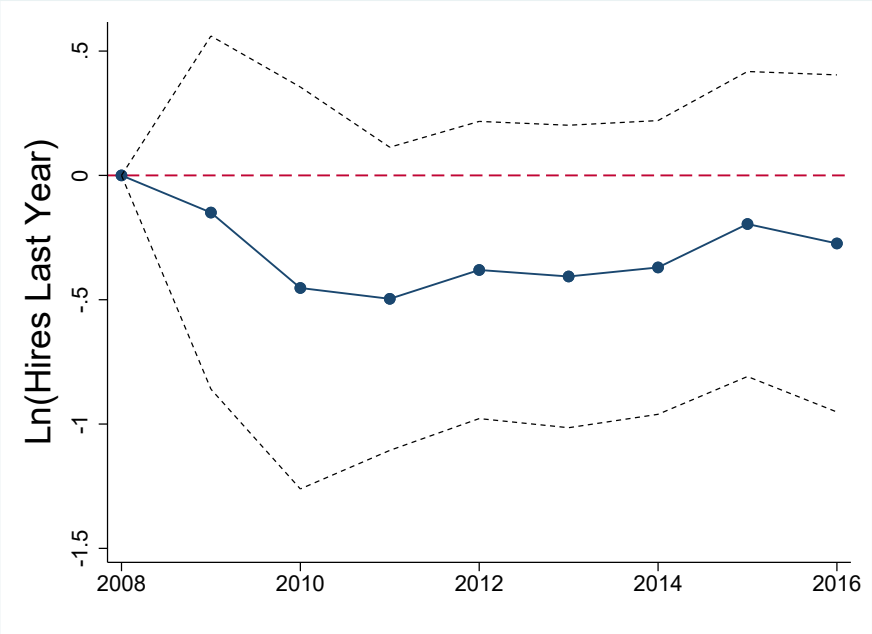

Figure 6: Within-Firm Changes in Hires Over Time

Notes: This figure shows the coefficients on the year fixed effects from regressing Ln(Hires Last Year) on year and firm fixed effects. Dotted lines show 95% confidence intervals, with standard errors clustered at the firm level. Coefficients are relative to 2008. See text for details.

the consumer price index.

These figures show that employers do not report substantially different plans to offer bonuses or salary increases from 2006 through 2008 (although there is an increase in the share offering signing bonuses during this time), but beginning in 2009 there was a substantial drop in both measures. This recovered relatively quickly for bonus plans but well into 2016 nominal salary increases remain almost 2 percentage points below planned salary increases in 2006. Real salary increases are more volatile, but also indicate persistently lower increases compared with the earlier period. However, these estimates may be an upper bound since the survey design did not allow employers to report negative nominal salary increases.

The fact that these measures lag the peak of the recession indicate that employers may be responding to market tightness rather than the broader domestic slowdown. According to the Bureau of Labor Statistics, the U.S. unemployment rate peaked in October of 2009 and remained close to 10% into early 2010, despite the fact that the official NBER end-point of

the Great Recession was June of 2009. Thus, when survey respondents first reported plans to substantially tighten bonuses and salary increases, the economy was already beginning to expand. However, the recovery of the labor market was slow and took the next several years. Thus, in the next section, we turn to employers' beliefs about market tightness which will more directly allow us to distinguish between general economic conditions and the state of the labor market.

5.2 Beliefs about the Labor Market

As described in Section 4.2.2, each year the NACE Job Outlook survey asks respondents their beliefs about the quality of the coming year's labor market for new college graduates in their industry. When employers believe the labor market will be good for job applicants, this indicates they believe there will be relatively more job openings per applicants, implying more competition among employers for qualified applicants. To maintain hiring, employers will likely have to expend more effort to hire the same quantity and quality of applicants.

