Analyzing how ALMPs affect the demand side of the labor market

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

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Our aim in this paper is to investigate the causal effect of meetings between case workers and unemployed workers on the duration of vacancies posted by firms. An impressive body of previous work has established a remarkable effect of meetings on individual unemployment duration. However, little work has been done in analyzing the effect on the demand side of the labor market. We argue that case workers make search more effective and hence contribute to reducing vacancy durations. We exploit a unique Danish data set derived from various sources, containing the timing of meetings between unemployed workers and case workers, the number of new vacancies, the stock of vacancies and individual vacancy duration. By applying the Cox proportional hazard model we are able to identify 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 main results suggest that meetings reduce vacancy duration in the pre-crisis period (2005-07), whereas no effects are found for the post-crisis period (2009-11). This suggests that the labor market would benefit from a cyclicality-oriented approach to ALMPs with the supply side being stimulated in economic upturns and the demand side being stimulated in downturns.[1]

JEL-Classification: J2, J6, J23
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Contents

1 Introduction

An impressive body of previous work has established a remarkable effect of meetings with caseworkers on individual unemployment duration, see e.g. Rosholm (2013). However, to our knowledge, no work has been done on how these meetings affect labor demand, which is crucial for establishing whether an impact at the level of the individual unemployed worker translates into general equilibrium effects and may reduce the overall unemployment rate rather than just lead to a reshuffling of a given number of jobs. Likewise there is little information about the importance of different hiring channels in the attempt to fill in vacancy. Since meetings play important role in reducing unemployment one can argue that they are important channel for hires. The main goal of this paper is to develop new empirical evidence which can aid understanding of the effect of meetings on vacancy duration. We also explore how does the answer changes depending on the market thightness. Finally, we want to see if at all the effect of meetings on vacancy duration varies when we take into account gender and skill level of the unemployed. These questions are addressed exploiting a unique Danish data set derived from various sources, containing individual unemployment duration, the precise timing of meetings between unemployed workers and case workers, and all new vacancies posted on the internet, the duration of each of these vacancies. There are both observed and unobserved factors that determine how fast one vacancy will be filled across municipalities, and these factors are directly or indirectly related with the meeting rates. For instance one can argue that higher unemployment may drive higher meeting rates and can also shorten vacancy duration if there are more workers applying for the same stock of vacancies. Or some other unobserved variable may jointly determine both high meeting rates and high probabilities to fill in vacancies Thus in order to eliminate the potential for endogeneity we use data from two different social experiments run in 2005 and 2008 in different municipalities in Denmark. The choice of municipalities was not random but when we look at the municipalities characteristics before the quasi-natural experiment took place we can safely conclude that there are no significant differences between the municipalities. With the random variation in the meeting rates we could safely infer casual relationship of meetings on vacancy duration. Specifically, we apply parametric and semiparametric duration models to identify the causal effect of meetings on the vacancy duration.

Background

The Danish model of the labor market has received much attention in the rest of Europe lately, because it has been able to sustain high participation rates and low unemployment rates during the past 15 years. Especially the structural unemployment rate estimated at 3.5% is noticed. It has been argued that the key to this successful performance is the Flexicurity model. The Flexicurity 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 culprit. Still, the direct effects on earnings and employment

at the level of the individual participant in active labor market programs are very often negligible (and often negative), see e.g. Heckman et al. (1999), Kluve & Schmidt (2002) and Fertig et al. (2006), and this is also the case in Denmark. Hence, there must be other aspects of labor market policies, for the argument made above to hold. The tightening of the active labor market policies was initiated in 1994 and has been continued until 2003, and it has consisted of earlier (and more frequent) mandatory activation periods, earlier and more frequent meetings with case workers, more strict enforcement of search requirements, and increased use of sanctions in the case of non-compliance to these rules. We build our analysis on the JSA literature and in particular on the branch, which provides evidence that meetings with case workers are effective in reducing unemployment duration. This effect, as the literature suggests, is shaped by three different forces.

