Job Vacancies and Unemployment in Switzerland 2006-2014:

Labor Market Mismatch and the Significance of Labor Market Tightness for Unemployment Duration

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Final Report

August 9, 2017

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Acknowledgement

Executive summary

Interestingly, the literature points to a drifting apart of the unemployment rate and the vacancy rate since 2009 as the vacancy rate grew more rapidly than the unemployment rate fell. Among the reasons the literature cites for this drifting apart figures labor market mismatch. Understanding the changing relationship between the unemployment rate and the vacancy rate and, hence, trends in labor market mismatch is of particular interest. This study therefore aims at answering the question of how labor market mismatch has developed over the period 2006-2014. Labor market mismatch analyses presuppose refined measures of relevant submarkets, indicating which vacancies are accessible to given jobseekers. These measures are also used to answer a second set of questions, namely, how labor market conditions in the contexts relevant to individual jobseekers affect unemployment duration, whether social groups are affected differently, and whether ALMPs vary in the relative speed of reemployment under varying labor demand conditions.

This study has tackled the four key challenges research on labor market mismatch is confronted with. These challenges include finding micro data on vacancies with detailed characteristics, choosing the appropriate level of specificity when defining geographic and occupational submarkets, properly considering flows across submarkets, and choosing which dimensions to use in defining submarkets. Successfully meeting these challenges was largely made possible by using data of the *Swiss Job Market Monitor* (SJMM), one of the rare datasets providing micro data on vacancies with detailed characteristics. The importance of accurate and validated measures with which to assess labor market mismatch is demonstrated in our study by showing, for example, that geographic mismatch would be overestimated when choosing districts (Bezirke) instead of labor market regions as the level of specificity. Likewise, ignoring flows across occupational submarkets would also overestimate mismatch.

The measures developed and validated for analyzing labor market mismatch are also of key importance for the micro analyses on jobseekers' unemployment duration under varying regional and occupational labor market conditions. Using SJMM vacancy data and AVAM unemployment data we were able to link, at the micro level, characteristics of the vacancies with characteristics of the unemployed. This made it possible to assess the role of labor market tightness in the contexts relevant to the individual jobseeker, constituting his or her job opportunities, for unemployment duration. Hence, this study is able to provide accurate estimates of variation in the length of unemployment under varying regional and occupational labor market conditions.

Our findings show that, by international comparison, although such comparisons are not without problems, labor market mismatch in Switzerland is rather low and more or less stable over the period under observation (2006-2014). Geographic mismatch varies between seven and ten percent, while occupational mismatch is in the range of eight and twelve percent. Noteworthy is that geographical mismatch is countercyclical, while occupational mismatch is cyclical with some lag in recovery. These trends are likely to stem from relatively high growth in unemployment among declining occupations during bust and relatively high growth of vacancies in growing occupations during recovery. In the absence of regional or occupational mismatch, the unemployment rate in Switzerland would fall by 0.035 to 0.05 percentage points. Take, for example, an unemployment rate of 3.3 percent in the year 2006. A decline by .05 percentage points in the absence of regional mismatch would result in an unemployment rate of 3.25 percent. Against the occupationally segmented Swiss labor market, a particularly important finding is that mismatch in the occupational submarket is lowest for the unemployed trained in VET (vocational education and training)[1] or PET (professional education and training)[2] compared to those

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[1] VET includes dual apprenticeships and fully school-based vocational education (and also Maturität und Berufsmaturität).

[2] PET includes höhere Berufsausbildung, Meisterdiplom, Techniker- oder Fachschule, höhere Fachschule.

having attained basic education only or university education. This suggests that vocational training, being the predominant training in this country, mostly provides the occupational skills employers demand.

Our findings attest that the speed of reemployment (i.e., unemployment duration) varies greatly by the conditions jobseekers encounter in the relevant regional and occupational submarkets. When job opportunities are few, indicating a loose labor market from the employer's perspective, the unemployed are slower in finding a job. For the actual geographic and occupational mismatch, the predicted mean unemployment duration amounts to 7.42 months. In the absence of both forms of mismatch, indicating a balanced number of vacancies and unemployed in all geographic and occupational submarkets, the predicted counterfactual mean unemployment duration would drop to 6.25 months, a reduction of 16 percent. Particularly, the removal of regional mismatch would contribute decisively to this shortening of the unemployment duration. The patterns of unemployment duration by social groups under varying labor market tightness conditions tend to show that more vulnerable social groups (e.g., predominantly the low educated, older unemployed, some immigrant groups, and, in some instances, women) are disadvantaged in their job search and also bear the burden of weak regional and occupational labor markets. Accordingly, the speed of reemployment of these social groups would profit to varying degrees from the absence of geographical and occupational mismatch. Most notably, VET-educated unemployed show the lowest predicted unemployment duration and a relatively low dependence on occupational job opportunities for reemployment. Finally, the study provides evidence that participants of various ALMPs (i.e., courses, internships, transient employment) depend differently on regional and occupational job opportunities for the speed of reemployment. Most noteworthy, finding a job after participation in an internship or especially in a transient employment is speeded up to a greater extent by many job opportunities in the occupational submarket compared to search duration of participants in other programs. Internships and transient employment generally aim at improving occupation-specific skills and related work experience, thus speeding up reemployment in the occupational submarket relative to other programs, particularly under favorable demand conditions. By contrast, jobseekers attending a course react more positively to better regional job opportunities than other ALMP participants in that they are relatively quicker in finding a job. As courses aim at improving jobseekers' employability in general, they should improve the chances of finding a job irrespective of the occupational skills required.

This study distinguishes itself by making several substantive contributions to the knowledge about labor market mismatch and unemployment duration in Switzerland. First, the findings add decisively to this knowledge as respective *direct* evidence has been extremely scarce to date. This study is the first one to provide *accurate* and *validated* measures of the appropriate level of specificity of submarkets, the proper flows across submarkets, and the multidimensionality of submarkets (i.e., cross-definitions). Secondly, the accurate and validated measures of vacancies accessible to individual jobseekers in the relevant labor market contexts allow to precisely estimate the impact of labor demand on job search duration, i.e., speed of reemployment. Third, the study is one of the few providing evidence whether some active labor market policies (ALMPs) fare better relative to other policies in rapidly integrating unemployed into the labor force depending on available job opportunities in the occupational and regional submarkets.

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Introduction

Across the OECD, during the years 2009 to 2011, unemployment increased, followed by a recovery in which vacancies grew more rapidly than unemployment fell (Hobijn & Sahin 2013). The scarce evidence available for Switzerland also shows, for the years 2006-2014, a trend towards increasing rates of both unemployed and vacancies as depicted in the Beveridge curve in the Appendix (Figure A1). The literature has pointed to many reasons for the drifting apart of unemployment and vacancies. One of them is labor market mismatch. Understanding the change in the characteristics of the unemployed and in vacancies and, hence, trends in labor market mismatch is of particular interest.

The first aim of this study is to provide evidence of geographic and occupational labor market mismatch in Switzerland for the critical time period from 2006 to 2014. This period encompasses the years when unemployment and vacancy rates increased simultaneously. It also covers a full business cycle. We will document the level and trend of labor market mismatch in Switzerland during this period. We are also interested in reporting whether particular social groups face worse mismatch than others. Based on the measures developed for the mismatch analysis, the second aim of this study is to show how tightness in the regional and occupational submarkets relevant to an individual jobseeker affects unemployment duration. Whether the labor market is tight or loose is considered to be the key measure when looking at how labor market conditions impact unemployment duration. This study thus helps to better understand whether jobseekers' search duration varies with the opportunities they encounter in their occupation and region. It will provide badly needed insight into whether such opportunities disproportionally impact disadvantaged jobseekers or affect the speed with which a given active labor market policy (ALMP) integrates unemployed jobseekers into the labor force relative to other policies. The contributions this study makes are thus manifold.

First, accurate and validated measures of sub labor markets (henceforth submarkets), including flows across submarkets and cross-definitions of submarkets are developed. The indispensable prerequisite for doing so was the availability of micro data on vacancies with detailed characteristics. The *Swiss Job Market Monitor* (SJMM) does provide this crucial information. The chosen approach is an improvement over previous research in this field hampered by using either highly aggregated measures of labor market conditions (i.e., national labor markets) or by relying on arbitrarily defined submarkets (e.g., administratively defined regions). However, accurate and validated measures of submarkets are needed to avoid the pitfall of generating biased estimates of labor market mismatch. Importantly, there are two sides of biased measures. When assuming too-specific submarkets, for example, the measures falsely define accessible jobs as inaccessible, leading to an overestimation of mismatch. Vice versa, too-broadly defined measures define inaccessible jobs as accessible, thus underestimating mismatch.

Second, the measures developed for the mismatch analysis are used to define labor market tightness in the submarkets relevant to an individual's job search and thereby constituting his or her job opportunities. These accurate and validated measures of vacancies accessible to individual jobseekers allow us to precisely estimate the impact of labor demand on job search duration. We thus are able to circumvent the trap that non-validated measures could bias estimates of how submarket job opportunities impact job search duration. This is an improvement over previous studies that have used very broad measures of the job opportunity structure, such as the overall unemployment rate, shifts in employment across industries or simply annual change in GDP to approximate the business cycle.

Third, the developed measures of individualized job opportunities are also applied to address the question of whether some active labor market policies (ALMPs) fare better relative to other policies in rapidly integrating unemployed into the labor force depending on available job opportunities in the

occupational and regional submarkets. The literature acknowledges that the evidence of how APLMs function under divergent labor market conditions is scare. Hence, this study advances this field by providing much needed insight into the conditions under which particular programs of active labor market policy integrate workers relatively more rapidly into the labor force compared to others.

It is not overstating the case that these contributions were largely made possible by the availability of appropriate micro-level data for the time period 2006-2014. The two major data sets used in this study are the *Swiss Job Market Monitor (SJMM)* and *AVAM* (administrative data from the unemployment insurance system Arbeitsvermittlung und Arbeitsmarktstatistik). SJMM data include annual random samples of all job advertisements in the press, on company websites, and in online job portals, covering Switzerland as a whole since 2001. This data contains detailed information on vacancies, including occupation, region, education level, and work experience, and is thus used for constructing detailed vacancy counts. The AVAM data provide monthly spells of registered unemployed with detailed information on workers' most recent occupation, town of residence, education, age, sought occupation, and the type of employment assistance received. The combined use of these two dataset provide the opportunity to link, at the micro level, characteristics of the unemployed and those of the vacancies. Our analyses are thus able to predict labor market mismatch using varying definitions of submarkets and to assess how job search duration of different groups of unemployed varies with fine-grained and validated variation in the tightness of the labor market contexts relevant to an individual jobseeker.

The first chapter of this report describes the theoretical and empirical background of labor market mismatch in Switzerland. It reports in detail the construction and validation of submarket measures and documents regional and occupational mismatch in the Swiss labor market over the time period 2006-2014. The second chapter turns the focus to labor market conditions in the submarkets relevant to an individual jobseeker and assesses how scarce and plentiful individualized job opportunities impact unemployment duration. This chapter closes with empirical findings of the speed with which ALMPs integrate unemployed in the labor force under varying conditions of labor demand in the regional and occupational submarkets. In the conclusions we present the lessons learned from this study.

Regional and Occupational Labor Market Mismatch

Labor market mismatch can be defined as a "situation in which the characteristics of unemployed workers, particularly in terms of skills, work experience, or location differ from those of the jobs that are available" (Jackman & Roper 1987). Mismatch is predominantly regarded as a type of "structural unemployment." Yet, it also shows strong cyclical overtones. During recessions workers are laid off in occupations or industries with declining demand and are hired during recovery periods in occupations or industries with increasing demand (Bonthuis et al. 2013; Dickens 2011; Dur 1999). The increase in unemployment across OECD countries during the years 2009 to 2011 followed by a recovery in which vacancies grew more rapidly than unemployment fell (Hobijn & Sahin 2013) might indicate an increased mismatch in the labor market. Hence, reliable evidence on the level and trend regarding labor market mismatch is needed.

Evidence about mismatch for Switzerland has been so far mostly *indirect*. There is evidence about trends on both the supply side of the labor market (e.g., changes in commuting and training) and on the demand side (e.g., shifts in industries and occupations). Less is known how these trends match up. With respect to potential *geographic* mismatch, for example, figures show that the percent of inter-municipal commuters has grown significantly in the past decades, from 52 percent of workers in 1990, to 58 percent in 2000, and 64 percent in 2010 (Bohnenblust 2013). The significance of this trend is unclear, however. People might commute more in order to compensate for an increase in underlying mismatch, or perhaps increasing commutes are driven by improved infrastructure, decreasing mismatch. For *occupational* mismatch, the evidence is mostly indirect as well. Job growth in high-skilled and significant losses in lowest-skilled occupations (Oesch & Menés 2011; Sheldon 2005) would indicate increasing mismatch if the skills in the work force had not increased accordingly, for which there is not univocal evidence. Analyses of wages indicate that skill level has kept up (see Puhani 2005), while relative high unemployment for unskilled youth suggests that it has not (Falter et al. 2010). Direct evidence of occupational mismatch is absolutely rare and the scarce evidence is mixed again (Kugler & Sheldon 2010; Stalder 1994). Against this background, reliable and valid measures of the level and trends in mismatch in the Swiss labor market are needed in order to better understand labor market dynamics in this country.

However, previous research on mismatch has been hampered by the problem of accurately defining and validating local or occupational "sub" labor markets (henceforth labeled submarkets). It is not overstating the case that definitions of submarkets within which workers and vacancies indeed match is fundamental for generating "true" or "correct" estimates of mismatch. This study takes mismatch research a step further in that we first develop accurate and validated measures of submarkets for Switzerland. We will then use these measures to examine labor market mismatch in Switzerland for the period between 2006 and 2014.

1. Theoretical considerations

While early work estimating labor market mismatch examined matching of vacancies and workers at the national level (e.g., Barnichon 2011; Blanchard 1989, 1990; Layard 1991; Pissarides 1986; van Ours 1991), the literature has come to acknowledge that nations are not synonymous with labor markets and that "the definition of the labor market unit is an open question in the literature" (Barnichon & Figura 2015) and "an important task for future research is to model mobility decisions across segments." Researchers agree that *submarkets* are those labor market units within which jobs and

workers match. The more challenging question is how to identify sub labor markets that meet this criterion. This study attempts to answer this question for the Swiss labor market.

1.1. Accurate and validated measures of submarkets – Three basic assumptions

Assessing previous research on submarkets we maintain that this field makes three fundamental assumptions. The first assumption refers to the necessity of specifying the level of submarkets (i.e., level of specificity). The second one adopts the idea that there are some flows between submarkets, when jobseekers switch occupations or change the geographic radius of their job search (i.e., flows across submarkets), for example. The third assumption acknowledges that submarkets, however defined, incorporate multiple characteristics simultaneously, thus requesting cross-definitions (i.e., multidimensionality of submarkets). The following three sections will develop these basic assumptions, stressing throughout the fact that previous research has not systematically tested different levels of specificity, different ways of considering flows, and varying crossed definitions. We also maintain that these shortcomings in previous research are mainly due to the lack of appropriate and suitable data, particularly the absence of multiple characteristics on vacancies.

The level of specificity of submarkets

Any description of submarket conditions presupposes the definition of what constitutes the relevant submarket. Previous research has often relied on pre-existing definitions provided by political boundaries in the case of geographic mismatch (e.g., Manning & Petrongolo 2013) or units defined by statistical offices in the case of occupational or industrial mismatch (e.g., Sahin et al. 2014). Submarkets based on pre-existing criteria are *arbitrarily* defined units, rendering questionable whether workers and vacancies really match within these so-defined spaces. This question is crucial regardless of the level of specificity at which submarkets are defined. If submarkets are not specified accurately, they either overestimate or underestimate mismatch. When researchers choose too-specific definitions of submarkets, they falsely define accessible jobs as inaccessible, leading to over-estimates of mismatch, while using too-broad definitions shows the opposite effect. This study acknowledges the necessity of testing different levels of submarkets, doing so for submarkets defined by different *occupational specificity* (i.e., 1, 2, 3, or 5 digit SBN codes) and *geographic or regional specificity* (i.e., labor market regions or districts (Bezirke)).

Flows across submarkets

Besides choosing the accurate delimitation of submarkets, flows between submarkets have been largely ignored in previous research. Flows between submarkets acknowledge that occupational, geographic, and other boundaries of interest are somewhat fluid. When researchers ignore these flows between submarkets, they neglect, for example, the fact that workers' job search strategies respond to higher demand in given occupations and regions, and thus over-estimate mismatch. The literature has suggested three approaches to consider flows. The first one weights data to include flows (see e.g., Aldashev 2012; Sahin et al. 2014). The second approach relies on incorporating directly different submarket definitions into the models being estimated (see e.g., Barnichon & Figura 2011; Gobillon et al. 2011). The third one uses post-hoc estimations to give an estimate of the extent of the problem used by Burgess & Profit (2001), for example. While previous research has provided evidence of flows between submarkets, it has not systematically tested different ways of considering flows nor validated flow-adjusted measures. This study will do exactly this. We will make use of the first approach by developing discrete and continuous weighting schemes for both geographic and occupational flows (i.e., transitions).

