Analyzing how ALMPs affect the demand side of the labor market

- Estimating the effect of meetings between caseworkers and unemployed workers on vacancy duration

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Abstract

This paper investigates the causal effect of meetings between caseworkers and unemployed workers on the duration of posted vacancies. While the literature contains evidence of the effect of such meetings on unemployment duration and employment outcomes, little work has been done in analyzing the effect of meetings on the demand side of the labor market. We argue that caseworkers make search more effective, also for firms, consequently reducing vacancy durations. We exploit a unique Danish dataset, containing the timing of meetings, number of new vacancies, stock of vacancies and individual vacancy duration. We estimate the time-varying dependence of vacancy duration on the meeting intensity. We use data from a social experiment to ensure exogenous variation in the meeting rates. The results suggest that meetings reduce vacancy duration in the pre-crisis period (2005-07), while we find no effects post-crisis (2009-11).

JEL-Classification: J2, J6, J23
Keywords: Caseworker meetings, vacancy durations, labor demand

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1 Introduction

Active labor market policies (ALMPs) are known to play a crucial role in ensuring qualifications and availability of the labor force. Caseworkers are responsible for actively carrying out ALMPs, and a large body of previous work has established a remarkable effect of meetings between caseworkers and unemployed workers on individual unemployment duration and subsequent employment outcomes. Hence it is clear that such meetings positively affect the supply side of the labor market. Establishing the effect of ALMPs on the labor demand is crucial for determining whether an impact at the level of the individual unemployed workers translates into general equilibrium effects. While Crépon et al. (2013) and Gautier et al. (2012) investigate the general equilibrium effects of job placement assistance, and Lechner et al. (2013) analyze how firms benefit from ALMPs, no work has been done on how caseworker meetings affect labor demand directly. This study aims at analyzing whether there are general equilibrium effects when increasing the meeting intensity.

If equilibrium effects exist, meetings may consequently contribute to reducing the overall unemployment rate, rather than just lead to a reshuffling of a given number of jobs, where those who attend meetings are hired at the cost of those who do not. Investigating the causal effect of such meetings on vacancy duration and thus developing new empirical evidence, which can aid the understanding of the effect of meetings on the demand for labor is the main goal of this paper. We exploit a unique Danish data set derived from various sources, containing the precise timing of meetings between unemployed workers and caseworkers, and all new vacancies posted on the internet including the duration of each of these vacancies spanning the period from 2005 through 2011. We further explore how the results vary with the tightness of the labor market. In order to reduce the potential for endogeneity we use data from two different social experiments conducted in 2005 and 2008 in different municipalities in Denmark. The experiment data paired with the random variation in the meeting rates, as well as the aggregated nature of the data allows us to estimate the effects of meetings on vacancy duration. In this paper we use the vacancy duration as a proxy measure for labor demand and attempt to analyze potential sources of variation in vacancy duration. Although the analysis of vacancy data can

pose problems of its own, it is important to understand, which forces that facilitate the matching between vacancies and unemployed workers. Another strain of literature takes up this question in the context of job creation. The initial point is that once employers realize that workers have started to apply more often, they are willing to open more vacant positions as the associated costs go down. However, there is little understanding of the sources that affect vacancy duration, which is what we investigate in this paper. In particular we want to analyze how the probability to fill in vacancy depends on the meeting intensity.

Background

The Danish Flexicurity model has received much attention in the rest of Europe, because it has managed to sustain high participation rates and low unemployment rates during the past 15 years. Especially the structural unemployment rate estimated at 3.5% is noticeable. The model consists of three elements; 1) flexible hiring and firing rules and regulations, 2) a generous unemployment insurance (UI) and unemployment assistance (UA) system, and 3) active labor market policies ensuring the availability and the qualification level of unemployed workers. As the Danish labor market has always been flexible and had generous compensation schemes for unemployed workers, it is the latter, intensive active labor market policies (which were intensified from 1994 onwards) that have been perceived as the main reason for success. This tightening consisted of earlier and more frequent mandatory activation periods, earlier and more frequent meetings with caseworkers, more strict enforcement of search requirements, and increased use of sanctions in the case of non-compliance to these rules. Since, to the best of our knowledge, no attempt has been made to analyze the effects of meetings on the demand for labor directly, we build our analysis on the literature, which provides evidence that meetings with caseworkers are effective in reducing unemployment duration. This effect, as the literature suggests, is shaped by three different factors.

First, the direct effects and importance of meetings has been documented in the international literature, see e.g. Dolton and O'Neill (2002), Dolton and O'Neill (1996), Ashenfelter et al. (2005), and McVicar (2010). Rosholm (2013) presents the evidence and discusses policy implications. Similar effects are also found in Denmark, see e.g. Kjærsgaard (2012) and Peder-

sen et al. (2012), where meetings are found to reduce unemployment duration and/or increase subsequent employment duration. Second, the threat effect of ALMPs is also important and has been documented by many international researchers. Most notably by Black et al. (2003), but also by e.g. Hägglund (2011). For Danish evidence, see e.g. Rosholm and Svarer (2008), Rosholm (2008), Geerdsen (2006), Geerdsen and Holm (2007), and Pedersen et al. (2012). In Denmark, the programs were not effective in themselves, on the contrary, but the perceived threat of having to participate continuously in programs led unemployed workers to leave the unemployment queue before entering the "active period".
Lastly, sanctions, if any, are determined at meetings, see e.g. Svarer (2011). Sanctions lead to dramatic increases in job finding rates, and there may even be important behavioral effects ex ante, contributing perhaps to a threat effect, see e.g. Lalive et al. (2005) and Arni et al. (2009). Still, sanctions also appear to reduce subsequent job quality, see e.g. Arni et al. (2009) and Van den Berg and Vikström (2009).

The rest of the paper is organized as follows. In the next section, we describe potential channels through which meetings may affect the demand side of the labor market, and potential barriers for such transmission mechanisms. Section 3 presents the institutional settings regarding active labor market policies in Denmark and describes the data which we use. In section 4, we present the econometric framework and discuss identification issues. Section 5 contains main results, section 6 covers our sensitivity analyses, and in section 7 we conclude and discuss policy issues. In the appendix we present the results from the sensitivity analyses, which are not included in the main body of the paper.

2 Theoretical model and considerations

The analysis takes its theoretical offset in the framework of the aggregate matching model. The model is widely used when analyzing the labor market equilibrium, see e.g. Gregg and Petrongolo (2005) or Pissarides (2000). This model is considered a key building block when modeling labor market flows. The matching model treats the labor market as a trading place, where firms and workers look for the right match. This search process on both sides of the market

is both costly and time consuming. In an unregulated labor market, there is assumed to be search frictions arising from imperfect information about possible trading partners, counterparty heterogeneity, and a variety of other factors. The matching function in its simplest form is given as

$$M_t = m(U_t, V_t) \tag{1}$$

where M_t denotes the number of matches created at time t. U_t denotes the number of unemployed workers looking for a job at time t, and V_t denotes the corresponding number of vacancies. The matching function is assumed to be increasing and concave with the condition that $m(U_t, 0) = m(0, V_t) = 0$. Based on the above, vacancies are assumed to be filled at a rate $\lambda_{Vt} = M_t/V_t$. We assume that meetings with caseworkers contribute to reducing the frictions in the labor market in terms of making the search process more efficient for the unemployed worker, consequently creating a more suitable field of applicants for the firms, as caseworkers take on the active role of 'matchmakers' in the labor market. This would lead to an increase in the number of matches for a given number of unemployed workers, hence λ_{Vt} should increase. Subsequently, this results in lower perceived costs of opening a vacancy, and consequently contributes to an increase in vacancies and thereby a further increase in job creation.