1. The threat effect of ALMPs, see e.g. Rosholm & Svarer (2008), Rosholm (2008), Geerdsen (2006), Geerdsen & Holm (2007) and Pedersen et al. (2012). Namely, the programs were not effective in themselves, on the contrary, but the perceived threat of having to participate continuously in ALMPs led unemployed workers to leave the unemployment queue before entering the 'active period'. The threat effect has also been documented by researchers in other countries, most notably by Black et al. (2003), but also by e.g. Hägglund (2006).
2. The direct effect of meetings on labor supply, see e.g. van den Berg et al. (2012) and Pedersen et al. (2012). Meetings reduce unemployment duration and/or increases subsequent employment duration. The importance of meetings has also been documented in the international literature, see e.g. Dolton & O'Neill (1996; 2002), Ashenfelter et al. (2005) and McVicar (2008). Rosholm (2013) presents the evidence and discusses policy implications.
3. Sanctions, if any, are determined at meetings see , see e.g. Svarer (2010). 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 & Vikström (2009).

All these aspects that have been shown to work well are closely related to meetings between the unemployed and case workers; threat effects occur presumably once the unemployed is made aware of the activation threat, and this typically happens during meetings with a case worker. Meetings provide job search assistance and hence may directly affect job finding rates, and finally, monitoring of compliance with search activity and other requirements takes place at meetings. Hence, meetings appear to be a crucial element in an active labor market policy.

In spite of this positive effects of meetings on labor supply there is little knowledge how meetings affect labor demand. In this paper we take the number of vacancies as a proxy measure of labor demand and attempt to analyse 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 facilitate the matching between vacant position 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 respective costs go down. However there is little understanding on the sources that affect vacancy duration. In particular we want to analyze how the probability to fill in vacancy depends on the meeting intensity.

Compare to other studies we use much better measure for labor demand as in the vacancy data we use we have information for posted vacancies extrapolated from many different sources. However, we still expect significant measurement error of the vacancy statistic. Standard assumption is that the vacancies are filled in by unemployed workers. However many of the vacancies could be taken by current employees in the firm and in that way nothing is gained in terms of general equilibrium employment. We cannot know from our data who has taken the vacancy nor if it has been taken down. Anyways if we assume that unemployed workers do not really care about the real vacant statistic but rather that there are enough available vacancies they can apply for we can argue that the error of the vacancy statistic is ignorable. Also there is no reason to believe that this error is higher in particular municipalities thus we can safely infer conclusions.

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 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 has some sensitivity analyses, and in section 7 we conclude and discuss policy issues. In the appendix we present the results from the sensitivity checks not included in the main body of the paper.

2 Theoretical model and considerations

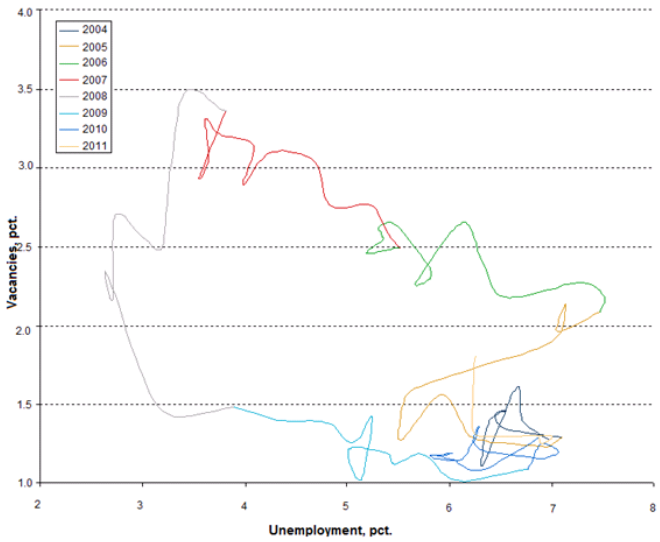
Below we discuss some hypotheses that may be derived from theoretical considerations. Attending meetings with case workers may enable workers to search more or more effectively, hence reducing the time they spend looking for work and hence reducing unemployment duration. This has been established in the literature already, cf. the discussion above. Now, if the search market is subject to a musical chairs constraint (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 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, 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. Hence, it will be important to allow for cyclical variations in the impact of meetings on vacancy duration.