Multidimensionality of submarkets

The literature has clearly recognized the fact that workers and jobs match on multiple dimensions simultaneously. Workers and vacancies match, for example, on occupation, geography, educational credentials or work experience required, thus engendering different levels and trends in mismatch by subgroups of workers. The problem is, however, that subgroup estimates incorporating multiple dimensions are quickly based on small cell counts with significant error. Because of this empirical limitation mismatch by subgroup has not been thoroughly researched. Acknowledging this limitation in the present study, we will restrict our analyses to examining cross-definitions by education and work experience.

The final step in the process of developing the most accurate measures of submarkets is the *validation* of varying levels of specificity of submarkets, flows between submarkets, and separate markets within submarkets. Our estimates of "correct" submarkets will be based on the predictive power in *matching functions* (Petrongolo & Pissarides 2001) (for details see section 2 of this chapter). Once the "correct" submarkets have been identified we then explore the extent to which inaccurate specifications of submarkets would bias mismatch estimates. This exercise is meant to underscore the importance of using accurate and validated measures when the level and trend of labor market mismatch is of interest.

1.2. Labor market mismatch in Switzerland – Level and trend 2006-2014

The preparatory work for providing accurate and validated measures of submarkets now allows us to examine the level and trend of mismatch in the Swiss labor market for the period 2006-2014. This period was chosen as there is international evidence (for OECD countries) that unemployment increased during the years 2009 to 2011. In the subsequent recovery period, vacancies increased more rapidly than unemployment fell, however, (Hobijn & Sahin 2013). These trends may suggest an increase in labor market mismatch, likely to apply to Switzerland. Given the scarce direct evidence of geographic and occupational mismatch in Switzerland as reported in the introductory paragraphs to this chapter, our expectations are of exploratory character. Based on evidence of mismatch trends in other OECD countries we anticipate, for both the occupational and geographic submarkets, a modest increase in mismatch starting in 2009 (when the unemployment rate began to increase). We also expect that validating the level of specificity of submarkets, flows, and the multidimensionality of submarkets indeed matters, suggesting that mismatch estimates would be biased when ignoring this problem. With respect to subgroups of workers we expect the least educated to face most geographic mismatch as they are less likely to move than their better-educated counterparts. The highly educated may also face worse geographical mismatch than the vocationally trained as the vacancies accessible for this group will be concentrated in urban centers. Occupational mismatch should be significantly lower among those with VET credentials as they have been trained to meet demand. Finally, those having no or only limited work experience are likely to suffer most from occupational mismatch as they may not yet have shifted occupations to meet labor market demand. Mismatch estimates are based on the so-called Jackman index (Jackman & Roper 1987) (for details see section 2 of this chapter).

2. Data and methods

Data

Three main data sets are used for the analyses presented in this section. These are (1) administrative data from the unemployment insurance system (Arbeitsvermittlung und Arbeitsmarktstatistik AVAM); (2) Swiss Job Market Monitor (SJMM) data; and (3) the Swiss Labor Force Survey (SLFS).

AVAM data for the period 2006-2014 is used for unemployment counts per year, occupation, region, education level, and experience. This data set includes 20,520,681 monthly spells of registered unemployed with detailed information on the workers' most recent occupation, town of residence, education, age, sought occupation, and the type of employment assistance received. A disadvantage of administrative data is that the sample can be biased as records exclude those who do not register or qualify for unemployment insurance. This disadvantage is somewhat attenuated in the case of Switzerland as most unemployed people choose to apply for benefit given generous benefits and broad eligibility including housewives and students entering the labor market.[3] Unemployment counts based on AVAM data do indeed closely match official unemployment counts using the ILO definition of unemployment.[4]

Swiss Job Market Monitor (SJMM) data (see box on the next page) are used to construct vacancy counts per year, occupation, region, education level, and experience. Using SJMM vacancy data, for the period from 2006 to 2014 we are able to overcome a major hurdle for developing valid measures of submarkets and labor market mismatch as this data contains micro-level vacancy information indispensable for validation. For studying mismatch or labor market matching, the key limitation usually is finding quality vacancy data that includes such vacancy characteristics.

The Swiss Labor Force Survey (SLFS) data is used for constructing transition matrices measuring flows (except for the continuous geographic weights based on geographical distances). In order to encounter sufficient numbers of estimated occupational and geographic switches, we pool the years from 2010 to 2013. As of 2010, the SLFS began collecting data on a quarterly basis. We restrict our sample to employees and the self-employed working more than, or equal to, 8 hours per week, aged 16 to 64 inclusive, and who report valid information on occupation and highest education level. In our sample of 252,149 person-quarter observations, only six percent changed jobs between the current and subsequent quarter, leaving us with a substantially reduced sample of individuals. In total, occupational and geographic transition probabilities are based on a sample of 12,146 job changers spanning the four years.

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[3] The AVAM data has some other limitations. The collection of administrative data may vary across cantons, offices and even across the person in charge of the individual unemployed. Hence, there is some heterogeneity in the coding concerning the job found or the categorization of policies. This should be mostly random, however and thus not bias the results presented here.

[4] For the validation of AVAM unemployed counts compared to ILO unemployment, see Figure A2 in the Appendix. AVAM unemployed are jobseekers registered at the local office and full-time or part-time unemployed. ILO unemployment counts exclude part-time workers but include unemployed not registered at the local office or not eligible for benefits. As these concepts of unemployment differ slightly, measures of mismatch may be influenced by the data source chosen. However, given the strong correlation of AVAM and ILO unemployment, the difference in mismatch measures based on the definition of unemployment should be very small.

Defining submarkets

For defining broader or narrower submarkets, different levels of geographic and occupational segmentation are distinguished. Geographic regions are coded at two levels, one being *labor market regions* (16 units) and the other one administrative *districts* (Bezirke, 148 units). Occupations are coded at four different levels using the Swiss occupational codes (SBN 2000). At the 1-digit level there are 9 groups, 38 at the 2-digit, 87 at the 3-digit, and 380 at the 5-digit level.[5]

Weighting for flows between submarkets

Weighting matrices based on occupational and geographic transitions are used to adjust vacancy counts to capture flows across submarkets. We developed *discrete* and *continuous* weighting schemes for both geographic and occupational transitions. Weights were applied to counts of vacancies rather than the unemployed. The logic behind this is that jobs should be brought "closer" to the unemployed based on where and in which occupations workers are willing to seek work. Each transition matrix was multiplied by the vectors of vacancy counts from SJMM. (For example the weighted vector of vacancies by labor market region (LMR) would be $V^*_{LMR} = W_{LMR}V_{LMR}$. The resulting vector of vacancy counts might be, in total, more or less than those observed in the original data. As such, after weighting, the distribution was adjusted upward to keep total vacancies constant ($\frac{V^*_{LMR,i}}{\bar{V}^*_{LMR}} * \bar{V}_{LMR}$).

For geography, the continuous and discrete weights differ somewhat in what they measure. The difference is that *continuous* weights measure the accessibility of jobs independent of the past commuting patterns and job distributions while the discrete measures are based on actual past flows. For continuous geographic transitions, we estimated distances between locations using as the crow flies' measurement based on geographic centroids extracted from the Swiss Boundaries geo-files as

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[5] The Swiss occupational codes describe some occupations *in greater detail* than others. At the detailed level (5 digit-level) this may raise some concerns regarding the calculation of mismatch measures. However, at less detailed levels, these differences should hardly affect the results presented here. When analyzing detailed levels of occupations (and also regions) some *small cell counts* in the SJMM database may also be of concern. Although the overall number of job ads in this database is large, there are only a small number of job ads for some occupations and regions.

well as driving distances calculated using calls to Google Maps. These distances were combined with data from the Swiss structural census (2012) on the distribution of commuting times (140,289 commuters). The distribution of commuting times was then fit using a gamma distribution (showing the best fit with the actual data) to transform the distance matrices into the relative probabilities of commuting from one location versus all other locations based on commute time.[6] The *discrete* geographic transition matrix compares the residential location of individuals before their job change to the location of their new employment (using SLFS data). For example, 86 percent of the workers who held a job in the labor market region of Lausanne took up a new job in the same region, while six percent took up a new job in the labor market region of Geneva and two percent in Fribourg. The intent was to capture the individuals' job search radius, including both a willingness to commute and move. The matrix was then row standardized, so that a single row indicates the percent of the unemployed from a given location working in each location following their job change.

For occupations, the *continuous* and *discrete* weights differ merely in their measurement precision at differently broad definitions of occupational coding. *Discrete* occupational transition matrices are estimated using the SLFS data generating the simple probability of a changing from any single occupation to another, including individuals who changed jobs but were not necessarily unemployed in between. *Continuous* occupational transitions were estimated using the SLFS data based on the proportion of job changers making 1, 2, 3, and 5 SBN digit occupational shifts. Continuous occupation transition matrices were constructed first by generating matrices at the 1 to 5 digit occupational levels, with cell entries indicating the number of digits' distance of each occupational code to the other. The probability of digit changes was then estimated at each level. These probabilities were subsequently divided across the number of possible 0, 1, 2, 3, and 5 digit changes for each occupation. *Discrete* weights are more useful when using broad definitions of submarkets whereas *continuous* weights are more useful when using detailed definitions of submarkets. The disadvantage of *discrete* weights is that as submarket definitions become more specific and cell counts shrink, errors for discrete transitions multiply. *Continuous* weights offer us an attractive solution to such measurement error, despite the strong underlying assumption that the probability of transitioning between any pair of occupations with a same digit difference is the same (Groes et al. 2015). These assumptions are perhaps best illustrated by noting that a full 89 percent of individuals in agriculture remain in their occupation, compared to just 68 percent of those in manufacturing. Using continuous weights, it is assumed that individuals in all occupations have a 77 percent chance of remaining. In sum, continuous weights ignore many qualitative differences in directed occupational mobility but discrete weights can decrease precision of vacancy counts.

Crossed submarkets

Individuals and jobs match on multiple dimensions, which lead us to consider submarkets of geographical and occupational markets based on various dimensions. Unemployed jobseekers and vacancies are heterogeneous not only in terms of their geographic location and occupation, but also in education and work experience. Thus, we define submarkets within geographical and occupational markets, differentiating educational levels and experience groups, respectively. Four education categories are used in both the unemployment and the vacancy data: compulsory education only, vocational education and training (VET), professional education and training (PET), and universities and universities of applied science (university). Work experience is classified as required/not required in the vacancy data according to what firms mention as requirement in the job ad. In the unemployed data experience/no experience classification is based on the equation: age - years of schooling - 6 years (age at school

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[6] See Figure A6 in the Appendix.

entry) - 6 years, meaning that unemployed who have spent more than six years in the labor market are coded as having work experience and those who have spent 6 years or less in the labor market compose the group of labor market entrants.

3. Results

In this section we present and discuss the results derived from macro level analyses of labor market matching and mismatch. First, *matching functions* are used to assess the most accurate definition of submarkets in Switzerland. Thereafter, we discuss the level and trend of the geographical and occupational labor market mismatch in Switzerland and compare them with mismatch level and trends using alternative definitions of submarkets. Finally, labor market mismatch is analyzed for different groups of unemployed separately.

3.1. The accurate definition of submarkets

The literature on labor market matching and mismatch often assumes a pre-defined definition of labor markets. This means that the measures of the submarket conditions are not validated. It thus remains uncertain whether these measures depict actual submarkets found in the labor market. In addition, it is uncertain how results would differ if alternative definitions of submarkets were being used. To be able to calculate valid mismatch analyses we need to detect the most accurate definition of submarkets.

We fit labor market matching functions to validate the most accurate definitions of submarkets. Inaccurate definitions should introduce random variability into matching functions. For this reason, fitting matching equations is a viable way to validate measures of submarket conditions. We use various definitions of submarkets, varying specificity, considering flows between submarkets, and taking the potential for separate markets within subgroups by education and experience into account. Matching functions applied here consider heterogeneous efficiency, i.e., random intercepts and slopes by submarket (e.g., occupation or occupation-education) and incorporate a random year intercept and time trend. For occupations, for example, the matching function is defined as:

$$ln\left(\frac{m_{it}}{u_{it}}\right) = \emptyset + ln(p_i) + \gamma d_t + \alpha ln\left(\frac{v_{it}}{u_{it}}\right) + \epsilon_{it}$$

with occupation-specific effect p_i and time trend d_t (Petrongolo & Pissarides 2001). This method allows for testing which definition of submarkets most closely matches the empirical conditions. The results suggest which submarket is the best approximation of the labor market conditions faced by the individual jobseeker and thus provide validated measures of the accurate labor markets. They show that the most accurate *geographical* definition of the labor market in Switzerland is given by using labor market region within experience groups considering discrete flow.[7] Regarding specificity, labor market regions correspond to the broadest definition of submarkets we considered. When using more specific submarket definitions (Bezirke), model fit deteriorated. Probably, commuting or switching locations within a labor market region is very common as the respective infrastructure in Switzerland is well developed. Accessing all vacancies within the broader labor market region thus is easily realized. However, this result might stem in part from low data quality at the detailed district level, especially in the vacancy data, likely to increase errors using detailed geographic regions. Regarding flow between submarkets in every model, continuously weighted vacancy counts offered an improvement

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[7] Methodological details and more results are presented in the first draft of the paper "Defining a Labor Market and the Sensitivity of Estimates of Labor Market Mismatch" which is devoted entirely to the accurate definition of a labor market (available upon request).

over raw counts and discrete weights offered an improvement over continuous. This result provides further indication that the unemployed consider commuting or moving locations even beyond labor market regions when searching for jobs and are most likely to follow past movement patterns of job changers. Using definitions of submarkets incorporating education did not tend to improve model fit. However, incorporating experience submarkets is slightly better than not considering any subgroups. This means that somewhat separate submarkets for experienced and early-career stage workers within labor market regions exist.

The best model fits for occupational matching uses 2-digit occupations considering discrete weights and ignoring subgroups by education or experience. In terms of submarket specificity, 2-digit occupations have a slightly better fit than 1-digit occupations, though the difference is not statistically significant. However, compared to 3 or 5-digit occupations, the results show that more general definitions predict matching significantly better. With too much specificity, a submarket seems to lose its quality of a contained category. Accordingly, the unemployed are not restricted in their search to very narrowly defined occupational groups; rather they can access jobs within a broader vocational field. Weighting for discrete flow between submarkets improved the model at the 2-digit level. At higher levels of specificity, discrete weights generate worse model fits, likely to decreasing sample size, though surprisingly, continuous weights, with their lower error but stronger assumptions, do not offer an improvement over raw vacancy counts. As discrete flow weights account for occupational changes between occupational categories, jobseekers seem not to be totally restricted to the 2-digit occupation, but can switch to certain occupations that belong to different occupational groups. Labor market segmentation in Switzerland may be strong, resulting in breaking up the labor market to 38 groups (2-digit occupations), but it also is to some extent permeable (discrete flow). Breaking up submarkets by education or experience, models provide an inferior fit at the 2-digit or higher levels. In part, occupational coding may already reflect such differences. In addition, the decrease in fit using subgroups perhaps also stems from declining sample size. However, it is likely that educational levels and experience do not hinder the unemployed from accessing diverse jobs within a certain occupation.

3.2. Level and trends in occupational and geographical mismatch in Switzerland

Exploring the level and the trend of labor market mismatch in Switzerland in this section, we will use the validated definitions of the most accurate geographical and occupational submarkets defined above. We then use these measures to assess the bias in calculating the level and trends in labor market mismatch using alternative definitions of submarkets.

The mismatch index chosen for the present report is one first proposed by Jackman in the 1980s, a seminal measure of mismatch based on unemployment and vacancy shares (Jackman & Roper 1987):

$$I = 1 - \sum \left(\frac{v_i}{v}\frac{u_i}{u}\right)^{\frac{1}{2}}$$

with *v* indicating the number of vacancies, *u* the number of unemployed and *i* the given sector. The index ranges from 0 to 1. If every sector has an equal share of unemployment and vacancies (perfect structural balance), the sum across groups of the square root of vacancy shares times unemployment share will be 1 resulting in an index of 0, if there is no labor market mismatch. The further the v and u shares are off from one another, the smaller the summation gets and the index moves towards 1. When mismatch is perfect (I=1), all vacancies are in one submarket and unemployed in another. Hence,

the index can be interpreted as the proportion of observed unemployment attributable to structural imbalance.[8]

Overall level and trend in mismatch

To better understand labor market mismatch in Switzerland a brief recollection of the separate trends in vacancies and unemployment in submarkets across the observation period (2006-2014) is perhaps useful (Figures A4 and A5 in the Appendix). Unemployment largely follows economic cycles but with great variation regarding occupations. Vacancies are also somewhat cyclical, but long-term trends dominate across regions and occupations. Although all occupations suffer downturns, growing occupations have better recoveries. The long-term trend towards increasing vacancies in occupations with already high demand and low unemployment may thus contribute to increasing occupational mismatch. Figure 1 presents results for the overall level and trend in geographical and occupational mismatch using the most accurate definitions of the labor market.