To test this hypothesis, in Table 6 we regress measures of recruiting intensity on the firm's beliefs about labor market quality. In all specifications we include firm fixed effects and cluster standard errors at the firm level. In the first panel, we see that when employers believe the quality of the labor market is good they are 17 percentage points more likely to report plans to increase the number of career fairs in the following year, and 23 percentage points more likely to report plans to change their brand, both of which are more than twice the rates for employers that rate the quality of the labor market poor or fair.

In addition, employers are 10 percentage points more likely to plan to offer a hiring bonus, however this is only marginally significant (10 percent level), and we cannot reject that the size of the bonus is the same regardless of the assessed quality of the labor market. Finally, employers report plans to increase the nominal starting salary by 1.3 percentage points more when they assess the labor market to be good, which amounts to 1.1 percentage points in real terms. Thus, when employers rate the labor market as better for new college graduates,

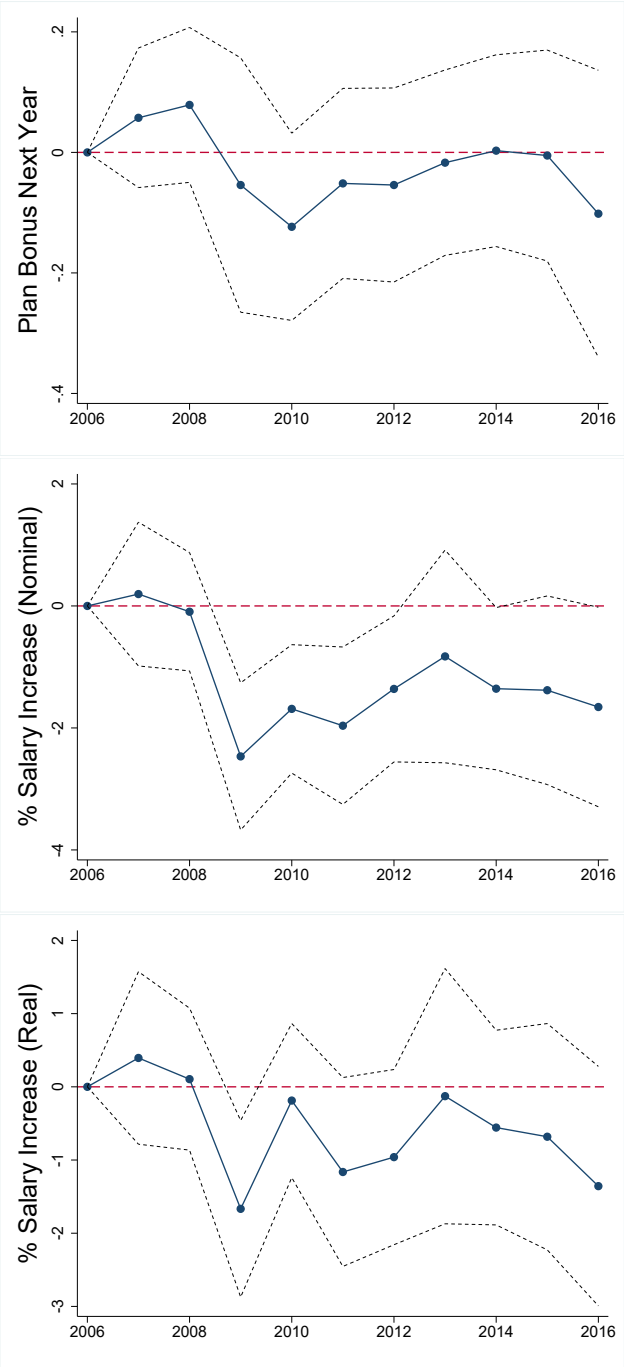

Figure 7: Coefficients from regressions in which recruiting intensity plans are regressed on firm and year fixed effects. Dotted lines represent 95% confidence intervals, using standard errors clustered at the firm level. The top figure reports the average within-firm change in plans to offer a hiring bonus to new college graduates, the middle figure shows the change in the nominal percent starting salary increase the employer plans to offer next year, and the bottom figure shows the change in the real percent starting salary increase.