The figure 1 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 1: The Beveridge curve



Source: Danish Economic Council, semiannual report fall, 2012

3 Institutional settings and data

Institutional settings

There are 91 job centers spread across the municipalities, which are responsible for effectuating ALMPs in Denmark. Over the year two elements stay important for the administering of ALMPs. First it is a system characterized by a right and duty scheme, which in short means that in order to claim a right a person must fulfill his duties. In this labor market setting it translates into the unemployed individual having to search actively for a job and willingly participate in any sort of labor market program he is assigned to by his caseworker. The default is that they have a right to participate in education program for 6 weeks. They are obliged to participate in one if they have been unemployed for 9 months if they want to claim right to UB. Different rules apply for unemployed workers bellow 25. Thus in our study we only look at the unemployed above age 25. Second feature that characterize the ALMP institutional setting is the frequent contact between the unemployed and the job center. All unemployed have to make CV available in the first four weeks of unemployment and they must go to a mandatory meeting every 3rd month. Meetings between caseworkers and unemployed individuals consequently have a threefold purpose; 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. All of these measures 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, serve 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, T. M. (2006) for a more detailed discussion on 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 newspapersjob centers, job data bases, 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 1 September 2013. (Source: jobindex.dk)

Table 1: Sources of vacancies

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

However, we can calculate the duration of the individual vacancy only from 2004 as before there is no information in the dataset about the end date of the vacancy.

Furthermore we have can follow vacancy until 2011. In order to assess the cyclical variation over symmetric pre/post crisis period we restrict our focus on the 2005-11 period. The data that covers the period from January 2005 through December 2011 enables us to capture any variation across a major cyclical upturn and downturn. In Denmark, the period 2005-7 was characterized by very low unemployment and an economy at the brink of overheating, while 2009-11 was the deepest downturn experienced for a very long time with a 7In some of the estimations, 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 show that our results are robust to such specification.

Figure 2 shows the number of new vacancies in a given month and average vacancy duration.

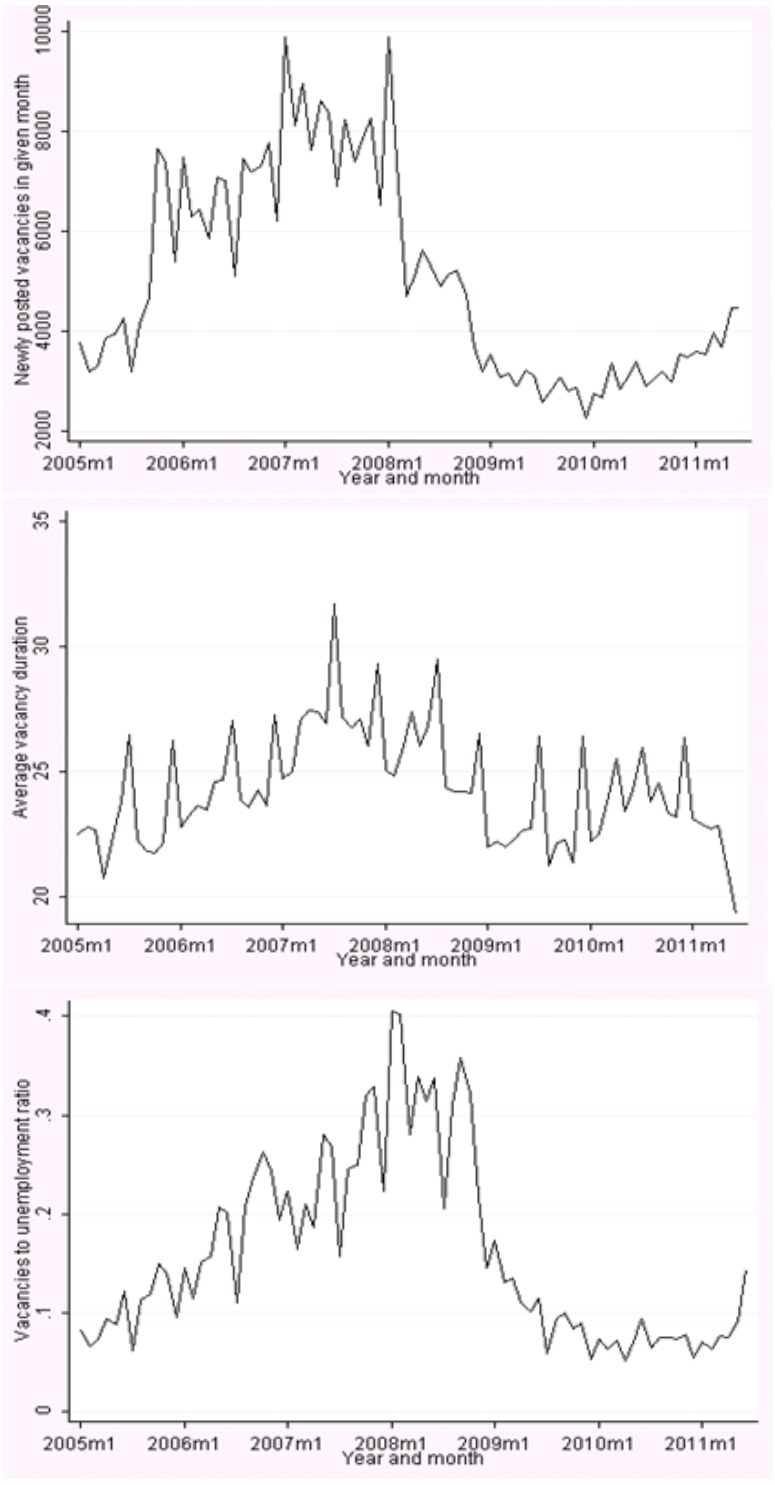
From figure 2 it is clear that there have been significant cyclical fluctuations in the average duration of vacancies as well as in the quantity of newly posted vacancies per month. . In our data 12