Figure 1: *Trend and level of geographical and occupational mismatch using the most accurate labor market definitions*
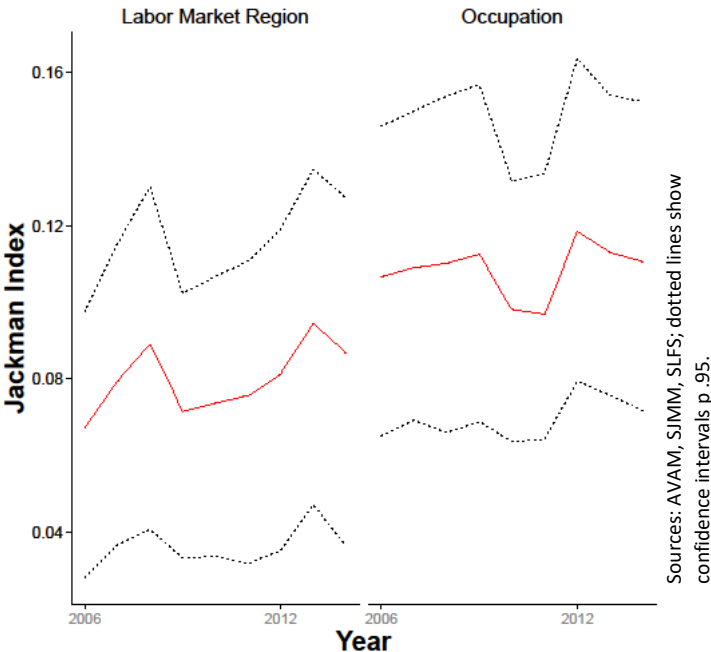
The left panel of Figure 1 illustrates geographic mismatch by labor market regions and the right panel occupational mismatch by SBN 2-digit occupations. The level of geographical mismatch varies between seven and ten percent over the years analyzed. The level of occupational mismatch is slightly higher varying between eight and twelve percent. By international comparison mismatch in Switzerland is rather low. In Germany, for example using similar definitions of submarkets the Mismatch Index is as high as 0.3 and 0.4, respectively (Bauer 2013). However, the level of mismatch is not directly comparable across countries due to the dependence of these indices on the number of submarkets. The

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[8] We also estimated results using another index proposed by Jackman (1987), namely, the summation across sectors of the absolute value of the difference between the sector's share of unemployment and its share of vacancies, indicating the proportion of the unemployed in the wrong sector. If this proportion of the unemployed was to switch sectors, there would be no mismatch. We also looked at the correlation between unemployment and vacancy share across groups (e.g., geographic unit or occupation.) In a market with no mismatch, the unemployment and vacancy shares should be perfectly correlated (i.e., for every occupation, the ratio of unemployed to vacancies should be the same), while a lower correlation between vacancies and unemployment indicates increasing mismatch. For simplicity, results are not presented here.

figures further show that geographic mismatch is countercyclical while occupational mismatch is cyclical with some lag in recovery. As expected, this pattern of fluctuations in occupational mismatch may stem from a relative high growth in unemployment among declining occupations during busts and relatively high growth of vacancies among growing occupations during recoveries. Contrary to expectations, however, both types of mismatch do not exhibit a significant long-term trend, indicating that geographical and occupational mismatch in Switzerland has been more or less stable over the past ten years. We suspect that due to increases in commuting driven by improved infrastructure, geographical mismatch remained low. And workers' skills seem to have kept up with changes in demand, particularly with growth in demand for high-skilled occupations. Further, this result is good news as it has been so far unclear whether the supply side of the labor market has been able to keep up with the changing demand structure and thus keeping occupational mismatch at a low level.

The accurate definition of a submarkets and consequences for mismatch measures

This study is the first one to measure the level and trend of labor market mismatch in Switzerland using reliable and valid measures of submarkets. It is therefore interesting to know what the level and trend of mismatch would look like when using alternative definitions of submarkets. Arbitrarily choosing a level of specificity or ignoring flows is assumed to bias mismatch calculations. This section compares different definitions of submarkets, showing how levels and trends in geographical and occupational mismatch change. This exercise provides an idea about the extent of the bias underlying most previous studies. The left and right panels of Figure 2 illustrate level and trends in mismatch using different specifications of geographical and occupational submarkets.

Figure 2: *Geographical and occupational mismatch using different submarket definitions*
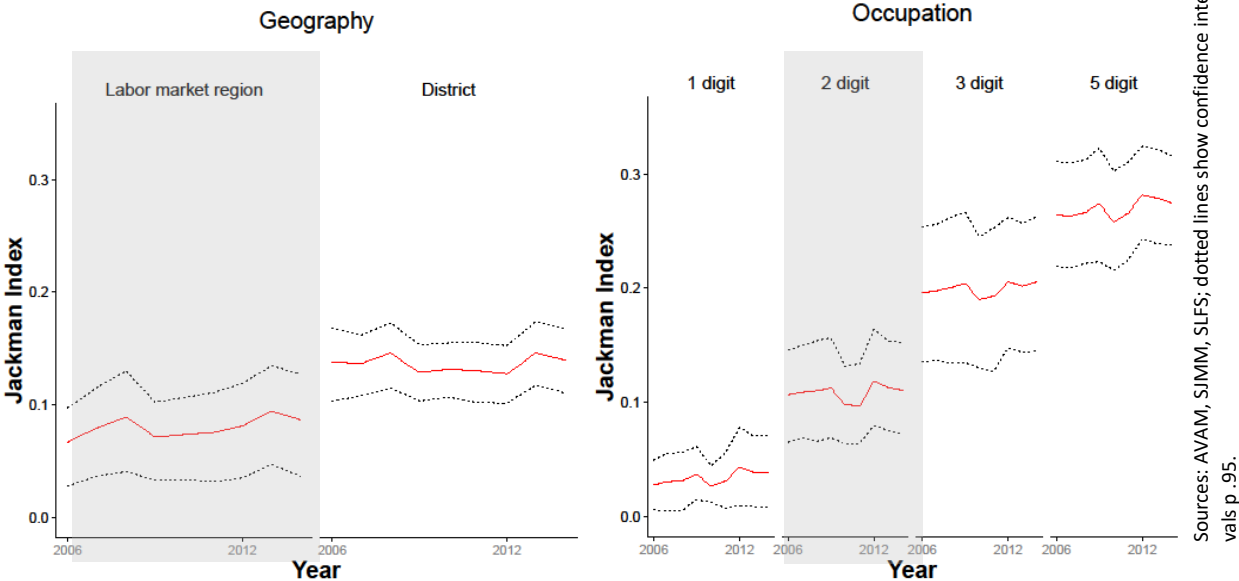
Using districts (Bezirke) instead of labor market regions increases the mismatch index from about .08 to .13. As expected, using more specific submarkets yields higher mismatch as narrow definitions make the false assumption of matching to be limited to small submarkets. Using very specific definitions of geographic submarkets also brings into play economic segregation in the metropolitan area with vacancies being more concentrated in centers than the unemployed. In addition, more specific geographical definitions introduce a relatively higher sampling error into vacancy than unemployment. Figure 2 also shows that more specific definitions of submarkets generated a slight downward trend in geographic mismatch as vacancy and unemployment distributions across labor market regions has been stable, while the distribution across smaller districts has shifted due to urbanization.

Growing occupational specificity from 1 to 2, 3, or 5-digit occupational coding increases occupational mismatch from about .5 to .26. Especially using very narrow defined submarkets (5-digit level) increases mismatch estimates sharply and mismatch is grossly overestimated. In contrast, using too broad definitions, mismatch is underestimated. Figure 2 also shows that using more specific definitions of occupational submarkets increases cyclicality. It is likely that in narrow defined occupations cyclical moves find more expression, while broader definitions should rather depict long term trends in differences between growing and declining occupations.

Figure 3: Geographical and occupational mismatch using different flow weights
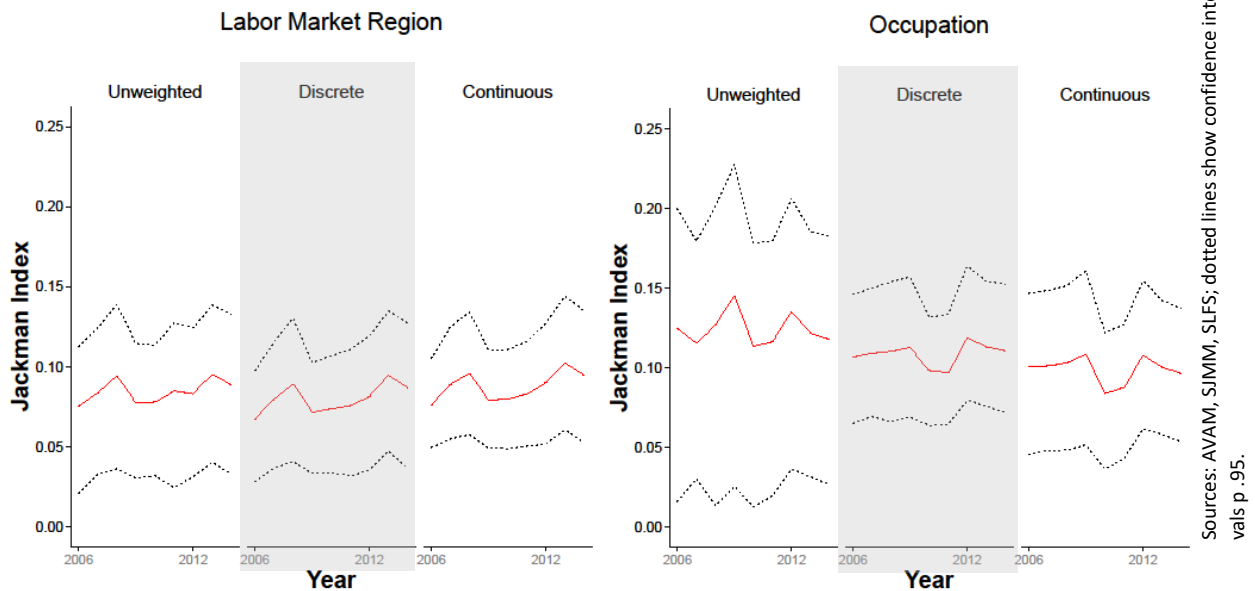
Flows between submarkets acknowledge that boundaries in the labor market are somewhat fluid. Considering flows should thus generally reduce mismatch measures since workers shift towards growing occupations and move or commute to areas with jobs. As shown in the left panel of Figure 3 for geographic mismatch, weighting does not have the anticipated effect. Mismatch levels and trends are nearly the same using discrete and continuous weights compared to using raw vacancy counts.[9] In contrast, the right panel of Figure 3, depicting occupational flows, shows the expected effect. Both types of weighting reduced occupational mismatch, suggesting that workers facing low demand in their occupation, especially during downturns, are more likely to shift towards occupations with higher demand.[10] Ignoring flows between submarkets thus leads to overestimating occupational mismatch as jobseekers' occupational flexibility is not taken into account.

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[9] For more specific definitions of geographic submarkets (i.e., district level) discrete weights would even inflate and smooth out mismatch due to increasing sample errors.

[10] For more specific definitions of occupational submarkets, discrete weights would inflate mismatch and smooth out cyclical trends due to increasing error. In contrast, continuous weights would continue to reduce estimated mismatch compared to raw vacancy counts by occupations.

Figure 4: *Geographical and occupational mismatch using different submarket crosses*
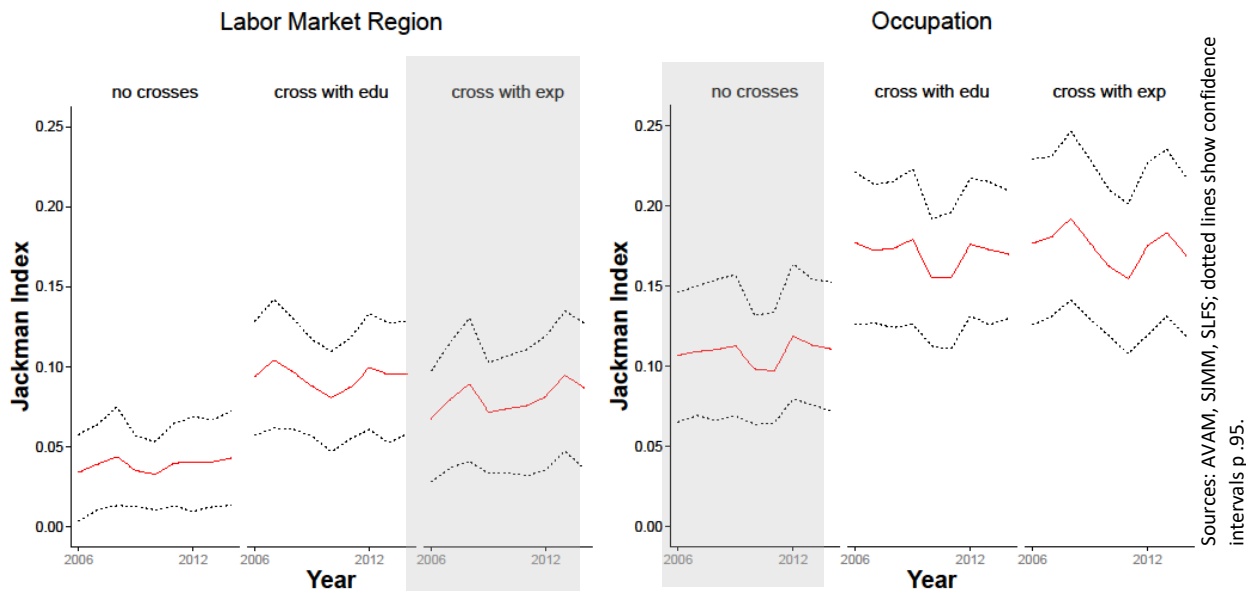
Submarkets may not only be reduced to regions or occupations but workers and jobs may also match on multiple dimensions simultaneously. Not considering such crosses should bias mismatch estimates downwards and considering them where not applicable should bias mismatch estimates upwards. When difference in matching by experience groups in geographical submarkets is ignored, mismatch is underestimated. Consideration of educational submarkets within labor market regions over-estimates, however, mismatch slightly. Crossing occupational submarkets with education or experience, occupational mismatch is overestimated. Likely, occupations at the 2-digit level are considerably segregated by education and possibly also by the level of experience. Therefore, drawing further educational or experience borders introduces bias.

The results presented so far show that the relevant labor market for unemployed jobseekers is defined rather broadly. The unemployed look for jobs in their labor market region and not only in their district (Bezirk) and even consider vacancies that are outside of their labor market region and well reachable. Similarly, the relevant occupation-specific labor market is best defined at the 2-digit level. Moreover, these occupational boundaries are also permeable. Measuring mismatch at more narrow or more widely defined submarkets and not considering flows between submarkets over- or underestimates the frictions between the characteristics of available vacancies and unemployed jobseekers. Based on this validated measures geographical and occupational mismatch in Switzerland is rather low by international comparison and rather stable during the period under observation.

Heterogeneous levels and trends in mismatch for subgroups of unemployed

In this section we use the validated measures of regional and occupational submarkets to assess whether certain groups of unemployed face worse mismatch than others or show different long term trends. We are compelled to focus on educational and experience groups as employers express their needs for education and work experience in job ads, but do not do so for personal characteristics such as gender or nationality.[11]

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[11] 1-digit occupations are used when considering occupational and experience submarkets as in cross this is the most appropriate level of specificity.