Table 6: Recruiting Intensity on Labor Market Conditions

VARIABLES	(1) More Career Fairs	(2) More Travel	(3) Change Brand	(4) Bonus	(5) Bonus Size	(6) Nominal Salary Inc. (%)	(7) Real Salary Inc (%)
				Panel A: Basic Specification			
Good LM Indicator	0.168**	0.092	0.233***	0.099*	380.703	1.317***	1.077***
	(0.081)	(0.068)	(0.090)	(0.057)	(747.201)	(0.420)	(0.416)
Constant	0.174***	0.102*	0.160**	0.426***	4,450.628***	1.524***	-0.237
	(0.067)	(0.056)	(0.074)	(0.045)	(644.746)	(0.329)	(0.327)
R-squared	0.641	0.601	0.653	0.618	0.816	0.657	0.651
				Panel B: Disaggregated Labor Market Beliefs			
Fair	0.173	0.034	0.099	-0.017	278.706	1.077	0.772
	(0.197)	(0.076)	(0.182)	(0.153)	(1,294.551)	(0.782)	(0.815)
Good	0.296	0.108	0.306	0.050	884.080	1.817**	1.426*
	(0.190)	(0.081)	(0.192)	(0.152)	(1,154.607)	(0.745)	(0.777)
Very Good	0.349*	0.107	0.338*	0.107	286.088	2.359***	1.774**
	(0.192)	(0.093)	(0.199)	(0.150)	(1,148.855)	(0.727)	(0.759)
Excellent	0.424**	0.272**	0.378*	0.168	554.862	3.504***	2.800***
	(0.209)	(0.119)	(0.210)	(0.157)	(1,184.545)	(0.860)	(0.884)
Constant	0.010	0.064	0.066	0.437***	4,248.497***	0.560	-0.929
	(0.182)	(0.073)	(0.182)	(0.143)	(1,031.338)	(0.680)	(0.713)
R-squared	0.645	0.608	0.654	0.621	0.818	0.670	0.660
				Panel C: Year Fixed Effects			
Good LM Indicator	0.237***	0.118*	0.261***	0.075	470.014	0.577	0.577
	(0.079)	(0.068)	(0.091)	(0.062)	(837.947)	(0.398)	(0.398)
Constant	0.263***	0.146**	0.184**	0.452***	3,135.221**	2.924***	0.424
	(0.079)	(0.068)	(0.085)	(0.089)	(1,395.285)	(0.580)	(0.580)
R-squared	0.660	0.606	0.661	0.624	0.825	0.680	0.666
Observations	1,120	1,120	1,120	2,099	722	1,565	1,565

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. All specifications include firm fixed effects. Standard errors are clustered at the firm level.

we find broad evidence that these employers plan to expend more effort on recruiting.

In Panel B of Table 6, we break the beliefs measure into the original five component categories. Here we see that, for all of the measures except bonus size, the point estimates are growing with the firm's assessment of the labor market, indicating that as the labor market improves, employers continue to increase recruiting intensity. In addition, although the travel measure was not statistically significant in the aggregated specification, we see that when employers rate the labor market as 'excellent' for new college graduates, they are 27 percentage points more likely to plan to increase travel in the coming year.

In Panel C of Table 6, we add in year fixed effects, to see how much of the measured variation in beliefs is driven by broader macro-economic conditions. Here we see the results for career fairs, travel, and plans to change branding grow stronger, but the results for bonuses and salary increases attenuate and are no longer significant. This suggests that the former measures of recruiting intensity are more closely linked to cross-sectional variation in labor market tightness within the industry, while the latter measures may be more closely linked to broader economic conditions.

In the previous table, we showed that firms adjust recruiting intensity measures in response to beliefs about labor market tightness. However, if the firm's own hiring plans are correlated with beliefs about market tightness, this may reflect plans to increase or decrease hiring, rather than a projection about how difficult it will be to recruit.