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. It is natural to expect a strong correlation between the two first measures as the increased posting of vacancies will result in an overflow of vacancies, consequently contributing to further tightening the labor market.

From the DREAM database maintained by the national labor market authorities, we have data on the precise timing of meetings for each unemployed worker in the country from 2005 onwards. One qualifies as unemployed if it has been actively looking for job for at least three weeks. From here we can calculate aggregate measure of the meeting intensities by job center. Additionally, from the Danish economic council, we have obtained access to monthly 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 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 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 ALMP in a variety of measures, 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 group weekly meetings with case workers and around 10 other unemployed workers during the first 4 months of unemployment, mandatory program participation for 3 months thereafter, and an

Figure 2: Newly posted vacancies, Average vacancy duration, and V/U ratio



initial job search assistance course. QB2 was in fact a set of 4 different experiments run in different regions. The treatment in QB1 was combination intensified meetings and early activation. QB2 was designed in such way that we could separate the effect of each element in QB1. One of the experimental region mimics QB1 such that the treatment group was attending biweekly group meetings after the week 14 they had to participate in training program. In order to separate the effect of meetings from the effect of early activation in one of the experimental region the treatment group had to attend a weekly group meetings for 14 weeks while in another experimental region the meeting rates did not change but the unemployed workers had to participate in a program from week 14, which is earlier than the standard. The last experiments that run in the region of Sealand consisted of biweekly meetings with caseworkers during the first 3 months of unemployment and they were not activated in any program earlier than the control group. Randomization took place within job centers, so meeting intensities were increased for about 50

Our dependent variable is the individual vacancy duration, which is the variable we expect to be most directly affected by the meetings. In addition, we will also investigate impacts on the number of new vacancies opened in a job center in a given week. 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. We also produce a 5 week centered moving average of the meeting rate, called the smoothed meeting rate. We include dummies taking the value 1 when QB1 and QB2 are taking 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.