Figure 5: *Regional and occupational mismatch by education*
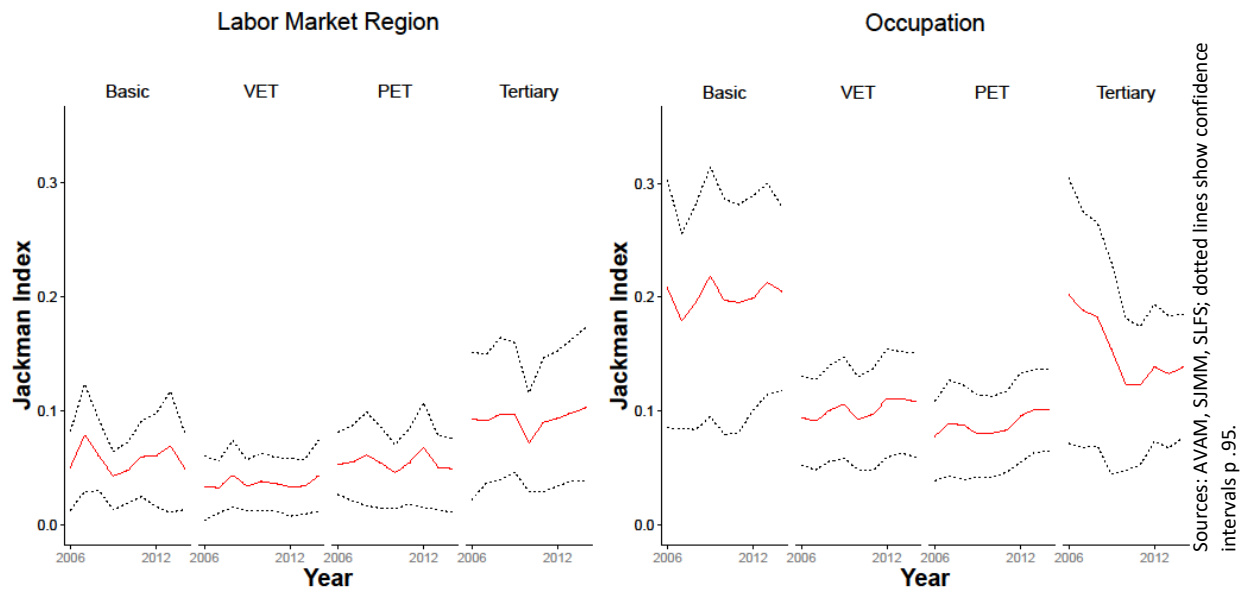
Regional mismatch is lowest among the vocationally trained and this group does not show significant variability over the business cycles or long-term trends (left panel of Figure 5). Vacancies for unemployed VET jobseekers seem to exhibit only little divergent distributions across labor market regions. The least educated, having only completed basic education, are affected by slightly stronger regional mismatch than jobseekers with VET, most likely due to their lower likelihood of moving. More importantly, they are strongly affected by economic cycles as they may be quickly laid off when specific regions experience a downturn. Jobseekers with PET are also somewhat more affected by regional mismatch than those with VET. Possibly, big companies influence the demand for PET to a greater extent in some regions, whereas jobseekers are more evenly distributed across regions. This may even hold more so for university educated as their level of regional mismatch is substantially higher than for other groups. Demand for university graduates is likely to be concentrated in the economic and administrative centers.

VET and PET unemployed have by far the lowest level of occupational mismatch compared to those having completed basic education only or university (right panel of Figure 5). Their occupational skills most likely match the skills required for filling vacancies demanding vocational training. No clear long-term trend is observable, however. Vocational training (VET and PET), being predominant in Switzerland, thus seems to provide mostly the occupational skills employers are looking for. Should supply and demand of occupation-specific skills not match, vocational training apparently allows for some occupational mobility with jobseekers adjusting to changing requirements. The low-educated unemployed face much worse mismatch than the vocationally trained, showing considerable variation over economic cycles. This suggests that the low-educated are quickly laid off during economic downturns, while vacancies created during upturns require different occupational skills due to structural developments. Finally, among the university educated the decline in occupational mismatch is striking. They faced a high level of mismatch at the beginning of our observation period in 2006. However, in the year 2014 occupational mismatch is much smaller. This trend may be attributable to the combined increase in the number of graduates from technical universities trained specifically for labor market needs and the shift in demand towards university education. A profound answer to this interesting trend would need further research.

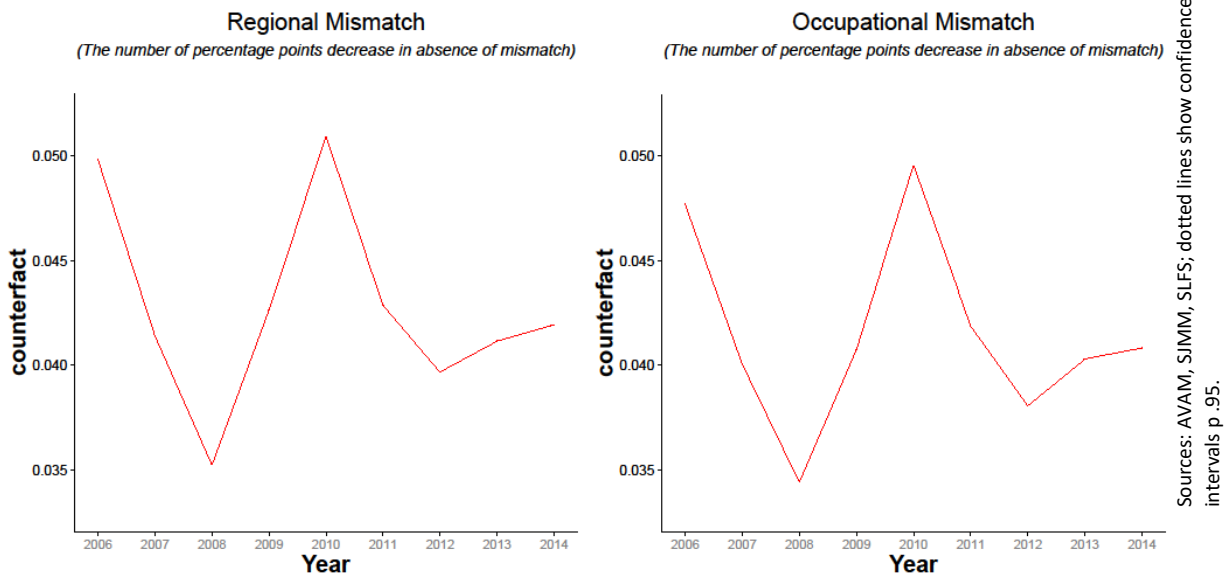**Figure 6:** *Regional and occupational mismatch by experience*
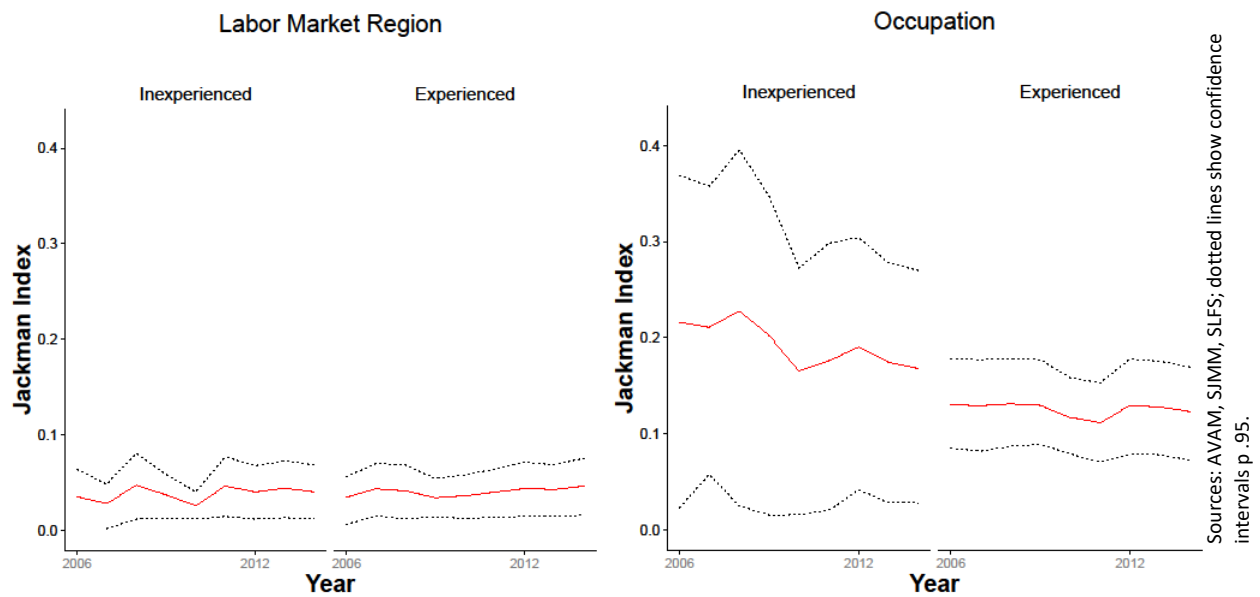
Inexperienced and experienced jobseekers are similarly affected by regional mismatch (left panel of Figure 6). However, the inexperienced seem to be more impacted by business cycles. Early-career jobseekers are likely to be laid off first when demand in specific regions deteriorates as they relatively often hold temporary work contracts.

The unemployed with little work experience suffer slightly stronger from occupational mismatch than those with at least seven years of working experience (right panel of Figure 6). Workers starting their careers may be concentrated in occupations that often provide training and may not have shifted yet occupations to meet labor market demand. More experienced jobseekers, probably facing worse mismatch due to structural shifts in demand away from their training, by contrast, seem to have changed occupations in accordance with demand. Striking is the fact that those with little experience suffer from increases in mismatch during downturns - a pattern much less observable for the experienced unemployed. Given that the mismatch index is based on unemployment and vacancy shares, this difference cannot be attributed to the simple fact that, during downturns, there are fewer jobs for those with less experience. It rather indicates that during downturns vacancies targeted at those without experience differ from the occupations of those without experience. Put differently, firms cut specific types of entry level jobs during recessions; they do not cut entry level jobs across the board.

3.3. Counterfactual unemployment: reduction in unemployment level in the absence of mismatch

An intriguing question is the extent to which unemployment would be reduced in the absence of mismatch. Related important issues are: Which proportion of the unemployment rate stems from labor market mismatch (i.e., mismatch unemployment) and which one from other factors like the speed of matching between unemployed and vacancies? Such knowledge is crucial for defining policy and indispensable for introducing accurate measures on either the demand or the supply side. Figure 7 shows the extent to which unemployment in Switzerland would be reduced in the absence of geographical or occupational mismatch. The percentage point decrease in the absence of mismatch is calculated by multiplying the Jackman Index with the unemployment rate in the respective year.

Figure 7: *Counterfactual unemployment in the absence of mismatch*

The unemployment rate in Switzerland would fall by 0.035 to 0.05 percentage points in the absence of regional or occupational mismatch (Jackman-Index=0), were vacancies and unemployed spread evenly across regions or occupations. Take, for example, an unemployment rate of 3.30 percent in the year 2006. A decline by .05 percentage points in the absence of regional mismatch would result in a counterfactual unemployment rate of 3.25 percent. In the year 2008, marked by a rather low unemployment rate of 2.6 percent, a decline by 0.035 percentage points in the absence of regional mismatch would result in a counterfactual unemployment rate of 2.565 percent. The line patterns in Figure 7 are very similar for both types of mismatch with the decrease in the absence of regional mismatch being slightly larger than in the absence of occupational mismatch. The decrease in unemployment without mismatch follows mostly the business cycle. In times of low overall unemployment, the decrease is generally smaller, while it is larger when overall unemployment is high.

Job Opportunities and Unemployment Duration

The focus of attention now turns to the question of how labor market tightness affects unemployment duration. The measures validated in the analyses based on the matching function and applied to the analyses of mismatch in Switzerland will be used to examine how the conditions in the labor market contexts relevant to an individual's job search (i.e., labor market tightness in occupational and regional contexts) impact unemployment duration. Of particular interest is how job search duration of various groups of unemployed jobseekers (i.e., by education, career stage, nationality, and gender) may differ depending on submarket tightness. In this respect, the question arises whether disadvantaged or vulnerable groups of labor market participants are disproportionally affected by unfavorable conditions, thus bearing the burden of a weaker labor market. Equally important is the question of whether different active labor-market policies (ALMPs) might vary in the relative speed with which unemployed are reintegrated in the labor market depending on labor market conditions. We need to know whether some policies fare relatively better than others when the relevant labor market contexts are tight and others when they are loose.

While there is a rich literature investigating how labor market tightness impacts unemployment duration and interacts with individual characteristics and policy, there is a blatant scarcity of empirical evidence on unemployment duration when considering submarkets relevant to an individual's job search. Mostly because of insufficient vacancy data, previous research was not able to specify and validate the job opportunities indeed available to individual jobseekers. Most studies used very broad measures of labor market tightness (e.g., overall vacancy to overall unemployment rate), thus ignoring that labor market tightness varies across locations, occupations, work experience, and educational levels. Hence, they failed to properly capture an individual jobseeker's job opportunities indicating the *accessible* vacancies per competitor. This neglect resulted in inaccurate estimates of the role of labor market tightness for job search duration. SJMM vacancy data and AVAM unemployment data used in this study provide the opportunity to link, at the micro level, characteristics of the unemployed and those of the vacancies. Our analyses are able to assess how job search duration of different groups of unemployed varies with fine-grained and validated variation in the tightness of the labor market contexts relevant to an individual jobseeker, thus making a decisive contribution to this literature. The significance of this contribution is highlighted by the assessment of the predicted job search duration for these groups assuming the absence of occupational and regional mismatch in the labor market. The contribution extends to the role of active labor market programs (ALMPs) in interaction with labor market tightness and individual characteristics for the speed of reemployment.

1. Theoretical considerations

Our theoretical considerations first assess the significance of labor market tightness in the submarkets relevant to an individual's job search for unemployment duration. Next we will elaborate on how job search duration might vary for different groups of unemployed under divergent conditions in the relevant labor market contexts. Finally, we advance considerations about how unemployment duration may vary by ALMPs when taking divergent labor market tightness into account.

1.1. Labor market tightness in relevant submarkets and unemployment duration

Unemployment duration or, vice versa, job search duration is the time until a job match is realized (Shimer 2012). Job matches involve both jobseekers searching for skill-adequate jobs and employers searching for fittingly skilled workers to fill vacancies (Gangl 2004). A major aim of economic and sociological theory is to explain how labor market conditions impact unemployment duration and

individual employment outcomes (Greve & Fujiwara-Greve 2000; Rosenfeld 1992). In fact, business cycles and labor market demand have been shown to potentially have a greater impact on unemployment duration than individuals' employment histories or individual characteristics (Shimer 2012). Another prominent indicator for labor market conditions is labor market tightness, usually measured with the ratio of vacancies to unemployment. Previous studies have primarily used *overall* labor market tightness (at the national level and, in some instances, within a geographic radius) for estimating job search duration. They thereby neglect that job seekers, given their skill sets, locations, and other characteristics, are likely to be fitting matches for a selection of vacancies in the overall labor market only. Vacancies constitute job opportunities, specifically available to the individual, only insofar as they are accessible. Consequently, job search duration (i.e., the speed with which job matches occur) depends on the availability of accessible vacancies in relation to the number of jobseekers, thus bringing the demand and supply side together (Rosenfeld 1992). What constitutes accessible vacancies is primarily subject to the labor market's reliance on skill credentialing (Blossfeld & Mayer 1988) and its regionality (Manning & Petrongolo 2013), however.

In occupationally segmented labor markets, such as the Swiss one, employers, when attempting to fill vacancies, strongly base their recruiting decisions on occupation-specific credentials and/or occupation-specific work experience of future job incumbents. Occupation-specific credentials send clear signals to employers about the skills and competences that can be expected of a future incumbent (Breen 2005; Kogan 2017; Kriesi et al. 2010). Likewise, jobseekers, having mainly invested in occupation-specific skills, look for a skill-to-job matching in order to reap benefits from their skill investments (Buchs et al. 2015; Kircher 2015) and to avoid lasting disadvantages on the labor market due to a skill-inappropriate post-unemployment job match (Gangl 2006). Under these labor market conditions, jobseekers' job prospects are strongly circumscribed by the vacancies they can access based on their occupation-specific credential and/or work experience in relation to the number of job competitors (Kriesi et al. 2010). Hence, we maintain that the stronger the tightness in the occupational submarket (i.e., from the employer's perspective), the shorter the unemployment duration.

How quickly jobseekers find a job is not solely dependent, even in occupational labor markets, upon vacancies for which they bring along the requisite skills. Search duration is also impacted by labor market tightness (or jobseekers' job prospects) in *regional* labor markets, including skill-fitting and other vacancies. Despite occupational segmentation, occupational labor markets do show some permeability (Witte & Kalleberg 1995), entailing the possibility of recruiting jobseekers for jobs outside of their acquired skills. This is likely to be the case when the labor market is tight. Under these circumstances, employers may be more willing to recruit jobseekers coming from different occupations. We thus maintain that the tighter the regional labor market (from the employers' perspective), the shorter the unemployment duration.

1.2. Labor demand and vulnerable jobseekers' unemployment duration

The literature has well established that the impact of labor market conditions on reemployment varies by individual characteristics such as education, occupation, work experience, career stage, immigration status, and gender (Berthoud 2009; Bleakley 2012; Gangl 2003; Logan 1996). The particular contribution of this study is to provide evidence of how the conditions in the labor market contexts relevant to an individual's job search, and thereby constituting his or her job opportunities, determine the unemployment duration of different groups of jobseekers. We will begin with education.