To address this, we estimate the following two specifications. First, we regress the recruiting intensity measure on the interaction between indicators for whether the employer believes the labor market to be good for new graduates ($GoodLM_{ft}$) and whether or not the employer intends to increase hires ($IncHires_{ft}$). The coefficient on GoodLM reflects whether employers are more likely to increase recruiting intensity when labor markets are tight, even if they do not intend to increase their own hires. If recruiting intensity increases for these employers, we know they are increasing recruiting intensity per vacancy since vacancies are not increasing. We include firm fixed effects and cluster standard errors at the firm level.

$$RecruitingMethod_{ft} = \alpha + \delta_f + \beta_1 GoodLM_{ft} + \beta_2 IncHires_{ft} + \beta_3 GoodLM_{ft} \times IncHires_{ft} + \epsilon_{ft} \quad (3)$$

In the second specification, we instead focus on whether or not employers believe the labor market to be slack, which we define as rating the quality of the labor market as poor or fair. We then interact this measure with an indicator for whether the employer intends to decrease hires in the coming year.

$$RecruitingMethod_{ft} = \alpha + \delta_f + \beta_1 PoorLM_{ft} + \beta_2 DecHires_{ft} + \beta_3 PoorLM_{ft} \times DecHires_{ft} + \epsilon_{ft} \quad (4)$$

The coefficient on $PoorLM$ reflects whether employers are more likely to decrease recruiting intensity when labor markets are slack, even if they plan to maintain or increase their own hires.

In Panel A of table 7, we estimate the first specification. Here we see positive and significant point estimates on the 'GoodLM' indicator for more career fairs and a change in brand. Other measures that represent an increase in recruiting intensity (such as use of travel, bonuses, and salary increases) are positive but not statistically significant. These estimates indicate that employers who are not intending to increase the number of hires in the coming year nonetheless plan to increase recruiting intensity when they believe the labor market to be tight.

In Panel B, we estimate the second specification. We find suggestive evidence that employers intending on maintaining or increasing hires more likely plan to reduce recruiting intensity when the labor market is slack, with firms reporting they are more likely to reduce travel. The magnitude suggests these firms are nearly 10 percentage points more likely to reduce the number of career fairs in slack markets, although this is not statistically significant

from zero. Thus, for both specifications, we find that employers do appear to be adjusting recruiting intensity per position in response to their beliefs about labor market tightness.

5.3 Vacancy Yield

Now we turn to evaluating the number of hires per vacancy. These measures were added to the survey in 2011, so we can only investigate the vacancy yield in the recovery from the Great Recession. Unfortunately, we are further limited in our ability to analyze hires per vacancy as the data on hires in the previous year is missing for nearly 40% of respondents. In Figure 8, we regress the log vacancy yield on firm and year fixed effects, clustering standard errors at the firm level. Here we see that our estimates are imprecise which is not surprising given the small sample size. However, the magnitudes suggest that despite the tightening labor market, vacancy yields are remarkably stable. The average yield is 0.99, and ranges from 0 to 2.35 after trimming outliers (see Appendix). Over 60% of firms report hires equal to vacancies each year. Nonetheless, we saw in Figure 1 that employers reported that the labor market was becoming tighter through this time period, which is consistent with the aggregate evidence. This suggests that employers may be adjusting recruiting behavior to maintain vacancy yields.

We test whether firms with greater hiring plans have greater vacancy yield, conditioning on market tightness. Davis et al. (2013) find evidence of this relationship, which the standard specification suggests should be nonexistent. We estimate the following cross-sectional regression, weighting observations by the number of vacancies:

$$Ln(Hires/Vacancies) = \alpha + \beta_1 Ln(Vacancies) + \gamma_t + u \tag{5}$$

To be conservative, we report standard errors robust to heteroskedasticity, as these are larger than the standard errors clustered at the firm level in some instances. This difference affects whether the coefficients are significant at the 5% level. In cases where the clustered