Table 2: Summary statistics

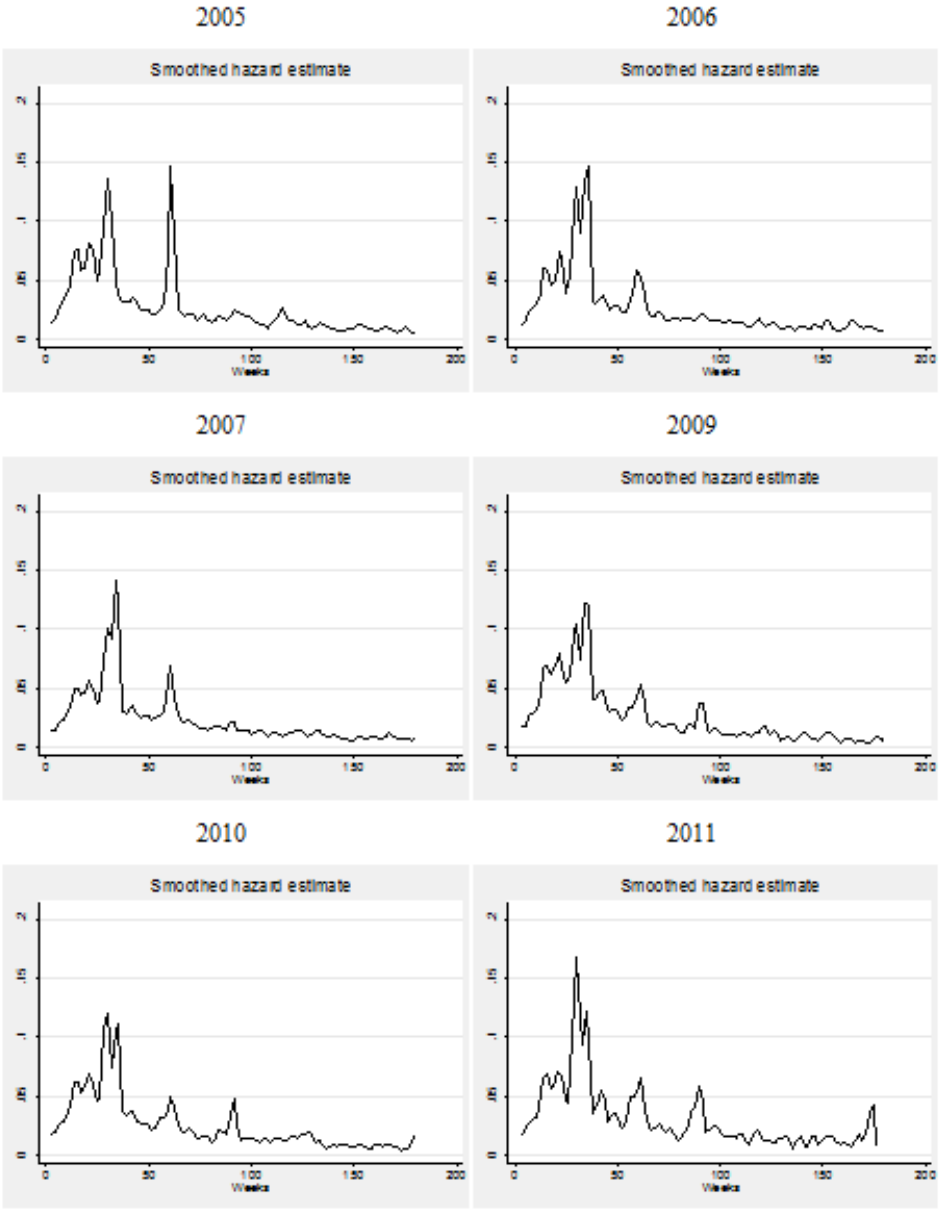
	Mean	Minimum	Maximum	Obs
Vacancy duration	24.6770	1	182	1604512
Meeting rate, smoothed	0.1020	0.0048	0.41198	1604512
Meeting rate, raw	0.1047	0	0.7192	1604512
V/U ratio	0.1496	0	3.9090	1604512
GDP growth	0.1496	-2.4181	3.8904	1604512

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. It is evident that our data contains dramatic fluctuations in both V/U-ratio and GDP-growth, the latter even being negative in the period following 2008. Summary statistics for municipalities participating in QB1 and QB2 are displayed in the appendix.

Below are inserted six separate Kaplan-Meier graphs, 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.