Education

Previous research has examined the unemployment risks of disadvantaged groups, attesting that the *lowest qualified* are most heavily affected by cyclical changes in economic conditions (Gangl 2000). They are dismissed first as they can be easily replaced, thus bringing little replacement costs along (Gesthuizen et al. 2011). Such findings support arguments proposed by labor queue theory (Thurow 1979), maintaining that employers fill vacancies by choosing the candidate most likely to perform to highest productivity levels on the job. Educational qualifications are one of the most important signals of productivity. Evidence from a vignette study suggests that employers use education as a signal of a job candidate's 'trainability' (DiStasio 2014). Based on these arguments we suspect that, particularly when the relevant labor market is weak (i.e., few individual job opportunities) and employers can choose among many jobseekers, unemployment duration of the lowest educated will be affected most in both the geographic and occupational submarkets. By contrast, the unemployment duration of jobseekers endowed with VET or PET credentials is expected to depend less on the labor market conditions.

Career Stage

Similar arguments apply to career stage. It is related to work experience, which is another signal for productivity. Workers in the early stage of the career bring along little work experience. Evidence on the notoriously higher youth unemployment rate compared to prime-age workers attests to this association, which is much stronger in times of low labor demand (Breen 2005; Buchmann 2017; Salvisberg & Sacchi 2014). Those in the mid-career stage are more experienced than those in the early stage of their career, thus likely to show higher productivity on the job (Maranto & Rodgers 1984). This does not extend to later stages in the career as additional work experience accrued after long years on the job does no longer translate into higher productivity. Negatives stereotypes about older jobseekers may be at work as well, making them less attractive for employers (Trageser et al. 2012). We thus suspect unemployed in the mid-career stage to show shorter job search duration compared to their counterparts in the early and late career stages, particularly when they face little opportunities in their relevant labor market contexts. Unemployed in the later stage of their career may show a particularly high dependence on job opportunities and endure the slowest exit from unemployment into reemployment.

Immigrants

In the Swiss labor market, like in those of other advanced industrial countries, we observe a bimodal concentration of immigrant labor in the least-skilled and high-skilled jobs. Immigrants tend to enter foreign labor markets via very low-skilled or very high-skilled jobs (Bernardi 2011; Drinkwater 2009; Heath 2006; Kogan 2017). Research has also shown that immigrant status is a signal that employers use when ranking potential job candidates (Lagana 2011). Being mostly a negative signal, immigrants experience greater labor market difficulties compared to natives, particularly in times of weak labor demand. Immigrants' employment penalties may arise for different reasons. Depending on the country of origin and time in the host country, a serious obstacle is the transferability of skills and credentials into the new context, often resulting in immigrants' occupational downgrading (Kogan 2017). Cebolla-Boado et al. (2014), for example, have shown that where unemployment is rising, education is less effective in ensuring continued employment for migrant populations than for the native population. They also report, for the Spanish labor market, important differences between migrant groups, with Africans and Latin Americans faring much worse when assessing their potential to prevent unemployment compared to (better-educated) migrants from Eastern Europe. Additional penalties include

language difficulties, immigrant jobseekers' lower job-search resources or discriminatory hiring practices on the side of employers (Borjas 1994; Chiswick 1979, 2002; Portes 2002). Given the multitude of potential handicaps, we first expect immigrant unemployed to experience longer job search duration than natives in both the regional and occupational submarkets. Secondly, we expect considerable variation in unemployment duration by immigrants' country/region of origin as country of origin is associated with transferability of skills, job search resources, and particular negative ascriptions by employers. Thirdly, we expect these differences to exacerbate in times of weak labor demand. As immigrants' and natives' unemployment duration in connection with varying levels of labor demand has often been examined with aggregate-level labor demand data, we advance this field by taking the relevant occupational and regional submarkets into account when assessing job search duration.

Gender

Stereotypically, married women and mothers in particular are even to date often perceived as secondary earners employed in part-time jobs. Although women often do not compete with men for jobs as the labor market still is sex-segregated to a considerably degree – more so in Switzerland than in other advanced industrial countries (Charles & Grusky 2004), they do compete in more integrated occupations in the service sector. The sex-segregated labor market makes the necessity obvious to specify labor demand in the occupational submarket relevant to an individual's job search when assessing unemployment duration particularly. The comparison of the average job search duration by gender further needs to consider that a sizeable proportion of women crowd into a few female-dominated occupations while men work in a much broader spectrum of occupations. Cyclical downturns of labor demand in one or several female-dominated occupations may thus strongly impact women, although some of these occupations (e.g., health sector) show relative modest fluctuations in labor demand. This is not the case for some of the male-dominated occupations, particularly some of the traditional, craft-type occupations in the industrial sector. The complex configuration of parameters makes it difficult to predict clean-cut gender differences in unemployment duration taking variation regarding the tightness in the regional and occupational submarkets into account. However, women, given their inferior labor market status, may experience somewhat longer unemployment duration than their male counterparts in the regional labor market. In the occupational labor market, women should have an advantage over men under favorable job opportunities as they compete only partially for jobs in the same occupational fields.

1.3. Labor market tightness and the speed of reemployment by ALMPs

The main concern here is whether labor market conditions interact with ALMPs' propensity to rapidly integrate unemployed into the labor force and whether this propensity differs by groups of unemployed, educational groups in particular. The aim is to answer the question of whether the speed with which some policy interventions (relative to others) bring participants into reemployment varies depending on available job opportunities. More precisely, we are interested in whether there are pronounced differences in these associations between regional and occupational submarkets.

The literature on how ALMPs fare under divergent labor market conditions is scarce (Card et al. 2015; Lechner & Wunsch 2009). Those studies that do consider this interaction traditionally measure labor market conditions by using the overall national unemployment rate or GDP growth, both indicating the business cycle (Lechner & Wunsch 2009). Perhaps due to this type of measurement, results of these studies are mixed. One European meta study suggests that ALMPs, particularly training programs, fare better when the unemployment rate is higher (Kluve 2010). However, an earlier study by the same author found that national unemployment rates and GDP growth play no role (Kluve 2006). Lechner and Wunsch (2009:653) also conclude that "there is not much convincing evidence between

the effectiveness of programs and the state of the economy." The argument advanced throughout this report, namely that labor conditions need to be specified for an individual jobseeker's relevant submarkets, is also used for answering the questions raised here. We maintain that it is probably less the conditions in the overall labor market that determine how rapidly particular ALMPs bring unemployed into the labor force, but the labor market contexts relevant to an individual jobseeker, thus constituting his or her job opportunities.

Besides using accurate and validated measures of the conditions in the submarkets relevant to an individual jobseeker, our study charts virgin soil as it compares how different ALMPs function dependent on individual job opportunities. Their susceptibility to labor market conditions is likely to vary. We distinguish between three groups of ALMPs according to the categorization provided by AVAM. The first group includes *courses* (Kurse) aimed at inculcating skills of how to properly apply for jobs, improving (foreign) language competences, IT skills or any other professional competence. These courses do not provide practical work experience; they rather attempt to improve the jobseeker's general employability. *Courses* are usually provided at the onset of unemployment. *Internships* (Berufspraktika, Ausbildungspraktika), organized in private companies, make up the second group of programs. They provide opportunities for the unemployed to accrue work experience in the occupation they come from. The declared objective is to help the unemployed find reemployment in their occupation. The third group includes programs offering *transient employment* (vorübergehende Beschäftigung). They offer on-the-job training in state-run programs, intending to provide a clearly structured work day and helping to update outdated occupational skills or inculcate new ones. These programs thus include both the component of improving the jobseekers' employability while at the same time increasing their occupational skill set. They are usually prescribed for longer-term unemployed.

The focus chosen for this study differs from the approach usually taken in this policy field, namely to compare ALMP participants with non-participants for establishing evidence of how well an ALMP measure functions. This approach is confronted with the so-called selection bias as unemployed are not randomly assigned to an ALPM. To acknowledge this bias methodological measures (e.g., propensity score matching) are required to isolate the effect of a program from the effects of unobserved differences in job-search relevant characteristics between those participating in a program and those who do not (see e.g., Lalive et al. 2008; Morlock et al. 2014). However, when interested in the variation of speed with which a particular ALMP (relative to others) integrates unemployed into the labor force under varying labor market conditions, the analysis can be justifiably based solely on ALMP participants as program assignment does not depend on labor market conditions (see also Lechner & Wunsch 2009).[12]

As research on the role of labor market conditions for the speed of reemployment by ALMPs is almost completely absent, we cannot rely on the literature or previous findings. The expectations advanced here are therefore not exhaustive and of exploratory character only. We expect that the number of job opportunities prevalent in the regional and occupational submarkets impact the relative speed with which the three distinguished ALPMs integrate unemployed into the labor force differently. The major reason is that some ALMPs are meant to primarily enhance employability, while others are more focused on updating occupation-specific skills and related work experience. For the former, reemployment in regional submarkets providing many job opportunities should therefore occur relatively faster, while the latter may be better placed speeding up reemployment in the occupational submarket providing many job opportunities. In particular, we suspect that unemployed, having served an *internship*, are relatively quicker in finding a job compared to those having participated in one of the *courses*

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[12] We conducted these analyses using Cox regressions and including as controls those social characteristics of the ALMP participants that were available in the AVAM dataset (e.g., age, sex, nationality, career stage, etc.).

with increasing job opportunities in the occupational submarket. Vice versa, the speed of reemployment after completion of an internship should be relatively lower compared to all other ALMPs when job opportunities become more plentiful in the regional labor market. *Internships* embody a clear occupational orientation, thus likely to be susceptible to favorable job opportunities in this submarket. Participants of *courses*, by contrast, may experience a speedier reemployment when job opportunities are plenty in the regional submarket and a slower one when job opportunities are plenty in the occupational submarket.[13]

We finally argue that the speed with which ALMPs integrate unemployed into the labor force under varying labor market conditions differs according to the social group to which they are applied. The policy literature shows in general that the functioning of programs does vary by social characteristics (Liechti et al. 2017; Morlock et al. 2014). Liechti and coauthors (2017), like many other studies, show that interaction effects are particularly relevant for educational groups. For this reason, we focus here on education. We do not expect completely different patterns by educational group; rather we anticipate a higher speed of reemployment for some groups than others depending on the ALMP.

2. Data and methods

The data used for the analyses in this section are the same as the ones described above; namely, the AVAM and the SJMM datasets. The monthly AVAM unemployment spells go into the analysis of individuals' unemployment duration. Our sample is constructed as an inflow of unemployed aged 16 to 65 years. We include only the first unemployment spell per person that begins after January 2006. This leaves us with 1'164'586 unemployed. We censor observation spells at 24 months as unemployment insurance is usually cut at two years at the latest. Our dependent variable is the hazard rate of job uptake, i.e., exit from unemployment to reemployment. 76 percent of all unemployed find a job within this time period. The remaining unemployed either have not been reemployed within that time period or are censored as they deregister without having found a job or move away.

AVAM data also include information on key characteristics of the unemployed. Education is categorized in four levels: basic education, vocational education and training (VET), professional education and training (PET), and university (including university of applied sciences). Another key measure is career stage. We distinguish three career stages based on information on work experience and age, namely, early career, mid-career and late career (50+). Early career stage jobseekers have less than seven years of work experience. The late career stage (50+) is age-based and refers to the unemployed aged 50-65. Those having more than six years of work experience and being younger than 50 years are mid-career. Nationality is categorized in four groups with Swiss nationals being the reference group. The other groups are citizens from Western Europe and North America, those from South and East Europe, and the fourth group includes those from all other countries labeled as Non-Western countries. Gender is a binary variable. Three types of active labor market programs (ALMPs) for the unemployed are distinguished. These are courses (Kurse), internships (Berufs-/Ausbildungspraktikum), and transient employment (Programme der vorübergehenden Beschäftigung).[14] For each monthly unemployment spell, information on whether an unemployed did (or did not) participate in a specific

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[13] We abstain from advancing expectations regarding transient employment (PVB) as these programs may aim at enhancing employability and simultaneously also offering opportunities for practicing occupation-specific skills.

[14] It is at the discretion of cantons to decide about the classification of programs. Consequently, the same program may be classified as course in one canton and as transient employment in another. The results presented in this study are not biased by this lack of clarity, but differences between the types of programs may fade.

program is available. To each unemployed the month of starting a program can therefore be assigned as well as the duration as of that month until a job is found.

A major contribution of this study is the construction of individualized measures of job opportunities at the micro level to examine job search duration upon unemployment. To this end, our individual unemployment data are matched with the v/u ratios according to the accurate regional and occupational submarkets validated in the analysis of matching functions. In order to assign job opportunities at the time of entry into unemployment or a labor market program, respectively, we construct monthly v/u ratios by imputing monthly measures of the annual SJMM vacancy counts. As predictors for the interpolation we use official quarterly statistics of vacancy counts and the number of employed. We additionally draw on the monthly ILO unemployment rate and a quarterly survey measure of firms' statements of how much they will increase their headcount.[15] Regional job opportunities are defined as the number of published job ads per unemployed which are regionally accessible to jobseekers based on the location of their residence. Acknowledging the occupational segmentation of the Swiss labor market, we define jobseekers' occupational job opportunities as the ratio of vacancies to unemployed in the occupational submarket accessible to them on the basis of the occupation they hold prior to unemployment.[16]

3. Results

The results presented here are derived from the micro-level analyses of unemployment duration depending on the availability of job opportunities (i.e., labor market tightness) in the regional and occupational submarkets. First, we assess *overall* unemployment duration in tight or loose submarkets. Second, we present evidence of how job search duration of different groups of unemployed varies when the relevant submarkets offer few or many job opportunities. These analyses show whether vulnerable groups of labor market participants are disproportionally affected by unfavorable conditions in the labor market. They are complemented with predicted counterfactual unemployment durations for the various groups of unemployed, indicating how much their unemployment spell would be shortened if there was no mismatch. Third, we analyze differences in the relative speed of reemployment between participants of different *active labor market programs* (ALMPs) depending on available job opportunities.

3.1. Regional and occupational job opportunities and unemployment duration

Job search duration among the unemployed is expected to depend to a large extent on the jobseeker's job opportunities defined as the accessible vacancies in the relevant submarkets in relation to the number of competing jobseekers. The better these job opportunities are, indicating stronger labor market tightness from the employer's perspective, the shorter the duration for the unemployed to find a job should be. We contribute to the literature on unemployment duration in that we use detailed and validated measures of job opportunities in the submarkets relevant to individual jobseekers.

The main method of estimation is a Cox proportional hazard model (Cox 1972). A benefit of this popular duration model is its flexibility, and that it is able to handle right-hand censoring. In the Cox model, baseline hazard rate is left unspecified. The marginal distribution for the hazard of exiting unemployment is estimated with time in months treated as continuous. We are interested in calculating

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[15] See Figure A7 in the Appendix.

[16] Raw ratios for regional and occupational labor market tightness per year can be found in Table A1 in the Appendix.

differences in time to this event according to the number of regional and occupational job opportunities. In the model we control for individual characteristics. These are education, career stage, immigrant background, and gender. Occupation and region dummies are introduced as control variables. Doing so, we ensure that the vacancy indicators measure variability in labor market tightness and do not indirectly depict characteristics of regions or occupations possibly influencing the duration until reemployment. The equation is formulated as follows:

$$h(t) = h0(t)e^{(\beta_1 regionalJobOpps+\beta_2 occupationalJobOpps+\beta_i(indivCharacteristics_i)+\beta_i(Controls_i))}$$

Our model specification is simplified to include baseline values of our indicators only, without introducing any time-varying covariates.[17] To facilitate the interpretation of results we calculate predicted marginal effects on the relative hazard at different levels of regional and occupational labor market tightness and present them graphically. Predicted marginal effects on the relative hazard show the relative predicted probability of quickly finding a job for the relevant groups of unemployed compared to all other groups. In addition to estimating how labor demand drives job search duration we predict counterfactual unemployment duration in the absence of mismatch. To this end we need to specify the baseline hazard and the shape of the hazard curve over time. We run parametric regression models[18], setting either regional, occupational or both v/u ratios (labor market tightness) to 1 for all jobseekers. This allows for predicting unemployment duration when demand and supply in all submarkets are balanced, i.e., there is no mismatch.

Assessing the effect of submarket tightness for all unemployed, Figure 8 depicts how the speed of reemployment varies by regional and by occupational job opportunities (left and right panel).