Table 7: Market Tightness, Hires, and Recruiting Intensity

VARIABLES	(1) Fewer Career Fairs	(2) More Career Fairs	(3) Less Travel	(4) More Travel	(5) Change Brand	(6) More Tech.	(7) More Social Networks	(8) Bonus	(9) Bonus Size (Logs)	(10) Nominal Salary Inc. (%)	(11) Real Salary Inc (%)
Panel A: Tight Labor Market and Increased Hiring											
Good LM Indicator	-0.093	0.179**	-0.230**	0.080	0.248**	0.088	0.028	0.037	0.292	0.472	0.541
	(0.103)	(0.090)	(0.106)	(0.072)	(0.098)	(0.114)	(0.112)	(0.123)	(0.267)	(0.686)	(0.675)
Increase Hires	-0.237	0.366*	-0.269	0.215	0.187	0.077	0.200	-0.077	0.811*	0.628	0.648
	(0.163)	(0.188)	(0.185)	(0.172)	(0.186)	(0.171)	(0.193)	(0.184)	(0.487)	(0.947)	(0.900)
Good LM x Inc. Hires	0.087	-0.188	0.177	-0.072	-0.114	-0.024	-0.163	0.106	-0.887*	0.365	0.363
	(0.169)	(0.192)	(0.195)	(0.194)	(0.197)	(0.182)	(0.210)	(0.190)	(0.533)	(1.383)	(1.329)
Constant	0.381***	0.075	0.422***	0.044	0.109	0.407***	0.447***	0.443***	8.046***	1.479***	-0.461
	(0.086)	(0.077)	(0.089)	(0.058)	(0.078)	(0.095)	(0.093)	(0.109)	(0.230)	(0.484)	(0.479)
R-squared	0.659	0.659	0.595	0.615	0.655	0.662	0.673	0.717	0.854	0.766	0.766
Panel B: Slack Labor Market and Decreased Hiring											
Poor LM Indicator	0.095	-0.169*	0.166*	-0.085	-0.227**	-0.101	0.029	-0.105	0.067	-0.517	-0.597
	(0.087)	(0.092)	(0.092)	(0.078)	(0.092)	(0.101)	(0.095)	(0.107)	(0.196)	(0.550)	(0.552)
Decrease Hires	0.087	-0.176**	0.066	-0.065	-0.100	0.011	0.000	-0.001	0.121	-0.161	-0.392
	(0.088)	(0.089)	(0.086)	(0.079)	(0.102)	(0.106)	(0.102)	(0.126)	(0.232)	(0.643)	(0.664)
Poor LM x Dec. Hires	-0.008	0.093	0.126	0.003	0.023	0.026	-0.090	0.144	-1.087	-1.245	-1.019
	(0.196)	(0.151)	(0.197)	(0.118)	(0.207)	(0.204)	(0.236)	(0.227)	(0.881)	(1.248)	(1.298)
Constant	0.203***	0.365***	0.138***	0.203***	0.406***	0.521***	0.493***	0.494***	8.294***	2.461***	0.626***
	(0.018)	(0.019)	(0.019)	(0.017)	(0.020)	(0.023)	(0.022)	(0.024)	(0.041)	(0.118)	(0.119)
Observations	1,116	1,116	1,116	1,116	1,116	1,116	1,116	1,059	387	701	701
R-squared	0.647	0.647	0.589	0.602	0.654	0.661	0.671	0.718	0.857	0.762	0.762

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. All specifications include firm fixed effects. Standard errors are clustered at the firm level.