Our argument is that shorter vacancy durations are a sign of less friction in the labor market, which consequently benefit the demand side of the labor market in terms of lowering search costs. This is particularly important in times of economic upturn, where lack of labor can be particularly costly for firms. We further hypothesize that the meetings held at the job centers specifically contributes to lowering the friction in the labor market by encouraging the unemployed workers to search broader. This hypothesis is strongly supported by an interview with Jobindex Director, Kaare Danielsen, in which he explains that meetings contribute to convincing unemployed workers to apply for jobs that they would not have considered themselves. In his opinion, the greatest cause of friction in the labor market is the fact that unemployed workers tend to be too narrow-minded about their future job prospects. Frequent meetings with caseworkers consequently leads to broadening the target, which intuitively increases the chances for success. [1]

[1] The interview is available upon request.

In other words, attending meetings with caseworkers may enable workers to search more or more effectively, hence reducing unemployment duration. This has been established in the literature already, cf. the introduction. Now, if we assume that the job market is subject to a "musical chairs" constraint (i.e. a fixed number of filled jobs), then the implication will just be that workers attending meetings will find jobs at the expense of workers that do not attend meetings.

However, there is no reason to think that the search market is limited by a fixed number of available jobs. Firms continuously post vacancies, and due to the frictional nature of the labor market, they rarely fill such vacant positions immediately. Search takes time. Now, if unemployed workers receive job search assistance, enabling them to better locate and apply for vacant positions, this might have the consequence that firms will find that it is easier to fill a vacant position. Define the number of potential jobs as the sum of filled and vacant jobs. Now, if the vacancy duration is reduced, the implication is that, at any point in time, the number of vacant jobs will be lower and the number of filled jobs larger than if vacancy durations were higher. The implication is that equilibrium employment goes up, and equilibrium unemployment declines. As firms realize that it has become easier to fill vacant positions they may even start posting more vacancies, as firms will continue to post vacancies as long as the net present value of opening a vacancy is larger than 0. If costs of issuing a vacancy are reduced (because workers search more effectively), they may open more vacancies, thereby increasing the number of potential jobs. As mentioned above, if meetings only have the impact that certain workers find jobs faster at the expense of other workers, then the "musical chairs" constraint may be relevant, but if total search effort increases, there is no reason to think why this might be the case.

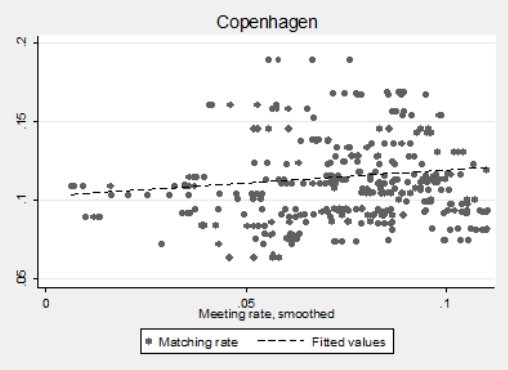
Of course, in a deeply depressed labor market, such as the current, one might expect additional search to have less of an impact on vacancy duration because there are already many applicants per vacant position compared to a booming labor market. Going beyond the theoretical framework, firms might even become 'congested' with applicants in a downturn, if meetings leads to excessive job search. In such a case, vacancy duration might even increase due to the

time it takes to sort through all applications to select the better match. Hence, it will be important to allow for cyclical variations when analyzing the impact of meetings on vacancy duration.

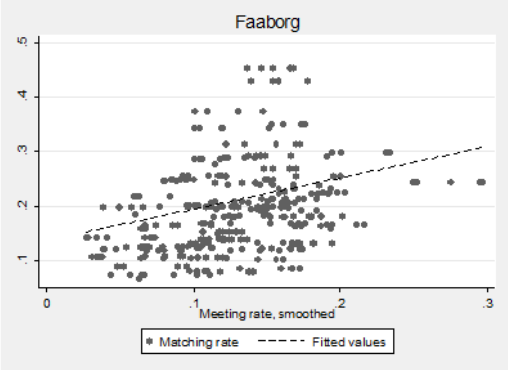
In figure 1 we plot the relationship between meeting intensity and the rate at which matches are made in 6 different municipalities using weekly data from 2005-11. Figure 1 generally depicts a positive relationship between meetings and matches, suggesting that our hypothesis regarding the role of the caseworker might be valid, although the causal relationship is not obvious. It further indicates that the labor market does not appear to be subject to the 'musical chairs' constraint. As argued previously, it is very plausible that there is a certain cyclical dependence of the effects of meetings on matches, as the matches, as illustrated in equation 1, depend on vacancies and unemployed workers.

Figure 1: Meeting intensity and matching rate in selected municipalities

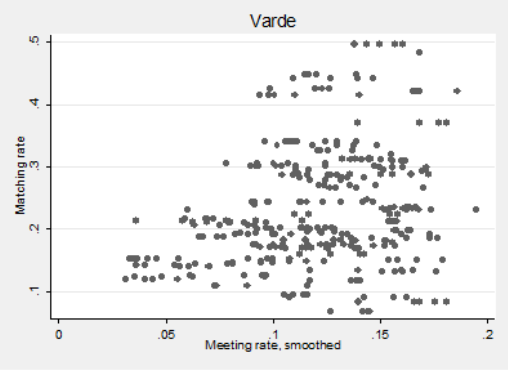
(a) Copenhagen



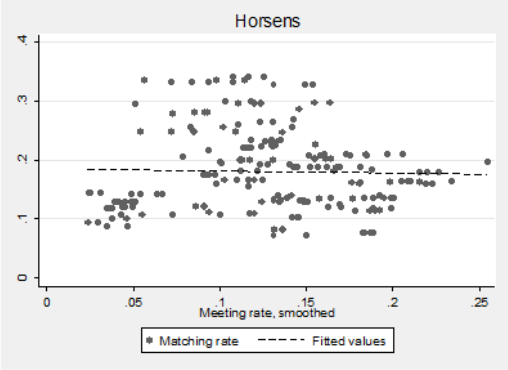
(b) Faaborg



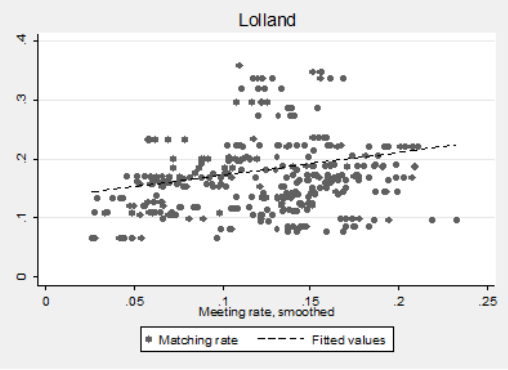
(c) Varde



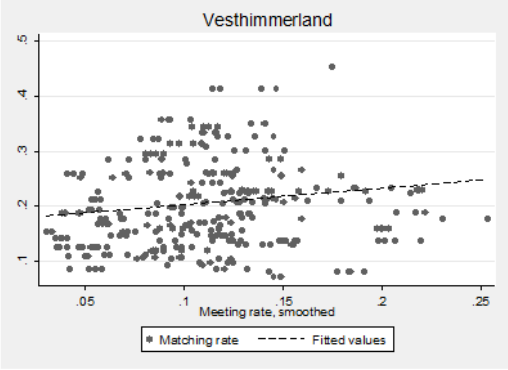
(d) Horsens



(e) Lolland



(f) Vesthimmerland



Note: Coefficients of the fitted regression lines are 0.16 for Copenhagen, 0.57 for Faaborg, 0.97 for Varde, -0.04 for Horsens, 0.38 for Lolland, and 0.29 for Vesthimmerland. All coefficients except for Horsens (-0.04) are significant at the 1%-level. The matching rate is calculated as the number of matches relative to the number of unemployed in a given municipality. For a geographical overview, please see map of Denmark in the appendix.