Figure 8: *Speed of reemployment by regional and occupational job opportunities (predicted marginal effects from Cox regressions)*

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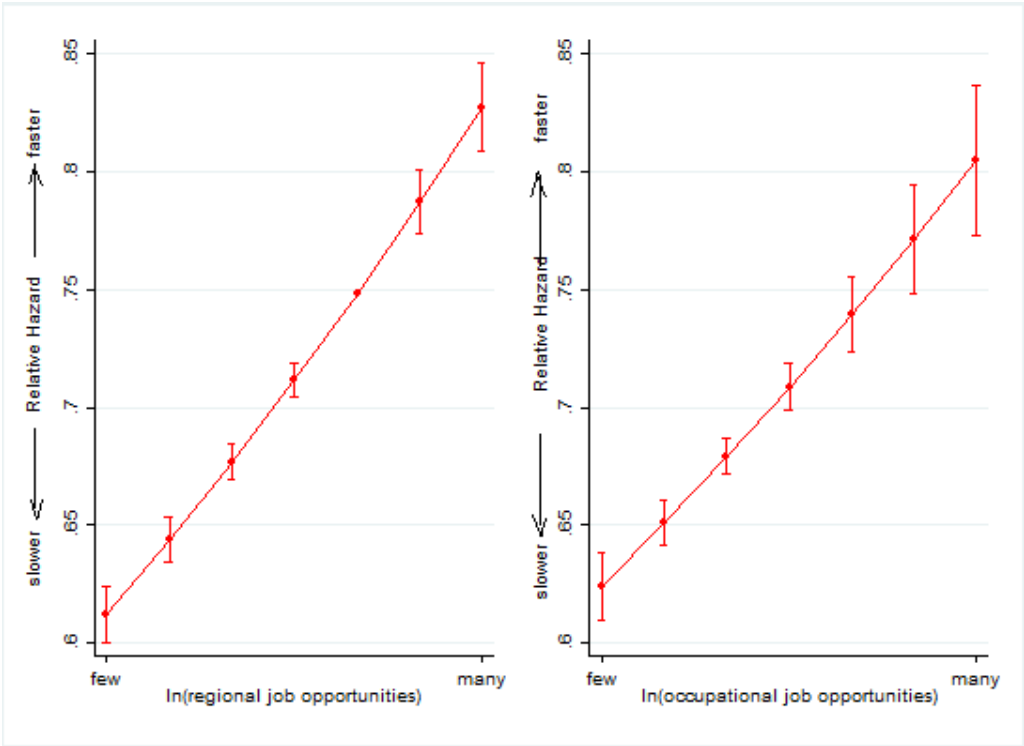
[17] Table A2 in the Appendix shows the results from this model. All models presented in this report meet the global test of proportionality demanded by this type of estimation. In other words, the effects of time and each covariate are multiplicative, but the effect a covariate has on the hazard of involuntary occupational downgrading remains the same over time spent unemployed (Bernardi 2001).

[18] The lognormal form fits our data the best and thus is used to calculate counterfactual unemployment.

The results provide clear evidence that the speed of reemployment depends on regional and occupational submarket tightness. When job opportunities are few, the unemployed are slower in finding a job and vice versa. Job opportunities in the region of the unemployed may be skill-fitting or not. Shorter unemployment duration in times of plentiful regional job opportunities suggests that the Swiss labor market allows for some occupational permeability. Although this result may in part simply stem from the higher number of available vacancies, firms may also be more willing to recruit jobseekers coming from different occupations when they face difficulties in finding new personnel. Jobseekers' chances to access non-skill-fitting jobs will thus rise the tighter the regional labor market is. The strong dependence of the unemployment duration on occupational job opportunities nevertheless indicates that occupational barriers between submarkets are considerably high in Switzerland. Jobseekers seem to attach importance to taking up a skill-adequate job in the occupation they held prior to unemployment, whereby the number of occupational job opportunities impacts their chances to do so. Additional analyses (see Table A2 in the Appendix) indicate that there is an interaction between job opportunities in the relevant submarkets and time elapsed since entry into unemployment. Job opportunities do matter for the likelihood of reemployment during the first six months of unemployment. Thereafter, they become irrelevant for the speed of reemployment. Jobseekers remaining unemployed for more than half a year might face disadvantages in their search that exceed the potentially positive effect of high labor demand.

Predicted mean unemployment duration in the actual labor market for all unemployed is 7.42 months. In the absence of occupational mismatch, that is, if the numbers of vacancies and unemployed in all occupational submarkets were balanced, the predicted counterfactual mean unemployment duration is 6.97 months, amounting to a reduction of 6 percent. In the absence of regional mismatch, that is, if the numbers of vacancies and unemployed in all regional submarkets were balanced, the predicted counterfactual mean unemployment duration is 6.66 months, indicating a reduction of 10 percent. The predicted mean unemployment duration in the absence of both forms of mismatch is 6.25 months, i.e., a reduction by 16 percent. If regional mismatch was removed, unemployment duration would thus be reduced most among all jobseekers.

3.2. Regional and occupational labor demand and different groups of jobseekers' unemployment duration

The previous results have pointed to the decisive effect of labor demand on jobseekers' unemployment duration. We now move forward to assess how this effect varies by social groups of unemployed. To this end, we run four additional Cox models predicting the influence of regional and occupational job opportunities and the individual characteristics of interest (i.e., education, career stage, immigration status, and gender) on search duration. We also integrate two interaction terms between these

individual characteristics and both types of job opportunities.[19] Again, predicted marginal effects are used to illustrate the effects on job search duration. We start with education.

Education

Low-educated unemployed are generally expected to be disadvantaged when searching for a job compared to better-educated jobseekers. Their disadvantage may be the stronger, the fewer job opportunities they encounter. Figure 9 illustrates unemployment duration depending on the number of regional and occupational job opportunities for jobseekers without post compulsory education, with VET, PET, and university.

Figure 9: *Speed of reemployment by education under varying regional and occupational labor demand (predicted marginal effects from Cox regression)*
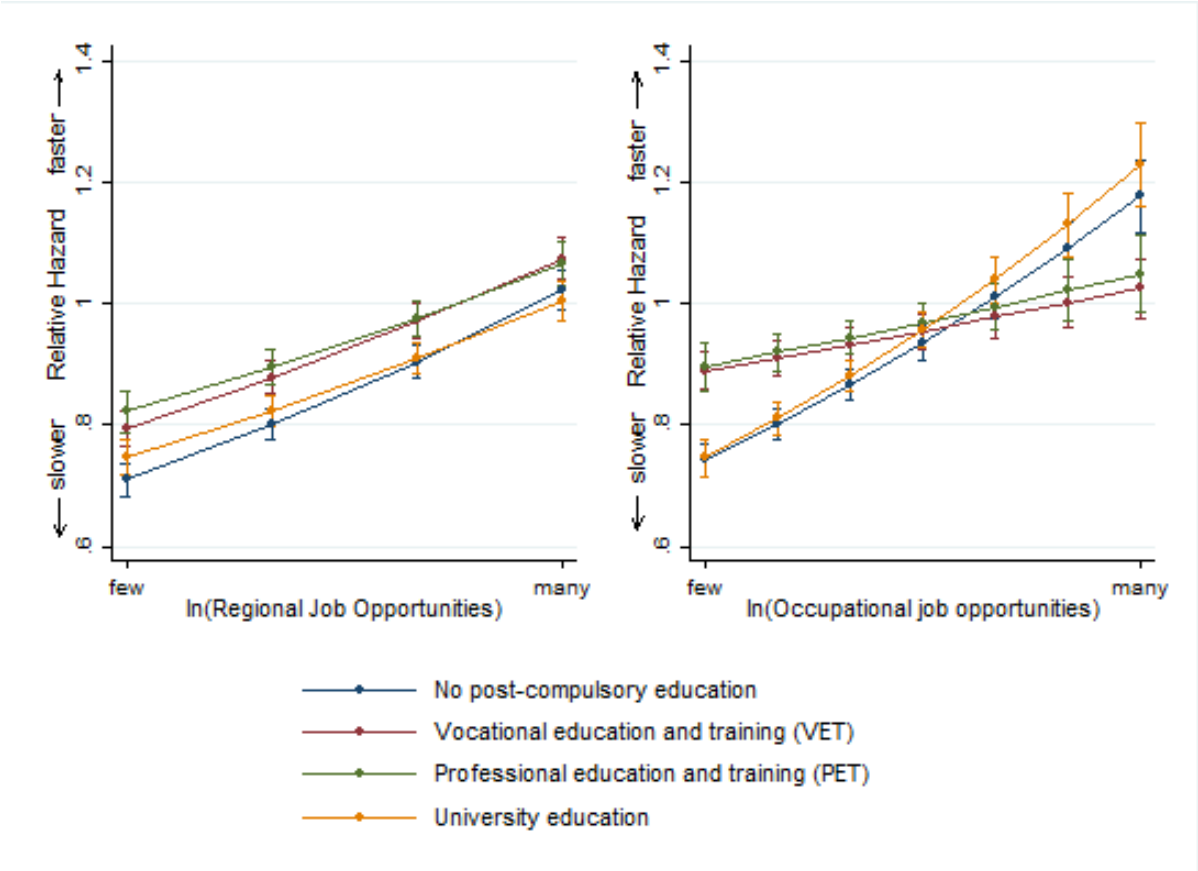
Regional job opportunities matter for the unemployment duration of jobseekers of all educational levels. However, the slope is somewhat steeper for the unemployed without post-compulsory education and for those with VET. These two groups depend more strongly on a high regional labor demand for quickly finding a job than jobseekers with PET or university. Importantly, VET and PET allow for faster reemployment at all levels of labor market tightness than university and basic education. These results largely confirm our expectations suggesting that jobseekers having not completed any post-compulsory education are disadvantaged in their job search and also bear the burden of a weak labor market. Interestingly, the highest educated are also comparatively slow in their reemployment. As most vacancies in the regional submarket are not skill-matching per definition we may speculate that the university educated attempt to avoid losses regarding their high skill investment at reemployment. They may therefore wait for a fitting job offer in the occupational labor market instead of accepting skill-inappropriate reemployment in the regional labor market. This calculus is likely to prolong their

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[19] Table A3 in the Appendix shows the results of these models.

unemployment duration and does not necessarily mean that they face disadvantages in their job search.

Occupational job opportunities have a more divergent effect on the speed of reemployment of the different educational groups. Jobseekers without post-compulsory education and those who completed university depend strongly on these opportunities, while the vocationally trained (VET and PET) do less so. When job opportunities are few, the former are significantly slower in finding a job than the latter. This result confirms that the low educated are most heavily affected by unfavorable conditions in the respective occupational submarket. For the highest educated, the result may reconfirm that their search calculus is driven mainly by the goal to preserve skill investments. Tertiary-educated job seekers seem to hold out in unemployment when occupational job opportunities are scare. When submarket demand is high, low-educated jobseekers and university educated, by contrast, find a job more quickly than those with VET or PET. The relatively fast reemployment of low-educated jobseekers under such conditions contradicts expectations. We suspect that demand in particular occupations such as construction drives this result. Finally, employment prospects are generally high for jobseekers with VET and PET. Their relative low dependence on occupational job opportunities for reemployment alleviates concerns about the specificity of their trainings and potential negative effects on job search when occupational demand is low.

**Table 1:** *Counterfactual unemployment duration (in months) without mismatch by education*

Predicted mean unemployment duration	With mismatch	No occupational mismatch	No regional mismatch	No occupational and regional mismatch
No post-compulsory education	8.26	7.59 (-8%)	7.35 (-11%)	6.76 (-18%)
VET	6.89	6.47 (-6%)	6.18 (-10%)	5.79 (-16%)
PET	7.44	7.16 (-4%)	6.64 (-11%)	6.39 (-14%)
University	7.95	7.76 (-2%)	6.99 (-12%)	6.83 (-14%)

The strong negative impact of unfavorable submarket conditions for the groups of low and high educated leads us to assume that their unemployment duration should considerably diminish in the absence of regional and occupational mismatch. As shown in Table 1, the actual predicted mean unemployment duration of jobseekers without post-compulsory education is 8.26 months. In the absence of occupational mismatch, the duration decreases by eight percent, and 11 percent in case of no regional mismatch, respectively. Compared to more educated jobseekers, the reduction for occupational mismatch is large. In the presence of mismatch, the predicted unemployment duration of VET-educated jobseekers is the lowest of all groups (6.89 months). This also holds under conditions of no mismatch (occupational, regional or both). For the university educated, the reduction of the unemployment duration in the absence of occupational mismatch is very small (-2%), particularly in comparison to lower-educated jobseekers. However, this group would enjoy the highest drop in unemployment duration, if there was no regional mismatch. The smaller decrease in unemployment duration in the absence of occupational mismatch for the higher educated (PET and particularly university) compared to the lower educated might stem from the fact that they experience less mismatch. However, at least in comparison to jobseekers with VET, this does not hold (see Figure 5). Rather, the highly educated, having invested much in their skills, seem little willing to react to structural chances of occupational demand.

Career stages

According to our theoretical considerations employers may ascribe a higher productivity to mid-career jobseekers compared to the unemployed in the early and the late stage of their career. The latter should therefore be disadvantaged in their job search. Figure 10 show the differences in unemployment duration by career stage under varying tightness in the regional and occupational labor market.

Figure 10: *Speed of reemployment by career stage under varying regional and occupational labor demand (predicted marginal effects from Cox regression)*
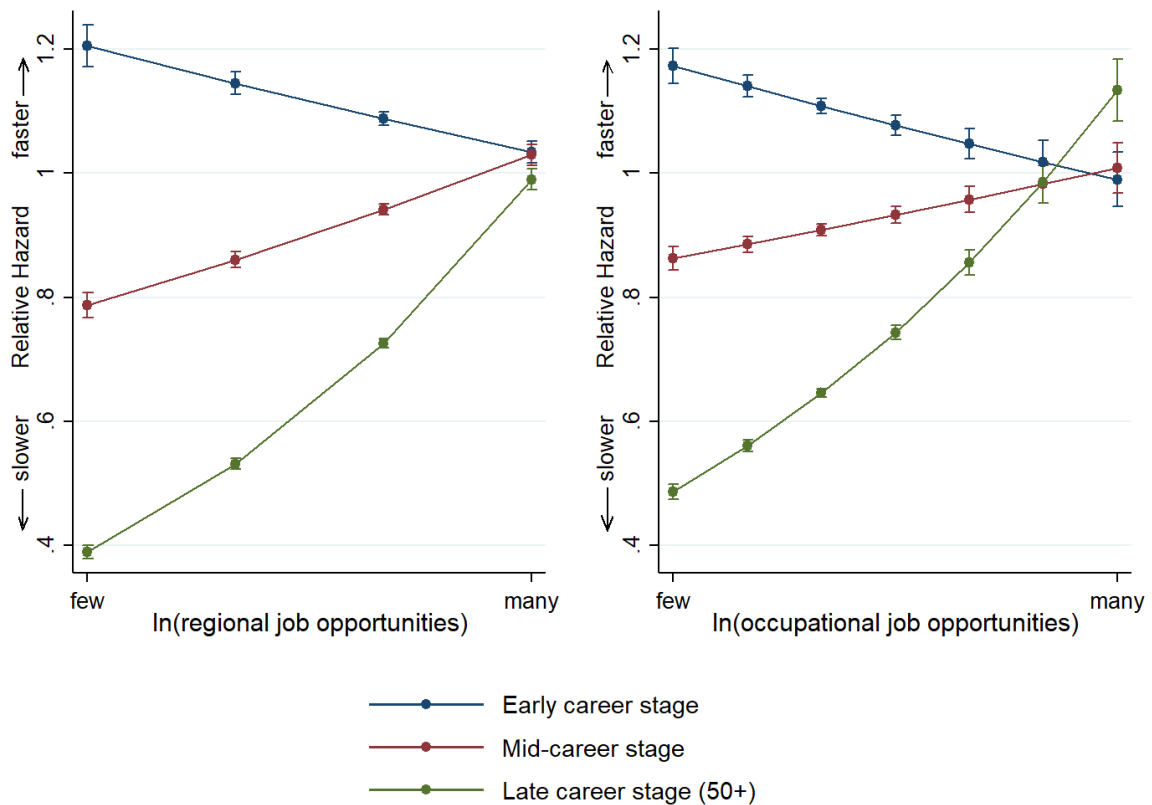
Contrary to our expectations early-career unemployed are quickest in finding a job, independent of the labor demand situation. Only when labor market tightness is very strong and job opportunities are thus many, do they not become reemployed faster than the unemployed in other career stages. Surprisingly, early-career jobseekers react negatively to increasing regional and occupational job opportunities. As plentiful job opportunities promise an easy reintegration into the labor market, early-career jobseekers, facing comparatively few financial obligations, might decide to deregister from the employment office for reasons of investing in further education, going abroad or spending time travelling, for example. According to these results, early-career jobseekers are not a particularly vulnerable group of unemployed when it comes to job search duration. However, the fast reemployment of early career stage jobseekers may result to some extent from Swiss policy, providing the young unemployed with benefits for a much shorter time period than the older unemployed. Moreover, benefits for young unemployed people were restricted in the course of the AVIG-revisions in 2011. Given that the results do not change with these reforms, policy seems to hardly influence the speed of reemployment among the early-career stage unemployed. Mid-career stage jobseekers show the expected positive dependence on regional and occupational job opportunities. The more vacancies compared to unemployed are available in the accessible submarkets, the quicker they find a job. Older jobseekers (50+) reveal a strikingly high dependence on job opportunities and are overall the slowest in exiting unemployment

for reemployment. Only when demand is very high they can draw level with younger jobseekers. In part, the unemployed aged 55 and over may search longer as they receive benefits for a longer period than other jobseekers. However, older unemployed seem to not only face difficulties in finding a job quickly, they are also disproportionally affected by unfavorable conditions in the relevant labor market contexts.