The municipality randomization is essential and safe way to attribute any dif-

Figure 3: Kaplan-Meier hazards for separate years



ference in the municipalities solely to the meeting intensities. From figure 4 we compare the vacancy hazard rates three months before the QB1 experiment took place for the municipalities that participated and the remaining municipalities in Denmark there is no significant difference in the exit rate. Three months after the experiment we can see that the hazard rate for the experimental municipalities went up. The effect of meetings is not immediate but if they do affect the probability of finding a job and of filling a vacancy this is something that we should see in about 3 months. We repeat the same for QB2, in figure 5. However here we do not see shorter vacancy duration after the experiment. On the contrary the experimental municipalities used to have higher exit rates before the experiment took place. Even when we restrict our focus to Sealand, we do not see positive effect of meetings. The upshot 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 from QB2 could indicate that in times of economic slowdown intensified meeting may not be an effective measure.

Figure 4: Vacancy duration before and after QB1, control and treatment

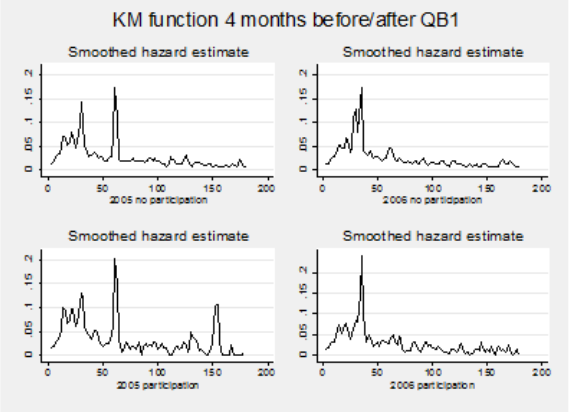
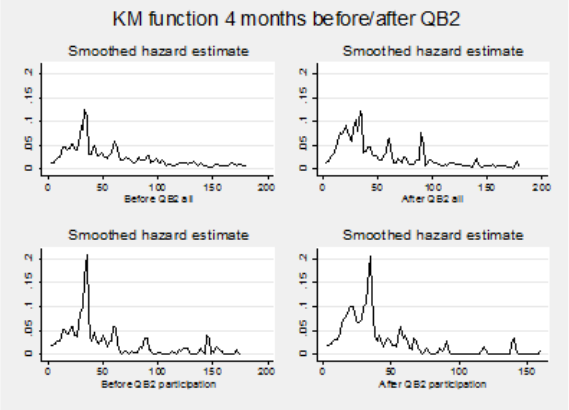


Figure 5: Vacancy duration before and after QB2, control and treatment



4 Econometric specification

The estimations are carried out using proportional hazard models, which estimate the exit rate from a given state controlling for observed heterogeneous characteristics. We use both parametric approaches with a piecewise constant baseline specification as well as a semi-parametric approach based on the Cox partial likelihood estimator 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:

$$\theta(t|x) = \lim_{dt \to 0} \frac{P(t <= T < t + dt | T >= t, x)}{dt = f(t)/S(t)} \tag{1}$$

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

$$\theta(t|x, \beta) = \theta_0(t)\psi(x, \beta) \tag{2}$$

in which $\theta_0(t)$ denotes the baseline hazard capturing any duration dependence, and $\psi(x(t))$ is a function of observed time-varying characteristics x(t). 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

$$\psi(x, \beta) = exp(x'\beta) \tag{3}$$

The estimated parameters are subsequently reported as hazard ratios, $exp(\beta_i)$. 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. Two factors can affect the meeting intensity. We see variation across job centers and time. Table 3 below displays the share of the standard deviations variance in meeting intensity, which can be explained by job centers and time respectively, in order to decompose the sources of variation in 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 case workers on vacancy durations, which are outcomes on the other side of the market. Hence, the direct link between treatment and outcome is not as close as is usually the case when estimating treatment effects.

Moreover, vacancy duration is 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, after the observation period used in this study. Still, one might worry that job centers react to changes in the labor market by adjusting labor market policy, including meeting rates. For example, firms can complain to job centers about problems in hiring workers, and the job centers may react by increasing meetings intensities, trying to stimulate job search. In this case, we should expect a positive bias, i.e. long vacancy durations are 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.