3 Institutional settings and data

Institutional settings

There are 91 job centers spread across the municipalities, which are responsible for conducting active labor market policy in Denmark. Two elements are important for administering ALMPs. The ALMP system is characterized by a mutual obligations scheme, which in short means that in order to claim a right a person must fulfill his obligations.This implies that the unemployed individual has to search actively for a job and to willingly participate in any sort of labor market program he is assigned to by his caseworker. An unemployed worker has a right to participate in an education program for 6 weeks. He is obliged to participate in one if he has been unemployed for 9 months. A feature that characterizes the ALMP institutional setting in Denmark is the frequent contact between the unemployed and the job center. All unemployed have to make a CV available during the first four weeks of unemployment, and they must go to a mandatory meeting at least every 13 weeks.

Meetings between caseworkers and unemployed individuals consequently have a fourfold purpose; providing job search assistance, referring the unemployed to relevant vacancies, monitoring that the unemployed fulfills their duties in terms of active job search and program participation, and assessing the overall job-related aptitude of the unemployed. In cases of non-compliance with the guidelines laid out by the caseworker, the UI-benefits may be forfeited for a shorter (temporary exclusion ranging from a couple of days to three weeks) or longer period. Search requirements and sanctions are necessary in order to prevent moral hazard in relation to the very generous UI benefits, which characterize the Danish Flexicurity model. The monitoring nature of these policy initiatives serves as a means to ensure that the generous unemployment benefits will not become an income substitution *per se* but a benefit to which one is only entitled if requirements of active search and skills upgrading are properly met. See Andersen and Svarer (2007) for a more detailed discussion of the Flexicurity concept.

Data

The empirical analysis is based on four different data sets. First, jobindex.dk collects all vacancies posted on the internet (online newspapers, job centers, job databases, etc.) since 2002,

and they have made these data available to us. Table 1 illustrates the origin of all vacancies available at jobindex.dk as of September 1, 2013.

Table 1: Sources of vacancies

Posted directly to jobindex.dk	3149
Job centers	2629
Company websites	455
Other job databases	2750

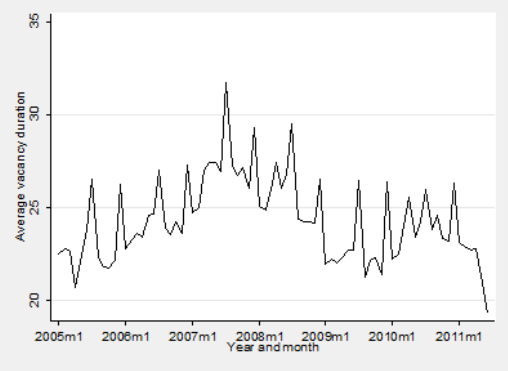
(Source: jobindex.dk) Note that this index collects vacancies from all types of databases, and consequently is not restricted to only containing certain types of vacancies.

However, we can calculate the duration of the individual vacancy only from 2004, as before this time there is no information available about the closing date of the vacancy. Furthermore, we have can follow a vacancy until the end of 2011. Aside from the fact that jobindex.dk is the largest job site in Denmark it has another advantage over e.g. Jobnet, which is used by the municipal job centers. The probability that the duration of a vacancy is in fact a measure of the time it takes to fill a vacancy is higher, relative to Jobnet since firms with listings at Jobindex.dk will have to actively pay for each week the vacancy is listed. According to Director of Jobindex.dk, Kaare Danielsen, it frequently happens that firms ask for a vacancy to be taken down 'prematurely' as they have already received many applications, just as it also happens that firms pay to have a vacancy listing prolonged due to lack of applicants.

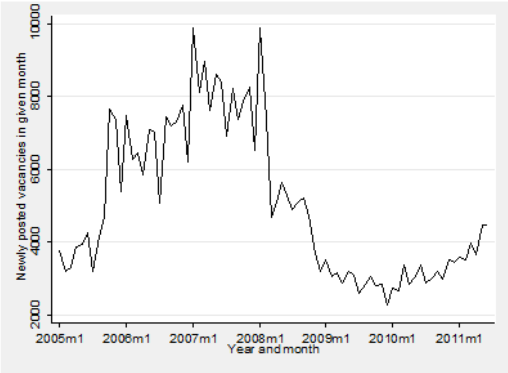
In order to assess the cyclical variation in the vacancy duration over two symmetric pre- and post-crisis periods we restrict our focus on the 2005-11 period. The data, which covers the period from January 2005 through December 2011, allows us to capture any variation across a major cyclical upturn and downturn. In Denmark, the period of 2005-7 was characterized by very low levels of unemployment and an economy at the brink of overheating, while 2009-11 experienced the deepest downturn recorded for a very long time with a 7% decline in GDP. In some of our estimations for the sensitivity analysis, we will in fact split our data into two samples, one for the pre-crisis period, and one for the post-crisis period, defined as the periods 2005-07 and 2009-11 respectively. We do this to show that our results are robust to such a specification.

Figure 2: Average vacancy duration (a), Newly posted vacancies (b), and V/U ratio (c)

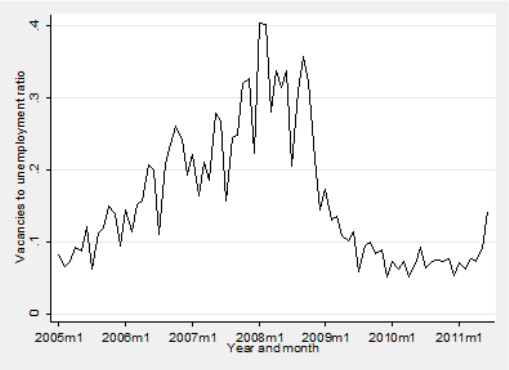
(a)



(b)



(c)

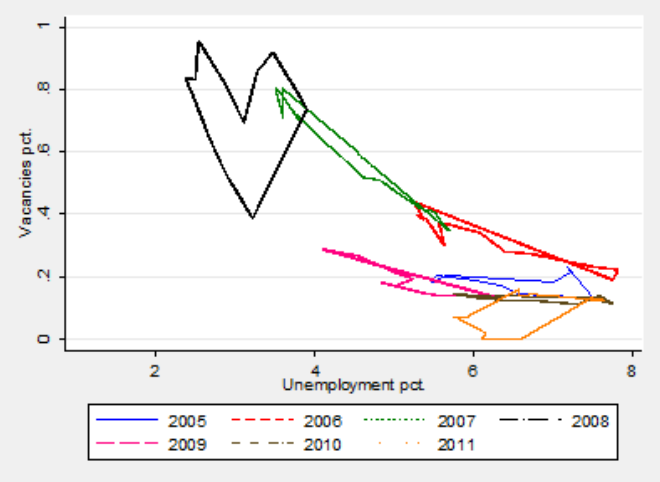


The overall impact of the cyclical variation is illustrated next. Figure 2 shows the number of new vacancies in a given month, average vacancy duration, and the V/U-ratio. Figure 2 demonstrates that there have been significant cyclical fluctuations in the average duration of vacancies as well as in the quantity of newly posted vacancies per month. Both the flow of vacancies and the average duration reach a peak in late 2007, followed by a drastic decline. Especially the vacancy duration is of interest, as it may suggest that the prolonged duration is a sign of the economy being on the verge of overheating, i.e. that there are more vacancies than suitable applicants, resulting in a tight labor market. This is further supported by the V/U ratio in figure 2, which shows a peak in late 2008, suggesting that the labor market has become increasingly tight up until the onset of the economic crisis. Expecting a strong correlation between the first two measures is natural, as the increased posting of vacancies will result in an overflow of vacancies, consequently contributing to further tightening the labor market. Note

that vacancy duration peaks earlier than both the new vacancies and the V/U-ratio, suggesting its possible use as an early indicator of potential overheating.