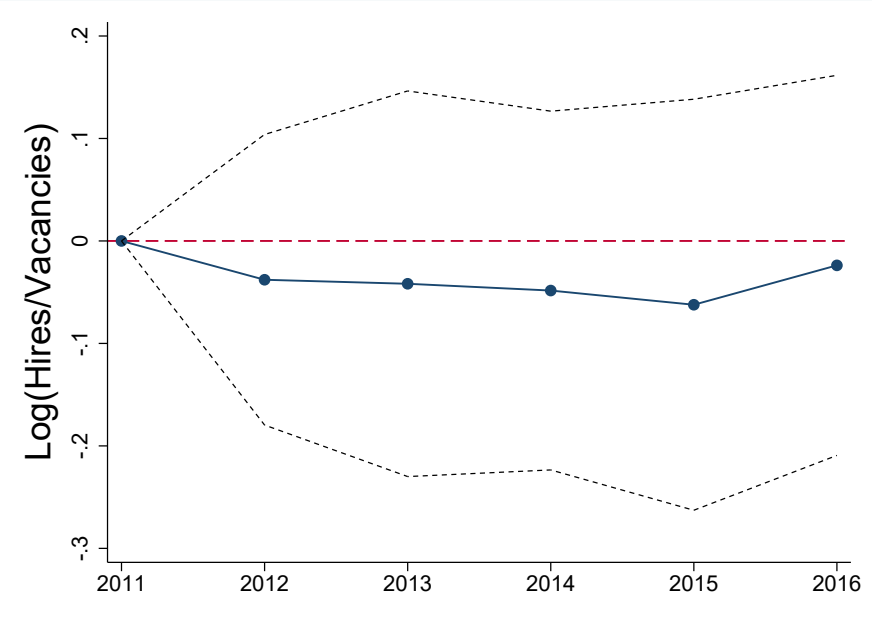

Figure 8: Coefficients from regressions in which the log of hires per vacancy are regressed on firm and year fixed effects. Dotted lines represent 95% confidence intervals, using standard errors clustered at the firm level.

standard errors are larger, it has no impact on whether the coefficients are significant at conventional levels.

We find evidence that firms with 25% more vacancies have vacancy yield that is higher by .2%. This is significant at the 10% level. However, we emphasize that the result is not robust to a number of alternative specifications. Much of this likely reflects our lack of power, as we have only approximately 730 observations in these regressions. The cross-sectional result does not hold once we control for industry and size group fixed effects, although there is considerable heterogeneity by industry. Not surprisingly, the result also does not hold once we include firm fixed effects, of which there are 450. Weighting and specifying the dependent variable in levels rather than logs also affect magnitude and significance.

While the positive relationship between vacancies and vacancy yield is certainly not strongly confirmed, we analyze whether the relationship disappears after controlling for measures of recruiting intensity. However, due to the structure of the survey, we have only three measures that report the recruiting methods used in the previous year: whether or not

the employer offered a bonus, whether the employer screened on GPA, and if so, the GPA cutoff. We set the GPA cutoff to zero for all firms that report they do not screen on GPA.

Table 8 shows that including these measures increases the magnitude of the coefficient on log vacancies, though slightly decreases the precision (p=.11). We cannot claim this is evidence of returns to scale in vacancies since we are not able to control for a large set of intensity measures. However, it is clear that the use of these specific intensity measures does not explain why employers have greater vacancy yield when they have more vacancies.

Offering a bonus has no significant effect on the vacancy yield. Screening on GPA has a negative effect on the vacancy yield, with $p = .1$. This may reflect that when firms relax standards, for example by hiring candidates with lower GPA, they increase the size of the applicant pool they actively recruit (either in the pre-application stage, or after applicants have applied). This decreases the likelihood they are unable to fill the vacancy. Interestingly, conditional on screening on GPA, if firms have higher GPA cutoffs this increases the vacancy yield. This approaches conventional levels of significance with $p = .11$. The opposite sign would have been consistent with the coefficient on GPA screen. The positive coefficient may reflect that among firms who screen, those with higher cutoffs are also using other channels to raise yield. While the statistically significant coefficient on vacancies disappears when controlling for industry and firm size, these coefficients on GPA screen and GPA cutoff remain approximately the same.