Since meetings take place at the municipal level, there are bound to be significant differences 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 aggregate individual vacancy and unemployment data, GDP growth rates, local use of activation policies, and composition of the work force More specifically, we include control variables, which cover share of activation type, e.g. activation through education or training, subsidized employment in private and public entities, and measures for skills and qualification among the unemployed. Such measures are normalized by number of unemployed in a given municipality.

The rules regarding meetings intensities are minimum rules, but are not always followed, and in any event, it is possible to hold more meetings than required by the rules. However, with a certain number of case workers, and the slow evolution of the number of unemployed workers, the variation (as shown below) is much larger between than within job centers. Hence, the approach of controlling as much as possible for local conditions dominates the municipal fixed effects approach, which would rely only on variation which is more likely to be endogenous (qua the argument made above) and more sparse. This argument is supported by the regression analysis in table 3.

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

The above table 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.

5 Results

In this section we present our findings of the effects of meetings on vacancy duration. Table 4 contains the estimated Cox hazard ratios (ψ) from equation 3 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.

Given that the estimates are hazard ratios, a value >1 indicates a positive relationship, whereas a value <1 suggests a negative relationship. The municipal variables include share of unemployed workforce at municipality level with different skills, e.g. untrained individuals, highly educated individuals etc., and economic measures such as GDP-growth local V/U-ratio, and shares of unemployed individuals in various activation programs. 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 duration, 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%. 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 on 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 vacancy duration, we estimate a model, where the smoothed meeting rate is interacted with the year dummies for our sample period.

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 figure 1, 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

Table 4: Estimation results for meeting intensities

Variables	(1)	(2)	(3)	(4)
Meeting rate, smoothed	0.968			
	(0.149)			
Year 2005	1.246***	1.261***	1.244***	1.244***
	(0.051)	(0.044)	(0.039)	(0.039)
Year 2006	1.150***	1.156***	1.143***	1.143***
	(0.037)	(0.034)	(0.031)	(0.031)
Year 2007	1.017	1.025	1.018	1.018
	(0.024)	(0.019)	(0.017)	(0.017)
Year 2009	1.197***	1.204***	1.199***	1.199***
	(0.029)	(0.027)	(0.028)	(0.028)
Year 2010	1.122***	1.127***	1.123***	1.123***
	(0.028)	(0.026)	(0.026)	(0.025)
Year 2011	1.183***	1.186***	1.186***	1.186***
	(0.034)	(0.033)	(0.034)	(0.033)
Meeting rate, raw		1.098		
		(0.087)		
Quickly Back 1 * time			1.110***	1.110***
			(0.035)	(0.035)
Quickly Back 2 * time			0.977	
			(0.027)	
Quickly Back 2, Sealand * time				0.956*
				(0.026)
Municipal variables	YES	YES	YES	YES
Month dummies	YES	YES	YES	YES

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

Table 5: Estimation results interacting with year dummies

Variables	(Hazard ratio)
Meeting rate * 2005	1.101
	(0.356)
Meeting rate * 2006	2.083***
	(0.545)
Meeting rate * 2007	0.903
	(0.194)
Meeting rate * 2008	0.642*
	(0.153)
Meeting rate * 2009	0.880
	(0.283)
Meeting rate * 2010	0.922
	(0.254)
Meeting rate * 2011	1.039
	(0.390)
Municipal variables	YES
Month dummies	YES

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

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 a sanction, 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.

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 hazard 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:

$$\lambda(t|x,\theta) = \omega(x,\beta)\lambda_m; \quad a_{(m-1)} \leq t < a_m \tag{4}$$

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 2, 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 available upon request, but 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, 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.

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 intensity and the raw meeting measure, both with very similar outcomes.