The cyclical fluctuations can be illustrated further by introducing the Beveridge curve. Figure 3 below depicts the Beveridge curve, which plots the relationship between vacancies and the unemployment rate in the period from 2004-2011. Roughly speaking, the figure can be divided into four quadrants. The curve is read counter-clockwise beginning in the lower right quadrant, suggesting that the beginning of our observation span demonstrated a slight shift in the unemployment rate coupled with an increase in vacancies. In the period of 2006-7, there is a clear trend toward many new vacancies and a dramatic drop in the unemployment rate. This was the exact time, where the Danish economy was experiencing rapid over-all growth. This is followed by a dramatic decline in vacancies in 2008 and 2009 as a response to the onset of the global economic crisis. This is in turn followed by an increase in the unemployment rate.

Figure 3: The Beveridge curve



From the DREAM database, which is maintained by the national labor market authorities, we have data on the precise timing of meetings with a caseworker at the job center for each unemployed worker in the country from 2005 onwards. From this information we can calculate aggregate measures of the meeting intensities by job center. We calculate the meeting intensity as the number of meetings held in a given week divided by the number of unemployed workers

that week. Additionally, from the Danish economic council, we have obtained access to municipality (i.e. job center) characteristics, such as the number of unemployed and vacancies, the GDP growth rate, the composition of the local work force, and the use of ALMPs. More specifically, the data encompass the share of the local work force with no specific training, some (vocational) training, short, medium, and long education in combination with the shares of various types of activation programs used in a given municipality. These data are all available at a monthly periodicity, and are consequently smoothed to fit onto our meeting dataset, which is reported on a weekly basis.

Finally, we are able to exploit unique Danish data derived from two controlled field experiments, 'Quickly Back to Work 1 & 2', henceforth denoted QB1 and QB2.
These randomized experiments were conducted in 2005 and 2008 respectively, in selected job centers with the aim of measuring the direct effects of intensifying ALMPs in a variety of dimensions, among these meetings. Both experiments were aimed at newly unemployed workers eligible for UI benefits. The first experiment, QB1, contained a number of intensified treatments, most notably weekly or fortnightly meetings with caseworkers during the first four months of unemployment, mandatory program participation for three months thereafter, and an initial job search assistance course. QB2 was in fact a set of four different experiments run in four different regions. The treatment in QB1 was a combination of intensified meetings and early activation. QB2 was designed in such a way that we could separate the effect of each element in QB1.

For the first region participating in the QB2 program, the treatment group had to attend a weekly group meeting for 14 weeks. In another experimental region, the meeting rates did not change but the unemployed workers had to participate in a job-training program from week 14. This is earlier than the standard, which is after 40 weeks. The last experiments, which was conducted in the region of Sealand, consisted of fortnightly meetings with caseworkers during the first three months of unemployment and they were not activated in any program earlier than the control group. In order to separate the effect of meetings from the effect of early activation in the experimental regions we construct a measure that focuses on this particular

region at the exact time that these meetings were held. Randomization took place within job centers, so meeting intensities were increased for about 50% of new UI benefit recipients for a three-month period. Consequently, not all workers were affected, but some were, and likely, overall job search effectiveness and intensity increased in those job centers. To the extent that the timing of these experiments was random, this is a source of random increases in meetings intensities. For more information on the design of the QB1 and QB2 experiments see Rosholm et al. (2011) and Pedersen et al. (2012), respectively.

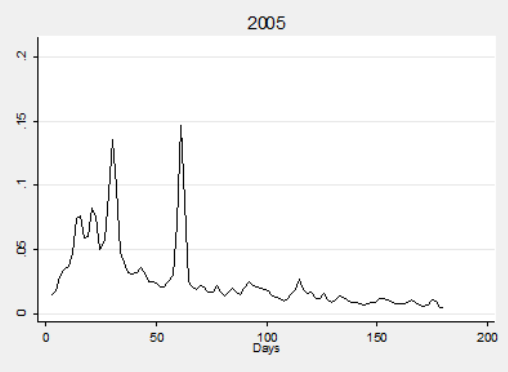
In the empirical analysis, our dependent variable is the individual vacancy duration, which is the variable on the demand side, which we expect to be most directly affected by the changing meeting intensities. Our main explanatory variables will be the meeting intensities, calculated as the number of meetings in a certain job center in a certain week divided by the number of unemployed workers in the same job center and week. In order to take into account that many vacancies are filled or opened in the first week of the month, we produce a 5-week centered moving average of the meeting rate, called the smoothed meeting rate. We include dummy variables for each of the experiments equal to unity when QB1 and QB2 take place in a job center (and three months after). Hence, if a vacancy is issued in one of these job centers at the time of the experiment, the appropriate dummy takes the value 1.

Summary statistics are presented next. Table 2 displays a quick glance at the data, with vacancy duration measured in days, and both the smoothed and raw meeting rates taking on values between zero and unity. Evidently, our data contains fluctuations in both V/U-ratio and GDP-growth, the latter being even negative in the period following 2008. Summary statistics for municipalities participating in QB1 and QB2 experiments are displayed in tables I and II in the appendix.

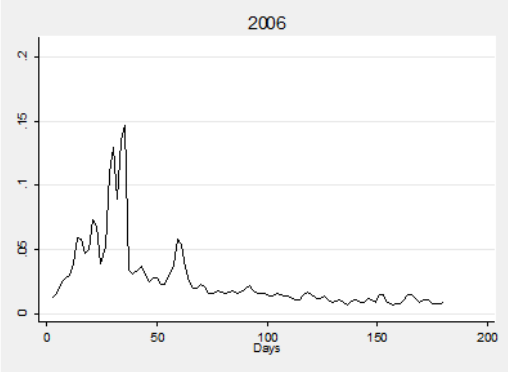
Below are inserted six separate Kaplan-Meier figures, which illustrate the rate at which a vacancy is closed down at different points in time measured in days from the posting of the vacancy. It may be observed that the exit rate is lower in 2007 than in other years corresponding to the observation that vacancy durations also peak in 2007, see figure 2.