6 Conclusions

In this paper, we use two unique surveys of employers from the National Association of Colleges and Employers to investigate how recruiting intensity varies over the business cycle and in response to beliefs about labor market tightness. We find that during the Great Recession, employers reduced recruiting intensity across a variety of measures, which only slowly recovered in the subsequent years. By measuring subjective beliefs about labor market

Table 8: Relationship Between Vacancy Yield and Vacancies

	(1)	(2)	(3)	(4)	(5)
Log Vacancies	0.008*	0.010	0.003	-0.080	-0.052
	(0.005)	(0.006)	(0.006)	(0.061)	(0.047)
Bonus Last Year?		0.004	-0.013		0.032
		(0.019)	(0.015)		(0.036)
GPA Screen		-0.246	-0.272**		-0.205
		(0.151)	(0.123)		(0.657)
GPA Cutoff		0.078	0.087**		0.054
		(0.049)	(0.040)		(0.214)
Observations	729	673	661	729	673
R-squared	0.021	0.037	0.125	0.726	0.788
Firm Fixed Effects	No	No	No	Yes	Yes
Industry and Firm Size Fixed Effects	No	No	Yes	No	No

* $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$. Dependent variable is Ln(Hires/Vacancies). To be conservative, robust standard errors are in parentheses, as these are larger than standard errors clustered at the firm level in some instances and affect whether the estimates are significant at the 5% level. In cases where the clustered standard errors are larger it has no effect on whether the results are statistically significant from zero at the 5 or 10% level. GPA screen is an indicator for whether the firm screens on GPA in their recruiting process. GPA cutoff is the firm's cutoff GPA used in screening. If firms report they do not screen on GPA, GPA cutoff equals zero. See text for details.

tightness, we show that employers more likely report plans to increase recruiting intensity when they believe the relevant labor market to be tighter, and more likely plan to decrease recruiting intensity when they believe the labor market to be more slack. Moreover, we find evidence that these recruiting plans change at a per-vacancy level. Our results provide direct evidence of the hypothesis advanced by Davis et al. (2013) that the breakdown in matching efficiency during and after the Great Recession can be explained in part by a reduction in recruiting intensity by employers.

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A Appendix

A.1 Additional Tables

Table A.1: Distribution of Responses by Year, Job Outlook Survey

Year	Frequency	Percent
2006	267	10.8
2007	276	11.16
2008	231	9.34
2009	201	8.13
2010	172	6.96
2011	244	9.87
2012	244	9.87
2013	208	8.41
2014	260	10.51
2015	201	8.13
2016	169	6.83
Total	2,473	100

Table A.2: Distribution of Repeat Sample of Firms, Job Outlook Survey

Frequency of Response	Number of Firms	Percent
1	608	52.73
2	242	20.99
3	115	9.97
4	72	6.24
5	41	3.56
6	32	2.78
7	17	1.47
8	12	1.04
9	6	0.52
10	7	0.61
12	1	0.09
Total	1,153	100

A.2 Data Notes

The hires and vacancies data are particularly noisy in the survey, thus required cleaning. We use the following refinements. First, if the number of hires and unfilled vacancies is

less than the reported number of vacancies, we treat this as a data error and drop these observations. In addition, we drop outliers that are defined as the top 2% of hires per vacancy. This amounts to a cutoff of 2.5 times as many hires as vacancies. Finally, beginning in 2013, NACE began asking employers to report hires separately for domestic and international positions, but vacancies and unfilled vacancies are ambiguous as to whether respondents should report the total number of vacancies or just vacancies for US positions. In this case, we used the sum of all hires for the hiring variable, unless the number of vacancies and unfilled vacancies was exactly equal to domestic hires, in which case we presume that the respondent is only considering domestic hires.