Table 2: *Counterfactual unemployment duration without mismatch by career stage*

Predicted mean unemployment duration	With mismatch	No occupational mismatch	No regional mismatch	No occupational and regional mismatch
Early career	5.42	5.11 (-6%)	4.87 (-10%)	4.59 (-15%)
Mid-career stage	7.24	6.79 (-6%)	6.44 (-11%)	6.04 (-17%)
50+ career stage	10.31	9.68 (-6%)	9.22 (-11%)	8.66 (-16%)

The actual predicted mean unemployment duration of early-career jobseekers is 5.42 months, being shorter compared to jobseekers in the two other career stages. When removing both forms of mismatch, the predicted mean unemployment duration of young jobseekers is only 4.59 months. The actual and counterfactually predicted unemployment durations for mid-career jobseekers are somewhat higher. The unemployed over 50 years are predicted to actually search for a job for 10.31 months

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Landing a job, sinking a career? The trade-off between occupational downgrading and quick reemployment according to unemployed jobseekers' career stage and job prospects

Helen Buchs, Emily Murphy and Marlis Buchmann 2017, under review

A critical aspect of careers is the quality of jobs the unemployed match to at reemployment. In addition to unemployment duration we assess how the quality of the job accepted at reemployment depends on the structure of labor demand (see separate attachment). Of particular interest is the search trade-off the unemployed face in occupationally segmented labor markets: quickly exiting unemployment via downgraded reemployment or holding out for a skill adequate job while remaining unemployed. As we expect this trade-off to differ by how much jobseekers have invested in their occupation-specific skills over the course of their careers, we examine how the likelihood of involuntary status downgrading relates to the relative availability of 'best fit' vacancies at particular stages of a career. Hereby, 'best fit' vacancies are available jobs in the relevant occupational submarket and offer employment that match the prestige of the occupation an unemployed person held prior to unemployment. This study thus contributes to the broader literature on scar effects incurred from the experience of unemployment. It also speaks to a crucial question raised in labor market theories, namely how the composition of labor demand affects job mobility. Our results show that a higher relative availability of 'best fit' vacancies lowers jobseekers' risk of taking up a lower prestige job than the one sought. Career stage also matters for the trade-off between the quality and speed of reemployment. Older jobseekers are more likely to hold out longer while unemployed to avoid downgrading than are mid-career jobseekers. In comparison, early-career jobseekers are more likely to accept downgraded reemployment sooner. These unemployed are also most responsive to job prospects. Overall, the study supports the idea that the search trade-off at exit from unemployment is simultaneously framed by the external demand structure and the individuals' situation as defined by their career stage.

before reemployment. This is very long compared to younger jobseekers. However, the relative reductions in the predicted mean unemployment duration in the absence of occupational or regional mismatch are strikingly similar over the different career stages.

Immigrant jobseekers

Immigrant jobseekers are expected to face more difficulties in finding a job than the Swiss counterparts, especially when job opportunities are few. However, immigrants are not a homogenous group as the transferability of skills and employers' ascriptions may differ across countries of origin. Figure 11 depicts unemployment duration under varying regional and occupational labor market conditions for Swiss jobseekers and different groups of immigrants. These are (1) jobseekers from Western Europe and North America expected to be able to transfer most of their skills and not subject to discrimination; (2) immigrants from South and East Europe entering the Swiss labor market mostly for low-skill jobs; and (3) a group composed of jobseekers from all other countries, especially Non-Western countries, expected to not being able to transfer their skills and suffer most from negative ascriptions.

Figure 11: *Speed of reemployment by nationality under varying regional and occupational labor demand (predicted marginal effects from Cox regression)*
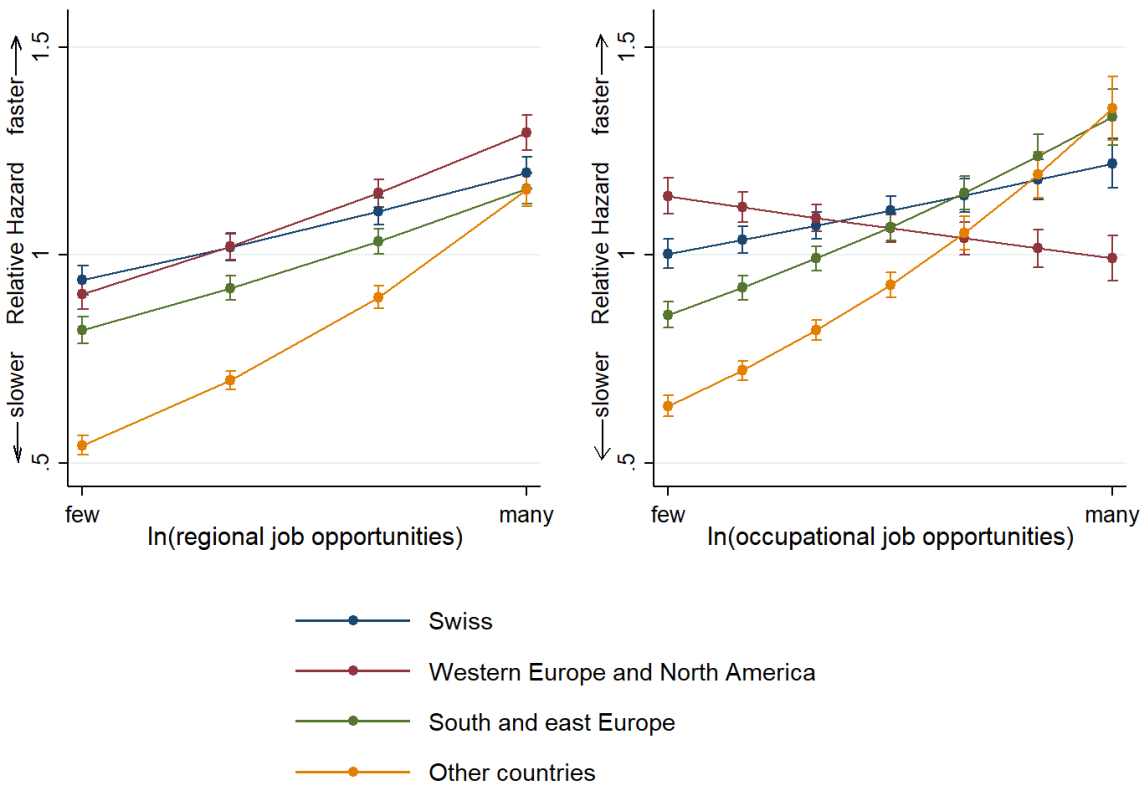
According to both panels of Figure 11 Swiss jobseekers reenter the labor market more quickly compared to immigrants from South and Eastern Europe as well as from Non-Western countries. Importantly, Swiss jobseekers' chances to exit unemployment quickly do not decrease as rapidly as those of these immigrant groups when labor market conditions deteriorate. By contrast, jobseekers from Western Europe and North America are similarly quick in finding a job as the Swiss unemployed. However, they react slightly more to job opportunities in their regional submarket. When demand is very high, their unemployment duration is even lower compared to the Swiss. Surprisingly, the more occupational job opportunities these immigrant jobseekers encounter, the slower they are in finding

a job.[20] Jobseekers from South and Eastern Europe are slower in finding a job compared to the Swiss, but faster than unemployed from Non-Western countries. Their dependence on vacancies is much higher than that of the Swiss, showing that the worse the conditions in their regional and especially in their occupational submarkets are, the longer they need to find a job. However, when labor market tightness is very high in the occupational submarket, jobseekers from South and Eastern Europe exit unemployment more quickly than the Swiss. This result could be driven by the conditions in some specific occupations these jobseekers often work in (e.g., construction). As the unemployed from Non-Western countries may usually not be able to transfer their skills and are also likely to be discriminated against, their performance concerning job search duration is worst. The lower the tightness in their regional or occupational submarket is, the more striking the difference between them and other jobseekers becomes. As these results hold ceteris paribus, they are not driven by a lower mean educational level among Non-Western immigrants. Clearly, the unemployed from Non-Western countries constitute a vulnerable group in the labor market, disproportionally affected by unfavorable conditions.

Table 3: *Counterfactual unemployment duration in months without mismatch by nationality*

| Predicted mean unemployment duration	With mismatch	No occupational mismatch	No regional mismatch	No occupational and regional mismatch
Swiss	7.06	6.67 (-6%)	6.32 (-10%)	5.97 (-15%)
Western Europe and North America	6.90	6.57 (-5%)	6.19 (-10%)	5.89 (-15%)
South and East Europe	7.68	7.10 (-8%)	6.81 (-11%)	6.30 (-18%)
Other countries	10.15	9.36 (-8%)	8.91 (-11%)	8.22 (-19%)

As shown, some groups of immigrants depend highly on labor demand. Compared to the Swiss their job search duration should thus considerably decrease in the absence of regional and occupational mismatch. Under mismatch conditions, the unemployed from Non-Western countries have the highest predicted unemployment duration (10.15 months). They are also predicted to experience a sharp decrease in this duration by 19 percent if both regional and occupational mismatch were removed. The predicted job search duration of immigrants from South and East Europe are much smaller with or without mismatch than the duration of immigrants from Non-Western countries. However, these two groups would experience a similar percentage decline if mismatch was removed. Against this, the predicted decline in the unemployment duration of the Swiss and immigrants from Western Europe and North America in the absence of mismatch is smaller.

Gender

The distinct sex-segregation of the Swiss labor market and expected gender differences in job search behavior make it difficult to come up with precise expectations of gender differences in unemployment duration. Figure 12 displays the unemployment duration of men and women depending on the number of available job opportunities in the relevant regional and occupational submarkets.

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[20] Although beyond the scope of this report, this unexpected result needs further examination.

Figure 12: *Speed of reemployment by gender under varying regional and occupational labor demand (predicted marginal effects from Cox regression)*
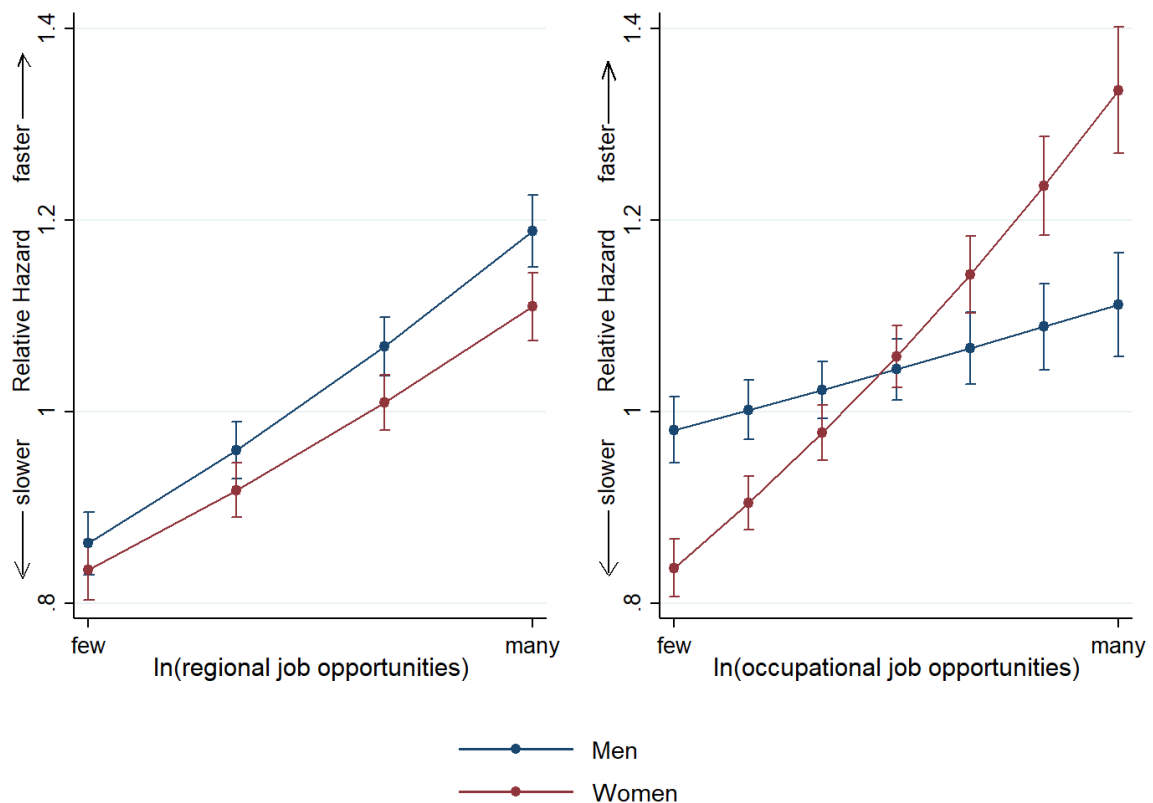
Regarding regional labor market tightness (left panel of Figure 12) men's and women's unemployment duration depends strongly on the availability of vacancies. However, men remain for a shorter period in unemployment and the better the conditions in the regional submarket are, the more quickly they exit unemployment for reemployment compared to women. Women thus seem to be disadvantaged in their job search, attesting to their inferior labor-market status compared to men. Surprisingly, this holds more when job opportunities are many and less when job opportunities are few. Alternative exits from unemployment among women under unfavorable labor market conditions may drive this result. Under such conditions, women might be more likely than men to deregister from the unemployment office in favor of housework or other activities. Another reason might be that those women who regard themselves as secondary wage earners in low-wage occupations may pay less attention to the quality of the job (i.e., wage), thus accepting, under bleak demand conditions, any job more quickly than men.

The picture looks somewhat different regarding job opportunities in the occupational submarket (right panel of Figure 12). When vacancies and unemployed are balanced, men and women do not differ in the speed of reemployment. When job opportunities are few, men are much faster than women and the reverse applies under very favorable labor market conditions. Hence, women's speed of reemployment depends much more on the availability of vacancies in the relevant occupational submarket than men's. This result may stem from occupational sex segregation in the Swiss labor market where women and men are separated into fairly distinct occupational submarkets within which they hardly compete and with women being crowded into a much smaller range of occupations. Differences between "male" and "female" occupations in turnover and fluctuations in labor demand over the

business cycle could therefore drive the results. For example, men, searching for employment in construction characterized by high turnover, may become unemployed relatively often but also find a job very quickly. Of course, the results presented here show only the tip of the iceberg. More analyses are desirable.

Table 4: *Counterfactual unemployment duration in months without mismatch by gender*

Predicted mean unemployment duration	With mismatch	No occupational mismatch	No regional mismatch	No occupational and regional mismatch
Men	7.21	6.80 (-6%)	6.43 (-11%)	6.07 (-16%)
Women	7.67	7.14 (-7%)	6.83 (-11%)	6.37 (-17%)

The results from calculating predicted counterfactual unemployment duration for men and women are not so complex. Women search longer for a job than men in all situations. And the predicted reduction in the duration of unemployment in the absence of both types of mismatch is only slightly higher for women than for men.

3.3. Labor demand, ALMP participation and unemployment duration

Labor market tightness in jobseekers' submarkets is expected to not only interact with individual characteristics but also with ALMPs for determining unemployment duration. This section assesses the extent to which participants of different ALMPs depend on regional and occupational job opportunities to quickly find a job. These analyses differ from to the ones presented above in that we exclude jobseekers having not participated in any program, leaving us with 566'427 unemployed. Job opportunities are assigned to jobseekers in the month of program start. This month is also taken as the starting point for the duration of job search. Of the unemployed ALMP participants, 83 percent find a job within 24 months.