Figure 4: Kaplan-Meier vacancy hazards for separate years

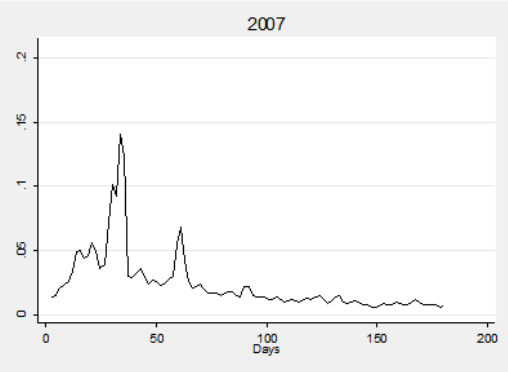
(a) 2005



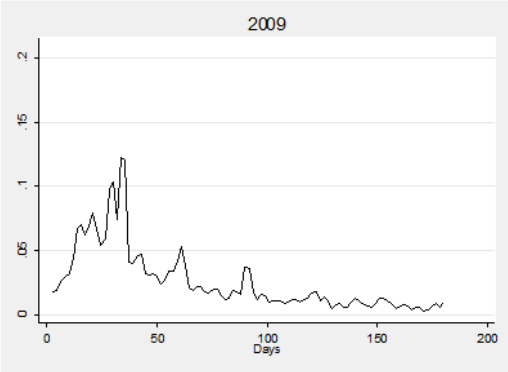
(b) 2006



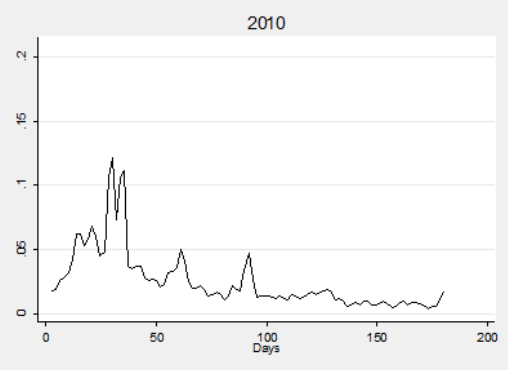
(c) 2007



(d) 2009



(e) 2010



(f) 2011

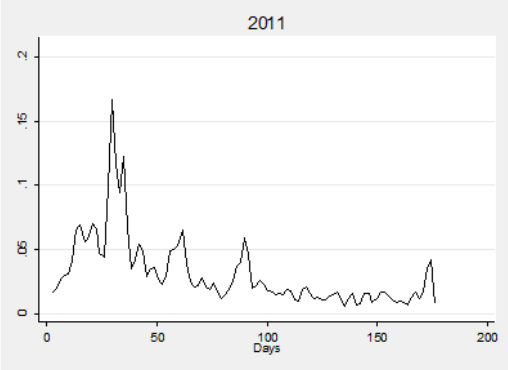


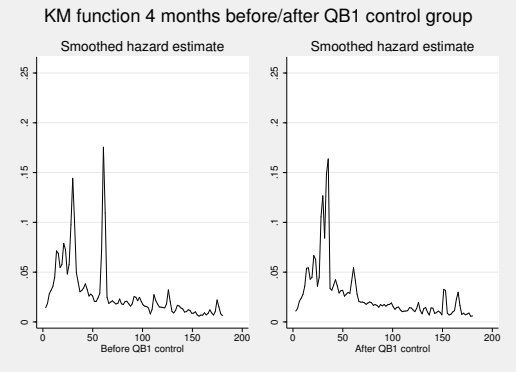
Table 2: Summary statistics

	Mean	Minimum	Maximum	Obs
Vacancy duration (days)	24.6770	1	182	1604512
Meeting rate, smoothed	0.1020	0.0048	0.41198	1604512
Meeting rate, raw	0.1047	0	0.7192	1604512
V/U ratio	0.1890	0	3.9090	1604512
GDP growth	0.1496	-2.4181	3.8904	1604512

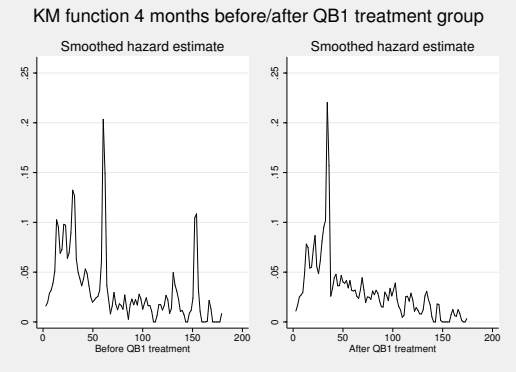
The municipality randomization is an essential and safe way to attribute any difference in the municipalities solely to the meeting intensities. From figure 5 (a) and (b) we compare the vacancy hazard rates up to four months before the QB1 experiment took place for both the participating and non-participating municipalities, where we note no significant differences in the exit rate. Three months after the onset of the experiment there is a slight indication that the hazard rate for the participating municipalities went up. The effect of meetings is not immediate but if meetings do affect the probability of finding a job and consequently filling a vacancy, this is something that we should see after 3 months. We repeat the procedure for QB2, in figure 5 (c) and (d). While we still observe shorter vacancy durations after this experiment, the effects do not appear to be as large as after QB1. The central idea is that any difference in the vacancy duration between the municipalities that have participated at the social experiment could be attributed only to the higher meeting rates for these municipalities. The exit rates pertaining to the QB2 experiment could indicate that in times of economic slowdown intensified meeting rates may not be an effective approach for reducing vacancy durations.

Figure 5: Vacancy duration before and after QB1 and QB2 experiments, control and treatment

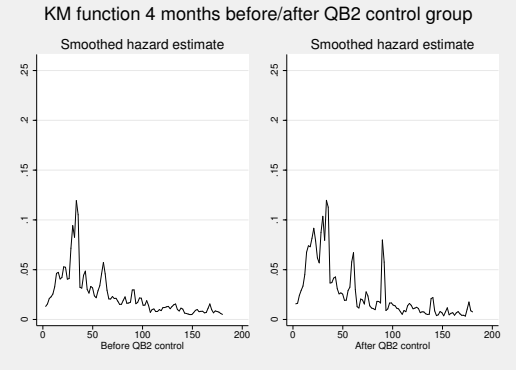
(a) QB1 control



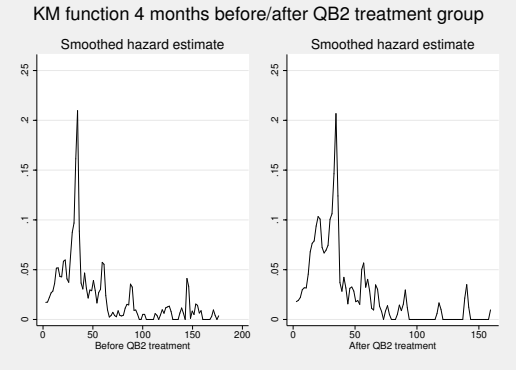
(b) QB1 treatment



(c) QB2 control



(d) QB2 treatment



4 Econometric specification

In this section we present estimates of the rate at which a vacancy is being filled, i.e. $\lambda_{Vt} = M_t/V_t$ cf. the theoretical section, conditional on the meeting rate in the municipalities. The estimations of the effects are carried out using Cox proportional hazard models, which estimate the exit rate from a given state controlling for observed heterogeneous characteristics. We use both a semi-parametric approach based on the Cox partial likelihood estimator as well as parametric approaches with a piecewise constant baseline specification, which are reported in the sensitivity analysis. Below follows a brief outline of the methodology. If we let T denote the time at which a vacancy shifts from being open to being filled (assuming that all vacancies that are no longer open are in fact filled), then $S(t) = Pr[T > t]$, i.e. the probability that a vacancy will be open for longer than t weeks, is referred to as the survivor function. The distribution of time until filling the vacancy is $F(t) = 1 - S(t)$ with density function $f(t) = -S'(t)$. This distribution is commonly characterized by the hazard rate:

$$\theta(t|x) = \lim_{dt \to 0} \frac{P(t <= T < t + dt | T >= t, x)}{dt = f(t)/S(t)} \tag{2}$$

The hazard rate, $\theta(t)$, is the likelihood of closing the vacancy in the next instant, given that the vacancy is still open at time t. We assume that the suitable functional form for the hazard rate is the proportionate hazards model, which may be written as

$$\theta(t|x) = \theta_0(t)\psi(x) \tag{3}$$

in which $\theta_0(t)$ denotes the baseline hazard capturing any duration dependence, and $\psi(x)$ is a function of observed characteristics x. This model can be estimated parametrically by specifying a functional form for the baseline hazard, such as the piecewise constant hazard rate. Alternatively, the baseline hazard can be left unspecified, in which case the semi-parametric Cox partial likelihood approach estimates the parameters of the model's proportional component $\psi(x(t)$, which is specified as

$$\psi(x) = exp(x'\beta) \tag{4}$$

The estimated parameters are subsequently reported as hazard coefficients, $exp(\beta_i)$.