A.3 Heterogeneity in the Vacancy Yield

Table A.3: Hires per Vacancy by Industry

Industry	Mean	SE	95% Conf.	Interval
Natural Resources	0.943	0.032	0.88	1.006
Construction	1.021	0.032	0.958	1.084
Manufacturing	1.018	0.014	0.991	1.045
Transportation/Utilities	0.993	0.030	0.934	1.052
Wholesale	0.921	0.023	0.876	0.966
Retail	1.000	0.202	0.604	1.396
FIRE	0.959	0.022	0.916	1.002
Services	1.005	0.014	0.978	1.032

Table A.4: Hires per Vacancy by Firm Size

Firm Size	Mean	SE	95% Conf.	Interval
Less than 500	0.984	0.018	0.949	1.020
500-1000	0.979	0.024	0.931	1.026
1001-2500	0.935	0.02	0.896	0.973
2501-5000	0.98	0.021	0.938	1.022
5001-10000	1.02	0.021	0.978	1.061
More than 10000	1.007	0.014	0.979	1.035

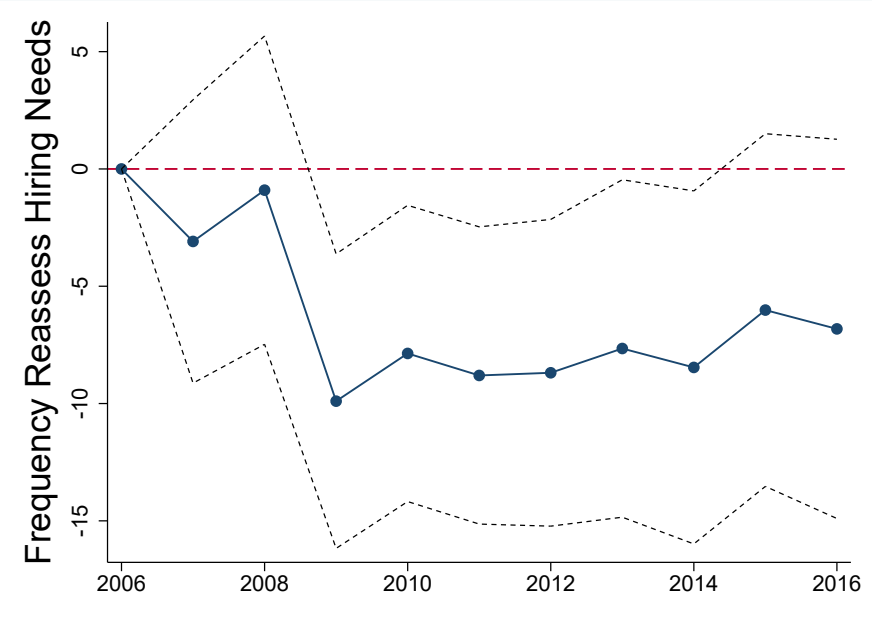

Figure A.1: Coefficients from regression in which the planned frequency of reassessment of hiring needs (in weeks) is regressed on firm and year fixed effects. Dotted lines represent 95% confidence intervals, using standard errors clustered at the firm level.

A.4 Reassess Hiring Needs

An additional measure in the survey asks respondents how frequently they plan to reassess hiring needs in the coming year. We convert this measure into weeks. Over the whole period (2006-2016), on average employers report reassessing hiring needs every 16 weeks (or between 3 and 4 months). To investigate how this measure has changed over time, we regress it on firm and year fixed effects. These year fixed effects are plotted in Figure A.1. Here we see the measure was relatively stable through 2008, after which it dropped by about 10 weeks, and has remained depressed through this period. Thus it appears that employers became more cautious after the Great Recession and tended to plan to reassess needs more frequently.

In Table A.5 we investigate how the frequency of reassessment depends on the employer's assessment of the quality of the labor market for new college graduates. Here we see that when the labor market is tighter, employers plan to reassess 3 weeks less frequently on average. When we control for year fixed effects, this point estimate attenuates by half and is no longer significant.

Table A.5: Frequency of Reassessment of Hiring Needs

	(1)	(2)
Good LM Indicator	3.206**	1.670
	(1.475)	(1.580)
Constant	15.011***	21.335***
	(0.611)	(2.696)
Observations	2,045	2,045
R-squared	0.621	0.633
Year FE?	No	Yes

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. All specifications include firm fixed effects. Standard errors are clustered at the firm level.