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

Variables	Cox smoothed	Cox raw	Cox instrument
Meeting rate * 2005	1.376		
	(0.557)		
Meeting rate * 2006	1.660*		
	(0.472)		
Meeting rate * 2007	0.860		
	(0.231)		
Raw meeting rate * 2005		1.298	
		(0.410)	
Raw meeting rate * 2006		1.406*	
		(0.259)	
Raw meeting rate * 2007		0.961	
		(0.155)	
Quickly Back 1 * time			1.086***
			(0.033)
Municipal variables	YES	YES	YES
Year and month dummies	YES	YES	YES

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

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

Variables	Cox smoothed	Cox raw	Cox instrument
Meeting rate * 2009	2.716***		
	(0.722)		
Meeting rate * 2010	0.763		
	(0.228)		
Meeting rate * 2011	0.850		
	(0.350)		
Raw meeting rate * 2009		2.126***	
		(0.355)	
Raw meeting rate * 2010		0.969	
		(0.187)	
Raw meeting rate * 2011		1.110	
		(0.264)	
Quickly Back 2 * time			0.992
			(0.040)
Municipal variables	YES	YES	YES
Year and month dummies	YES	YES	YES

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

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, whereas QB2 is still insignificant just like the negative estimates for the post-crisis model.

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 the appendix, do not appear to be significantly different from when January is included in the model.

Estimations using municipal fixed effects and leaving out extreme durations

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 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.

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.
Our results suggest that one should consider 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 an unemployed worker receiving counseling from a case worker at the job center, may benefit from the counseling because he or she is inexperienced at job search and 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 case worker 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 ALMP. 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 more job creation, or at least to shorter vacancy duration, during downturns.

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Appendix

Table VIII: Summary statistics for municipalities in the QB1 experiment

	Mean	Minimum	Maximum	Obs
Vacancy duration	22.7214	1	182	172571
Meeting rate, smoothed	0.1189	0.0048	0.4198	172571
Meeting rate, raw	0.1224	0	0.6392	172571
V/U ratio	0.1158	0.0045	0.9560	172571
GDP growth	0.1456	-2.4181	3.8904	172571

Table IX: Summary statistics for municipalities in the QB2 experiment

	Mean	Minimum	Maximum	Obs
Vacancy duration	22.6849	1	182	58660
Meeting rate, smoothed	0.1125	0.0088	0.2489	58660
Meeting rate, raw	0.1148	0	0.5356	58660
V/U ratio	0.0758	0	0.4343	58660
GDP growth	0.1892	-2.4181	3.8904	58660

Table X: Cox estimations including municipal fixed effects

Variables	Cox smoothed
Meeting rate * 2005	0.877
	(0.172)
Meeting rate * 2006	1.563**
	(0.306)
Meeting rate * 2007	0.751*
	(0.120)
Meeting rate * 2008	0.430***
	(0.112)
Meeting rate * 2009	0.544**
	(0.154)
Meeting rate * 2010	0.541**
	(0.156)
Meeting rate * 2011	0.537
	(0.262)
Municipality FE	YES
Year and month dummies	YES

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

Table XI: Piecewise constant estimations

Variables	Piecewise smoothed
Meeting rate * 2005	1.094
	(0.352)
Meeting rate * 2006	2.133***
	(0.553)
Meeting rate * 2007	0.903
	(0.189)
Meeting rate * 2008	0.685
	(0.160)
Meeting rate * 2009	0.871
	(0.281)
Meeting rate * 2010	0.939
	(0.262)
Meeting rate * 2011	1.026
	(0.385)
Municipal variables	YES
Month dummies	YES

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

Table XII: Leaving out January

Variables	(Cox smoothed)
Meeting rate * 2005	1.002
	(0.338)
Meeting rate * 2006	2.196***
	(0.608)
Meeting rate * 2007	0.996
	(0.204)
Meeting rate * 2008	0.655*
	(0.152)
Meeting rate * 2009	0.806
	(0.258)
Meeting rate * 2010	0.908
	(0.266)
Meeting rate * 2011	0.855
	(0.342)
Municipal variables	YES
Month dummies	YES

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

Table XIII: Omitting extreme vacancy durations

Variables	(Cox smoothed)
Meeting rate * 2005	1.307
	(0.366)
Meeting rate * 2006	1.740*
	(0.567))
Meeting rate * 2007	0.841
	(0.167)
Meeting rate * 2008	0.665***
	(0.090)
Meeting rate * 2009	0.687
	(0.204)
Meeting rate * 2010	0.637*
	(0.155)
Meeting rate * 2011	0.723
	(0.252)
Municipal variables	YES
Month dummies	YES

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