In other words this means that if x_i changes by one unit, the probability of filling the vacancy will be changed by $exp(\beta_i) - 1$.

Treatment effects and identification

The variable of interest in the x-vector is the meeting intensity. The meeting intensity, varies across job centers and time. Table 3 below displays the share of the variance in meeting intensity, which can be explained by job centers and time, in order to decompose the sources of variation for this variable. Here we report the variation in the smoothed meeting intensities.

Now, an obvious concern is that meeting intensities may be endogenous. However, in this case we are estimating the effect of meetings between unemployed workers and caseworkers on vacancy durations, which are outcomes on the other side of the market. Hence, the direct link, and hence the risk of confounders between treatment and outcome is not as close as is usually the case when estimating treatment effects. Moreover, vacancy durations are not even observed by job centers, since we are the first to publish data on them (except the Danish Economic Council who presented similar numbers in their "State of the Economy" report from the autumn of 2012).[2] Still, one might worry that job centers react to changes in the labor market by adjusting labor market policies, including meeting rates. For example, firms can complain to job centers about problems with hiring workers, and the job centers may react by increasing meetings intensities, trying to stimulate job search. In this case, we should expect long vacancy durations to be associated with more meetings. This would imply a bias towards negative impacts of meetings on the closing rate of vacancies. Since we are hypothesizing (and also find) positive effects, a negative bias would just imply that the true effects are even larger. Moreover, the historical contact level between firms and job centers has been very low during the 2000s as job center caseworkers focused almost exclusively on the workers.

Since meetings take place at the municipal level, there are likely to be significant differences

[2]Note that this analysis, was carried out *after* the observation period used in this study.

in the meeting intensity across municipalities. It is hence important to control as much as possible for local labor market conditions and the local composition of the work force. We do so by including information on job center and time specific V/U ratios (stock of vacancies to stock of unemployed) calculated by aggregating individual vacancy and unemployment data, GDP growth rates, local use of activation policies, and local composition of the work force. More specifically, we include control variables, which cover the share of the local number of unemployed workers participating in a given activation type, e.g. activation through education or training, or subsidized employment in private and public entities. We also include normalized measures for skills and qualification among the unemployed.[3]

When deciding how to control for the municipal variation, we are faced with two options. We can either include municipal fixed effects, or we can include control variables, as discussed in the previous paragraph, in order to capture how regional differences contribute to explaining the variation in vacancy durations. Although the rules regarding meeting frequencies are minimum rules, there are cases, in which these rules are not always followed. In any event, it is possible to arrange more meetings than required by the rules.This suggests that the variation between municipalities should be accounted for in our estimations. Table 3 illustrates the results from three simple linear regressions with the smoothed meeting rate as the dependent variable; one where the meeting rate is regressed on a set of month dummies, another where it is regressed on dummies for each municipality, and finally, one where both sets of dummies are used as regressors. When examining the results, it is clear that the R-squared pertaining to municipal variation by far exceeds the variation explained by time. Consequently, including municipal fixed effects in our analysis would eliminate this inter-municipal variation in our model, which we have argued is more likely to be exogenous with respect to vacancy durations than the variation over time within municipalities. Estimations with fixed effects are included in the appendix as a sensitivity check.

[3]These measures consist of the share of unemployed workers in a given municipality with e.g. no training or a short/medium/long education.

Table 3: R-squareds from various dummy regressions

Dependent variable: Meeting intensity	Months	Municipalities	Both
Constant	0.123***	0.072***	0.093***
Sd. error	(0.000)	(0.000)	(0.000)
R^2	0.14	0.25	0.39
N	1,604,512	1,604,512	1,604,512

5 Results

In this section we present our findings of the effects of meetings on vacancy duration. [4] Table 4 contains the estimated Cox hazard ratios (ψ) from equation 4 for the smoothed and raw meeting intensities, and for the QB1 and QB2 dummy variables interacted with the time periods in which they took place for the period of 2005 through 2011. The reported standard errors in all tables allow for clustering by municipality.

For the smoothed and raw meeting intensities respectively, these estimates do not demonstrate any significance. However, the QB1 dummy indicates a strongly positive effect of increased meeting intensity on vacancy closing rates, suggesting that increased meeting intensity leads to a shortening of the duration of a vacancy. These results indicate that with an intensified meeting frequency, the likelihood of a vacancy being filled increases by 11%.[5] This finding is consistent with the results presented by van den Berg et al. (2011) and Pedersen et al. (2012), in which they find that the intensified frequency of meetings had positive effects on the probability of exiting unemployment. However, note that the effects we find here are demand-side effects of a policy implemented on the supply side, and only for a short period of time. In order to estimate how the state of the business cycle affects the impact of the meeting intensity on the vacancy duration, we estimate a model, where the smoothed meeting rate is interacted with the year dummies for our sample period.

[4] We have estimated the effect of the meeting intensity on the issuing of new vacancies and on the unemployment rate in order to see whether there would also be second-order effects on the demand side. We find no significant relationships, which suggests that there is only the first-order effect, namely the direct effect on vacancy durations.

[5] Found by taking the exponential function to the coefficient and subtracting 1. I.e. $(e^{0.104}) - 1 \approx 11\%$

Table 4: Estimation results for meeting intensities

Variables	(1)	(2)	(3)	(4)
Meeting rate, smoothed	-0.032			
	(0.153)			
Year 2005	0.014	0.022	0.012	0.012
	(0.029)	(0.026)	(0.024)	(0.024)
Year 2006	-0.067***	-0.065***	-0.073***	-0.074***
	(0.022)	(0.022)	(0.021)	(0.021)
Year 2007	-0.189***	-0.185***	-0.189***	-0.190***
	(0.014)	(0.013)	(0.013)	(0.013)
Year 2009	-0.026	-0.024	-0.025	-0.026
	(0.020)	(0.019)	(0.020)	(0.020)
Year 2010	-0.091***	-0.091***	-0.091***	-0.091***
	(0.017)	(0.017)	(0.017)	(0.017)
Year 2011	-0.039	-0.040	-0.036	-0.036
	(0.029)	(0.028)	(0.028)	(0.028)
Meeting rate, raw		0.093		
		(0.080)		
Quickly Back 1 * time			0.104***	0.104***
			(0.031)	(0.031)
Quickly Back 2 * time			-0.023	
			(0.027)	
Quickly Back 2, Sealand * time				-0.045*
				(0.027)
Municipal variables	YES	YES	YES	YES
Month dummies	YES	YES	YES	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: The change is calculated by taking the exponential function of the parameter estimates and subtracting 1. Standard errors are clustered at the municipal level.

Table 5: Estimation results interacting with year dummies

Variables	(Cox smoothed)
Meeting rate * 2005	0.096
	(0.324)
Meeting rate * 2006	0.734***
	(0.262)
Meeting rate * 2007	-0.102
	(0.215)
Meeting rate * 2008	-0.443*
	(0.239)
Meeting rate * 2009	-0.128
	(0.321)
Meeting rate * 2010	-0.081
	(0.276)
Meeting rate * 2011	0.038
	(0.375)
Municipal variables	YES
Month dummies	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: The change is calculated by taking the exponential function of the parameter estimates and subtracting 1. We allow for clustering at municipality level in the standard errors.

The results from table 5 show that the only significant positive effects are found in the pre-crisis period, namely in 2006, where meetings appear to significantly decrease the duration of a vacancy. This was the year where the Danish Economic Council started to voice concerns over an overheated economy, since the unemployment rate was still falling rapidly. It was, in short, a booming year. In this situation, before the overheating actually took place (which it basically did in 2007), meetings proved highly effective in making unemployed workers search more and hence easing firms' access to available labor. The fact that there is a positive effect in the pre-crisis period is in perfect keeping with figures 2 and 3, which showed that this was in fact a period with a tight labor market.

In short, when the supply of labor is scarce, it makes sense that an increased meeting intensity may contribute to increased and more efficient job search, thus helping both sides of the labor market. The supply side, i.e. the unemployed workers, will benefit from what is assumed to

be increased counseling where information of potential job matches is made available, consequently significantly lowering the search costs of the applicants. Moreover, the meetings have a monitoring component, as this was also a period of strict search requirements, which were to be documented at these meetings. Insufficient search might lead to the imposition of sanctions, see e.g. Svarer (2011). Hence, there was a control element as well, leading to increased search. The demand side, i.e. the firms posting the vacancies also benefit in terms of a better suited and possibly broader field of applicants, due to the intensified search related to the increase in meeting intensity.

For the period from 2009-11 there are no significant effects. This period is characterized by a less tight labor market with fewer vacancies and more unemployed workers, cf. figure 3, which may be interpreted as the reason for the insignificance. If more unemployed workers are encouraged to search for jobs, the firms posting vacancies will likely experience a larger field of applicants,which contributes to prolonging the hiring process as they have to sort through more applicants.

6 Sensitivity analysis

In order to assess the robustness of our results we conduct a series of robustness analyses, which will be elaborated in this section.

Piecewise constant estimations

We estimate the same models from the result section using the piecewise constant hazard specification in stead of the Cox proportional hazard. The piecewise-constant hazard model is specified as follows:

$$\lambda(t|x) = \omega(x)\lambda_m; \quad a_{(m-1)} \leq t < a_m \tag{5}$$

This specification allows the hazard to be different but constant over each time interval. The argument for estimating this model is that we may assume a variation in the hazards of the vacancies at specific points in time. Thus, the parameters to be estimated are β and λ, with λ being the vector of time intervals denoted by m= 1,....,M.

Based on the Kaplan-Meier plots for vacancies presented in figure 4, we let m take the values 10, 20, 30, 40, 50, 60, 90, 120, and 150, censoring any durations longer than 180 days or six months. The results are presented in the appendix, where we conclude that there are no significant differences in the estimates when comparing to the Cox model.

Splitting the sample into pre- and post-crisis

In order to validate our results, which suggest that meetings had a positive effect in the pre-crisis years and insignificant effects in the post-crisis years, we split up our sample in two periods, namely 2005-07 and 2009-11, leaving out 2008 where the onset of the crisis occurred. The results are presented in tables 6 and 7 below.[6]

Table 6: Estimation results for pre-crisis (2005-07) period

Variables	Cox smoothed	Cox raw	Cox instrument
Meeting rate * 2005	0.319		
	(0.405)		
Meeting rate * 2006	0.507*		
	(0.285)		
Meeting rate * 2007	-0.150		
	(0.269)		
Raw meeting rate * 2005		0.261	
		(0.316)	
Raw meeting rate * 2006		0.341*	
		(0.184)	
Raw meeting rate * 2007		-0.039	
		(0.161)	
QB1 instrument			0.083***
			(0.030)
Municipal variables	YES	YES	YES
Year and month dummies	YES	YES	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

In the pre-crisis period, there are positive effects in 2005 and 2006, although only the latter is significant at the 10%-level. The model is further estimated for both the smoothed meeting

[6]Placebo tests for the Quickly Back instruments are found in the appendix.

Table 7: Estimation results for post-crisis (2009-11) period

Variables	Cox smoothed	Cox raw	Cox instrument 2
Meeting rate * 2009	-0.109		
	(0.294)		
Meeting rate * 2010	-0.275		
	(0.294)		
Meeting rate * 2011	-0.113		
	(0.411)		
Raw meeting rate * 2009		-0.035	
		(0.142)	
Raw meeting rate * 2010		-0.028	
		(0.188)	
Raw meeting rate * 2011		0.094	
		(0.233)	
Quickly Back 2 * time			0.004
			(0.038)
Municipal variables	YES	YES	YES
Year and month dummies	YES	YES	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

intensity and the raw meeting measure, both with very similar outcomes. Most importantly, by also including the measure for QB1 in our model, we confirm the previous results that QB1 has a significant and positive effect on the vacancy duration.

For the post-crisis period in table 7 we see primarily negative, but overall insignificant effects. This reinforces our interpretation of the results from table 5, which indicated that the hiring process is now prolonged due to the 'congestion effect' arising from increased search for a very limited number of vacancies.

Leaving out January

When examining the data, there were some cases in which the meeting rate would be close to zero for some municipalities. This is due to the fact that the meeting intensity tends to be lower in January, right after a period with holidays and vacations. We leave out all vacancies from our data that start in January, in order to verify that our results are in fact robust to this. These estimation results, which are presented in table III in the appendix, do not appear to be

significantly different from when January is included in the model.

Municipal FE and leaving out extreme durations and Copenhagen suburbs

As a final robustness check, we estimate all of our models, substituting our municipal control variables presented in the data section, with a dummy variable for each municipality. We even include the fixed effects alongside the municipal variables in table V, and find that our initial results are robust to this specification. We further run the models for a reduced dataset where any extreme vacancy durations, i.e. durations shorter than 1 week and longer than 3 months, are removed. The fixed effects estimates are qualitatively similar albeit slightly smaller in magnitude and less significant for the pre-crisis period, whereas they suggest negative and significant effects in the post-crisis period. When omitting extreme durations, we obtain results that are fairly similar to our original model. Finally, we conduct the analysis while omitting the 15 municipalities that are formally considered as being suburbs to Copenhagen. We do this in order to verify that our results are robust to vacancies being filled by out-of-town unemployed individuals.

Estimating a matching model for the labor market

In table 8 we have estimated a matching model for the labor market in both stages of the economy based on our aggregate data. Such a model analyzes the transitions from unemployment to employment. We estimate the model from equation 1.

Based on this very simple model we are able to do a back-of-the-envelope calculation of the direct effect of meetings on the unemployment rate.

Let the matching rate, m be given a function of the number of matches in a given month divided by the stock of unemployed individuals, M_t/U_t. Then, let the unemployment rate u be given as a function of the matching rate, such that $u_d = 1/m$ is the average unemployment duration, e_d is the average employment duration and u consequently can be stated as $u_d/(u_d + e_d)$

Since we know from the estimated matching model that a 10% increase in the meeting rate will result in a 1.32% increase in the matching rate, we can then decrease the average unemployment duration from 16 to 14.2, which results in a decrease in the structural unemployment rate, (u) from 4% to 3.6%.

Table 8: Aggregate matching model

Variables	2005-7	2005-7	2009-11	2009-11
Meeting rate	0.084***		0.067***	
	(0.012)		(0.016)	
Stock of unemployed	0.338***	0.313***	0.680***	0.672***
	(0.021)	(0.021)	(0.018)	(0.018)
Stock of vacancies	-0.144***	-0.154***	-0.209***	-0.207***
	(0.016)	(0.016)	(0.015)	(0.015)
Inflow of unemployed	0.470***	0.487***	0.064***	0.067***
	(0.018)	(0.018)	(0.016)	(0.016)
Inflow of vacancies	0.108***	0.113***	0.174***	0.168***
	(0.017)	(0.017)	(0.016)	(0.016)
Constant	-2.295***	-2.612***	-2.924***	-3.090***
	(0.090)	(0.078)	(0.090)	(0.082)
R^2	0.72	0.72	0.57	0.57
N	3,243	3,243	3,799	3,799
Year and month dummies	YES	YES	YES	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: Both the dependent variable (number of matches in a given month) and the explanatory variables have been normalized by the labor force and then logarithmized.

7 Discussion and conclusion

Our estimations clearly suggest that there is strong cyclical variation present in the effect of meetings on vacancy durations in terms of positive effects in an economic downturn and small even negative, albeit insignificant, effects in the period characterized by an economic downturn. There may be several reasons for this. First of all, it may be fair to assume that in economic upturns, there are not as many who are unemployed, consequently lowering the number of clients per caseworker. We observe the number of meetings, but unfortunately we are unable to observed the quality of the meetings held. However, one could argue that with fewer clients, the caseworker is able to spend more time and energy on each one. This aspect may contribute to the positive results we observe for the pre-crisis period. On the other hand, one can argue that the relatively low level of skills assumed to characterize the group of workers who are unemployed despite a roaring economy would tend to render meetings less effective.

Whichever the reason for the positive effects, it remains clear that caseworker meetings do contribute to lowering vacancy duration in good states of the economy. Consequently, our results suggest that one might consider a policy of always stimulating the short side of the market; the supply side should be stimulated in economic upturns, as such an economic state is characterized by workers being in short supply, and interventions aimed at increasing effective labor supply appears to boost vacancy creation, too. In such a scenario as the pre-crisis period, unemployed workers receiving counseling from a case worker at the job center, may benefit from the counseling because they are inexperienced at job search in a setting where there are in fact plenty of jobs available. This in turn presents the employers posting a vacancy with more suitable candidates, as those who have applied may have done so based on caseworker guidance. In that scenario it seems plausible that the hiring decision is made easier for the employer thus contributing to shortening the duration of the vacancy.
Conversely, a different scenario emerges in times of economic downturn. Here, there are less vacancies relative to unemployed workers, and consequently it intuitively makes less sense to stimulate the supply side of the labor market, as the shortage here is on the demand side. Continuing the strategy of stimulating supply in a downturn, may just lead to a 'congestion effect', where employers are presented with an increased number of applicants and thus face prolonged vacancy durations as sorting through applicants is more time consuming.

This would suggest that both sides of the labor market would benefit from a cyclicality-oriented approach to ALMPs. In short, we suggest that the supply side is stimulated in times of economic upturn (e.g. through more intensive meeting frequencies), whereas the focus should shift to the demand side and assisting the firms in finding the best applicants, and hence reduce the costs of sorting through piles of applications during times of economic downturn. Such a strategy might lead to increased job creation, or at least to shorter vacancy duration, during downturns.

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Appendix

Table I: Summary statistics for municipalities in the QB1 experiment

	Mean	Minimum	Maximum	Obs
Vacancy duration	20.95979	1	182	21,239
Meeting rate, smoothed	.1566484	.0722372	.235678	21,239
Meeting rate, raw	.1584681	.0022727	.363901	21,239
V/U ratio	.0846641	.0096931	.1569595	21,239
GDP growth	1.481782	-.8253	2.5986	21,239

Table II: Summary statistics for municipalities in the QB2 experiment

	Mean	Minimum	Maximum	Obs
duration	23.82981	1	182	8,367
Meeting rate, smoothed	.1613481	.0824742	.2489112	8,367
Meeting rate, raw	.1600309	.0410448	.5355588	8,367
V/U ratio	.1323368	.0232558	.4343318	8,367
GDP growth	-.2713293	-2.4181	1.4615	8,367

Table III: Sensitivity analyses

Variables	Municipal FE	No January	No extremes	No suburbs
Meeting rate * 2005	-0.131	0.002	0.100	-0.002
	(0.196)	(0.338)	(0.367)	(0.330)
Meeting rate * 2006	0.447**	0.787***	0.768**	0.605**
	(0.196)	(0.277)	(0.319)	(0.264)
Meeting rate * 2007	-0.286*	-0.004	-0.388	-0.128
	(0.160)	(0.205)	(0.274)	(0.221)
Meeting rate * 2008	-0.844***	-0.424*	-0.903***	-0.496**
	(0.260)	(0.231)	(0.321)	(0.236)
Meeting rate * 2009	-0.609**	-0.216	-0.274	-0.315
	(0.283)	(0.320)	(0.379)	(0.292)
Meeting rate * 2010	-0.615**	-0.097	-0.213	-0.152
	(0.289)	(0.293)	(0.284)	(0.195)
Meeting rate * 2011	-0.621	-0.156	0.056	-0.174
	(0.488)	(0.400)	(0.384)	(0.366)
Municipality FE	YES			
Year and month dummies	YES	YES	YES	YES
Municipal variables		YES	YES	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table IV: Piecewise constant estimations

Variables	(Piecewise smoothed)
Meeting rate * 2005	0.090
	(0.322)
Meeting rate * 2006	0.757***
	(0.259)
Meeting rate * 2007	-0.102
	(0.210)
Meeting rate * 2008	-0.378
	(0.233)
Meeting rate * 2009	-0.138
	(0.323)
Meeting rate * 2010	-0.063
	(0.279)
Meeting rate * 2011	0.026
	(0.375)
Municipal variables	YES
Month dummies	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table V: Including both FE and municipal variables

Variables	(Cox smoothed)
Meeting rate * 2005	-0.407
	(0.251)
Meeting rate * 2006	0.555***
	(0.182)
Meeting rate * 2007	-0.264**
	(0.122)
Meeting rate * 2008	-0.740***
	(0.242)
Meeting rate * 2009	-0.518*
	(0.283)
Meeting rate * 2010	-0.505
	(0.310)
Meeting rate * 2011	-0.495
	(0.375)
Municipal variables *and* FE	YES
Month dummies	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table VI: Placebo test for QB1

Variable	Cox instrument QB1
QB1 placebo dummy	0.050
	(0.031)
Municipal variables	YES
Year and month dummies	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: The placebo dummy is constructed by interacting the treatment indicator with a time period a year prior to when the experiment took place. The dependent variable in this Cox regression is the vacancy duration.

Table VII: Placebo test for QB2

Variable	Cox instrument QB2
QB2 placebo dummy	0.008
	(0.039)
Municipal variables	YES
Year and month dummies	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: The placebo dummy is constructed by interacting the treatment indicator with a time period a year after the experiment took place. The dependent variable in this Cox regression is the vacancy duration.

Geographical location of municipalities from figure 1