Our analyses explore the varying degree to which reemployment of jobseekers having participated in different ALMPs (i.e., internships, courses, and transient employment) is speeded up by increasing regional or occupational job opportunities. Put differently, we examine job search duration for different ALMPs under varying submarket conditions. With this analytical focus, we do not aim to assess the absolute effectiveness of these programs or quantify their effects under varying labor market conditions.[21]

As before, we run a Cox regression model. The marginal distribution for the hazard of exiting unemployment is again estimated with time in months treated as continuous. We are interested in estimating differences in time to this event based on the interplay of ALMPs with regional and occupational job opportunities. Hence, we include an interaction term between participation in ALMP programs and each type of job opportunities. The model controls for individual characteristics - education, career stage, immigrant background, and gender. Dummies for the number of the ALMP (how many programs a jobseeker has attended) as well as dummies for occupation and region are also included as control variables. The equation is formulated as follows:

$$h(t) = h0(t)e^{\begin{array}{l}(\beta_1 ALMP + \beta_2 regionalJobOpps + \beta_3 occupationalJobOpps + \beta_4 regionalJobOpps*ALMP \\ + \beta_5 occupationalJobOpps*ALMP + \beta_i(indivCharacteristics_i) + \beta_i(Controls_i)\end{array}}$$

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[21] As outlined in the theoretical section, the analytical focus chosen here strongly attenuates the selection problem with which studies are confronted when assessing the effectiveness of programs by comparing participants and non-participants of given ALMPs. In addition, our focus circumvents the selection issue as program assignment does apparently not depend on labor market conditions (Lechner & Wunsch 2009)

Our model specification is simplified to include only baseline values of our indicators, without introducing any time-varying covariates.[22] To facilitate the interpretation of results we calculate predicted marginal effects at different levels of regional and occupational labor market tightness and present them graphically. Being only interested in the slopes and not in the level of the curves, we shift the lines to cross when vacancies and unemployed in the submarket are balanced.

Figure 13: *Relative speed of reemployment of participants of ALMPs under different regional and occupational labor demand*

Note: Interpretation of slopes only and not of levels
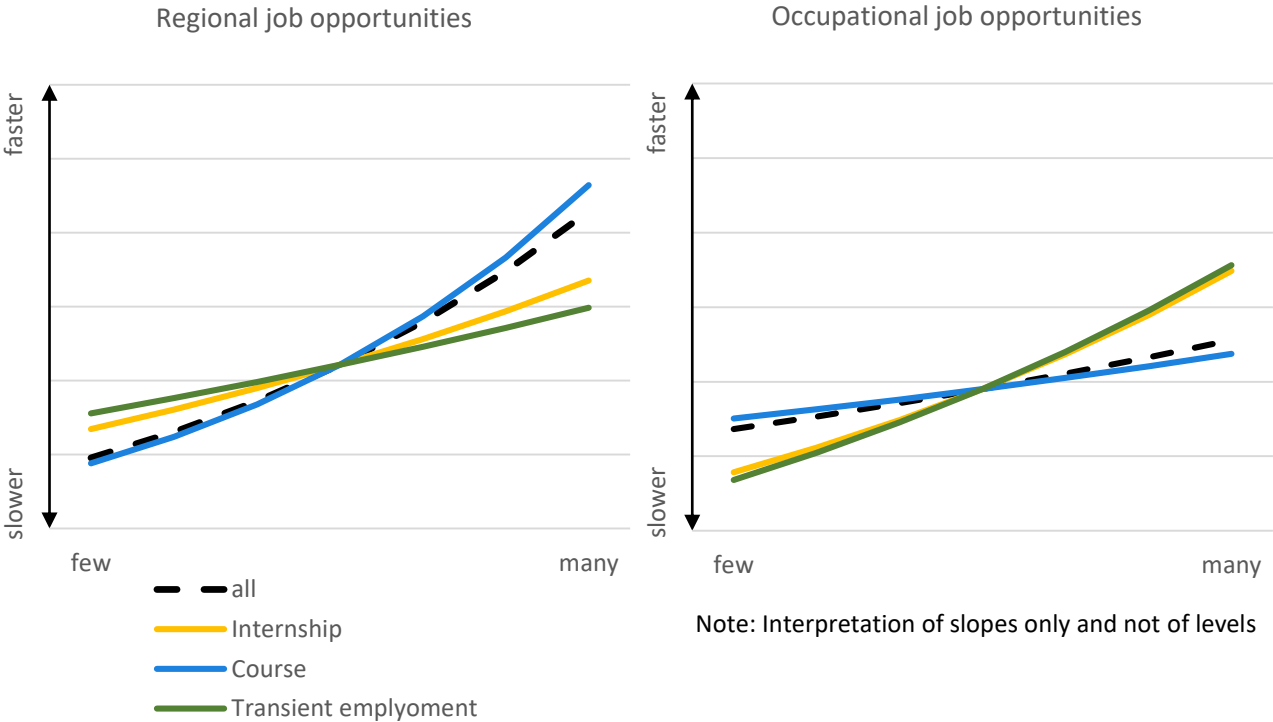
Interpretation of Figures 13 and 14

Figure 13 shows how available job opportunities impact the *relative reemployment speed* of participants of a specific program compared to all ALMPs. These analyses allow for the interpretation of *slopes* only and not of *levels*. A *steep* slope indicates that participants of a program (e.g., courses in the left panel of Figure 13) are relatively quicker in finding a job when job opportunities are *raising* compared to participants of all other programs. A *flat* slope shows that participants of a program (e.g., transient employment in the left panel of Figure 13) are relatively quicker in finding a job when job opportunities are *shrinking* compared to participants of all other programs.

Figure 13 provides evidence that participants in various ALMPs depend to different degrees on regional and occupational job opportunities for the speed of reemployment.[23] Regarding regional demand *internships* and especially *transient employment* have a markedly flatter slope than other ALMPs. This indicates that participants of these programs are less dependent on the availability of regional job opportunities and are thus relatively quicker in finding a job when regional demand shrinks compared

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[22] Table A4 in the Appendix shows the results from this model.
[23] Similar results prevail when analyzing the periods before and after the AVAM revisions in 2009 or the AVIG revisions in 2011 separately. Hence, these revisions do not influence the results.

to other ALMPs. These programs might thus help more than other programs to attenuate the negative effects of weak labor demand on the speed of reemployment. However, when there are many job opportunities in the regional labor market, they do not additionally improve the speed of reemployment. The relatively flat curve for transient employment might also stem from the fact that these policies are prescribed predominantly to long-term unemployed, hardly reacting to variation in job opportunities. *Courses* feature a steeper slope than other programs.[24] Jobseekers attending a course react more positively to better regional job opportunities than other ALMP participants in that they are relatively quicker in finding a job. These programs might thus be more helpful for jobseekers to exit unemployment for reemployment when regional labor market tightness is high. As courses aim at improving jobseekers' employability in general (i.e. self-presentation, language skills, etc.), they should improve the chances of finding a job irrespective of the occupational skills required. Given that jobs in the regional labor market feature all occupations, chances to access these jobs should improve more with upgraded general employability than with occupation-specific skills. The speed of reemployment after participation in one of the courses thus depends relatively much on regional job opportunities.

ALMP participants are also differently affected in reemployment speed by demand conditions in their occupational submarket (right panel of Figure 13). *Internships* and *transient employment* feature a relatively steep slope. Finding a job after participation in these programs is thus speeded up more by many occupational job opportunities than after participation in other programs. Internships and transient employment should improve jobseekers' occupation-specific skills and speed up reemployment in the occupational labor market. The strong reaction of jobseekers who have participated in an internship or transient employment to occupational job opportunities thus indicates that these programs may help relatively more to quickly find a job when skill demand is high in the relevant submarket. For an unemployed jobseeker coming from an occupation that is marked by excess supply, however, these programs might not so much increase the speed of reemployment. For *courses*, the increase in the speed of reemployment by occupational job opportunities is lower compared to all other programs. The relatively flat slope thus indicates that participants of courses react little to improved conditions in the occupational submarket. Participation in courses providing general skills and not occupational ones may not speed up reemployment significantly more when occupational job opportunities are many compared to when these are few.

ALMPs and education

Unemployment duration by education may depend differently on labor demand and ALMP participation. We therefore repeat the above analyses by ALMPs separately for the four educational groups.

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[24] Courses include a wide range of programs. We also ran separate analyses for basic training, language courses, and occupational courses. No substantial differences between these types of courses were found and they were therefore collapsed.

Figure 14: *Relative speed of reemployment of participants of ALMPs under different regional and occupational labor market conditions by education*
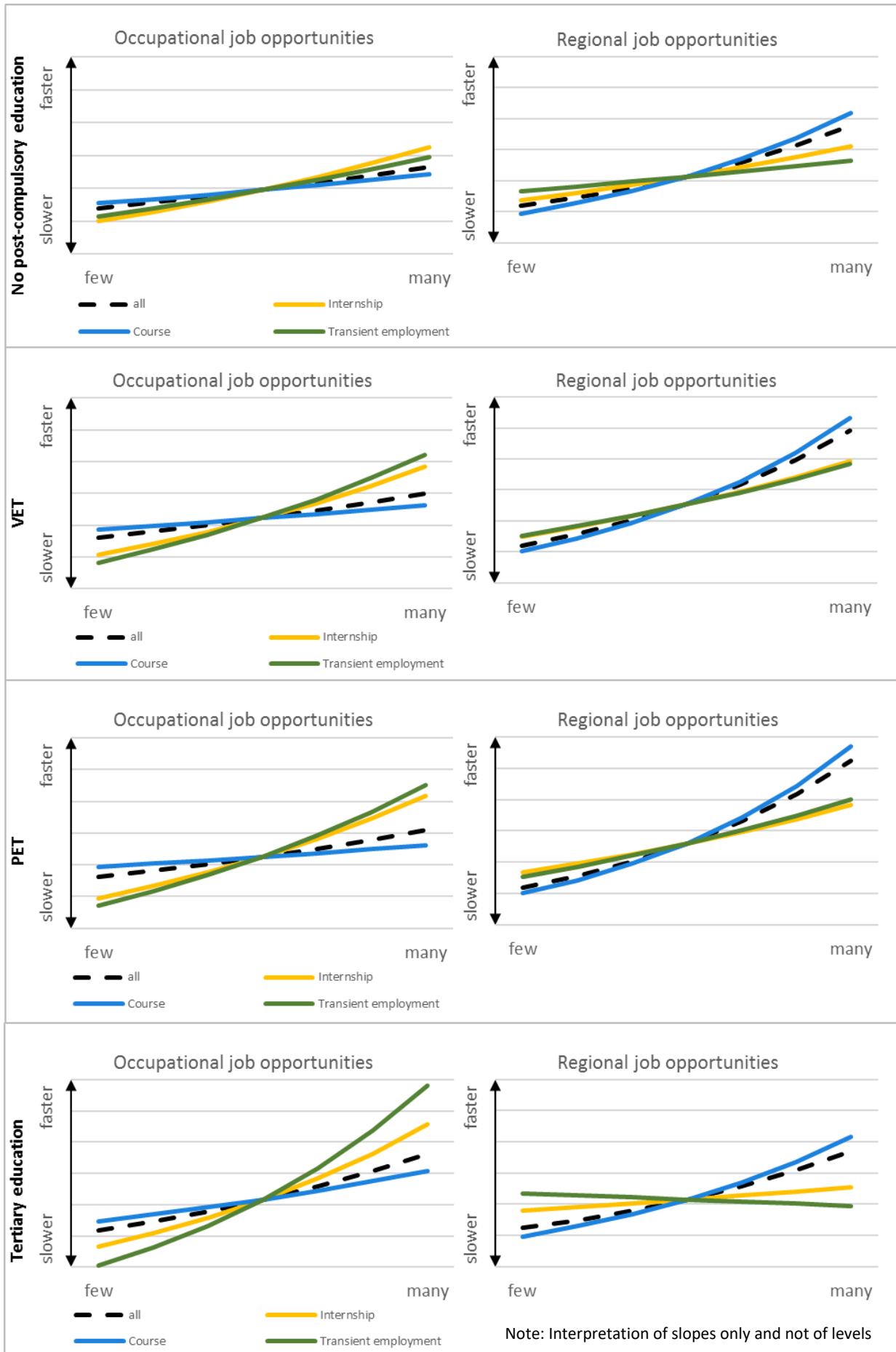
The pattern of how participants of different ALMPs depend on job opportunities for the speed of reemployment does not vary much between the four educational groups. However, some differences are noteworthy. First, jobseekers without post-compulsory education having participated in a program of transient employment do not experience to the same extent a speed up in reemployment with increasing occupational job opportunities compared to other educational groups having participated in such a program. Transient employment for the least-educated jobseekers may have a different focus than transient employment for other educational groups. The focus may be on non-qualifying work with the intention to provide the unemployed with a daily time structure. The programs may also aim to push the low-educated jobseekers to search more intensively for a job as they are less attractive than regular work. Transient employment programs for jobseekers having obtained a post-compulsory certificate (VET, PET or university) may, by contrast, aim mainly at improving occupation-specific skills. Reemployment chances for more educated jobseekers having participated in transient employment thus rise with the number of occupational job opportunities. Second, the speed of reemployment among the university educated does decrease with rising regional submarket tightness. It is possible that transient employment for the highly educated has a negative signaling effect thus lowering their chances to find a job (see also Liechti et al. 2017).

Conclusions

This study distinguishes itself by making several substantive contributions to the knowledge about labor market mismatch and individual unemployment duration in Switzerland. The decisive prerequisite for making these contributions was the availability of micro data on vacancies with detailed characteristics. The Swiss Job Market Monitor (SJMM) provided such data, also being representative for the Swiss job market.

By international comparison, although such comparisons are not without problems, mismatch in Switzerland, defined as the divergence of the characteristics of the unemployed and those of the vacancies, is rather low and more or less stable over the period under observation (2006-2014). Geographic mismatch varies between seven and ten percent, while occupational mismatch is in the range of eight and twelve percent. These findings decisively add to our knowledge about labor market mismatch in this country because respective *direct* evidence has been extremely scarce to date. They are particularly valuable as no previous study has provided mismatch estimates that were based on *accurate* and *validated* measures of the appropriate level of specificity of submarkets, the proper flows across submarkets, and the multidimensionality of submarkets (i.e., cross-definitions). The significance of validated measures for any statement about labor market mismatch is demonstrated, for example, by our findings that by choosing the inaccurate specification of *regional* submarkets (districts instead of labor market regions in the Swiss case), labor market mismatch would be substantially overestimated. Regarding occupational mismatch, the findings show that inaccurate specifications of occupational submarkets (1-, 3-, and 5-digit instead of 2-digit SBN occupations) would either underestimate (1-digit) or grossly overestimate (5-digit) mismatch. Given these decisive advantages over previous research, we have confidence in our findings that unemployment would drop by 0.035 to 0.05 percentage points was there no mismatch in the regional or occupational labor markets. Against the occupationally segmented Swiss labor market, a particularly important finding of our study is that mismatch in the occupational submarket is lowest for the unemployed trained in VET or PET compared to those who have attained basic education only or university. We may therefore conclude that vocational training, being the predominant training in this country, mostly provides the occupational skills employers demand.

The measures developed and validated for analyzing labor market mismatch are also of key importance for the micro analyses on jobseekers' unemployment duration. Using SJMM data and AVAM data we were able to link, at the micro level, characteristics of the vacancies with characteristics of the unemployed. The main question of interest is how tightness in the regional and occupational submarkets relevant to the unemployed jobseeker affects unemployment duration. Tightness is measured by accessible vacancies per unemployed in the relevant submarkets, thus constituting a jobseeker's job opportunities. This study provides accurate estimates of variation in the length of unemployment under varying regional and occupational labor market conditions. Our results provide evidence that the speed of reemployment does depend on regional and occupational submarket tightness. When job opportunities are few, the unemployed are slower in finding a job and vice versa. Importantly, the predicted mean unemployment duration in the actual labor market, that is, given geographic and occupational submarket mismatch, amounts to 7.42 months. In the absence of both forms of mismatch, when there is a balanced number of vacancies and unemployed in all geographic and occupational submarkets, the predicted counterfactual mean unemployment duration would drop to 6.25 months, a reduction of 16 percent. Particularly, the removal of regional mismatch would contribute decisively to this shortening of unemployment duration. The patterns of unemployment duration by social groups show, several interesting exceptions notwithstanding, that vulnerable groups (e.g., low-educated, older unemployed, some immigrant groups, and, in some instances, women) are disadvantaged

in their job search and also bear the burden of weak regional and occupational labor markets. Most remarkable, and in line with the macro findings, VET-educated unemployed show the lowest predicted unemployment duration. They also show a relatively low dependence on occupational job opportunities for reemployment. These important findings alleviate concerns about the specificity of their training and potential negative effects on job search when occupational demand is low. Finally, this study provides answers to the policy-relevant question of how job search duration of the unemployed having participated in one of the several ALMPs (i.e., courses, internships or transient employment) varies according to the number of regional and occupational job opportunities. These findings are novel as knowledge about how ALMPs fare under varying labor market conditions is generally scarce. The important message is that some programs help more than others to attenuate the negative effects of weak labor demand on the speed of reemployment. Likewise, some ALPMs are relatively more helpful than others when job opportunities are many in the regional or occupational submarkets.

Our study has helped to better understand labor market mismatch and the significance of labor market tightness for unemployment duration in Switzerland. Despite the many novel and insightful findings, the study has pointed to several questions and issues where future research is still needed.

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Appendix

Figure A1: Beveridge curve
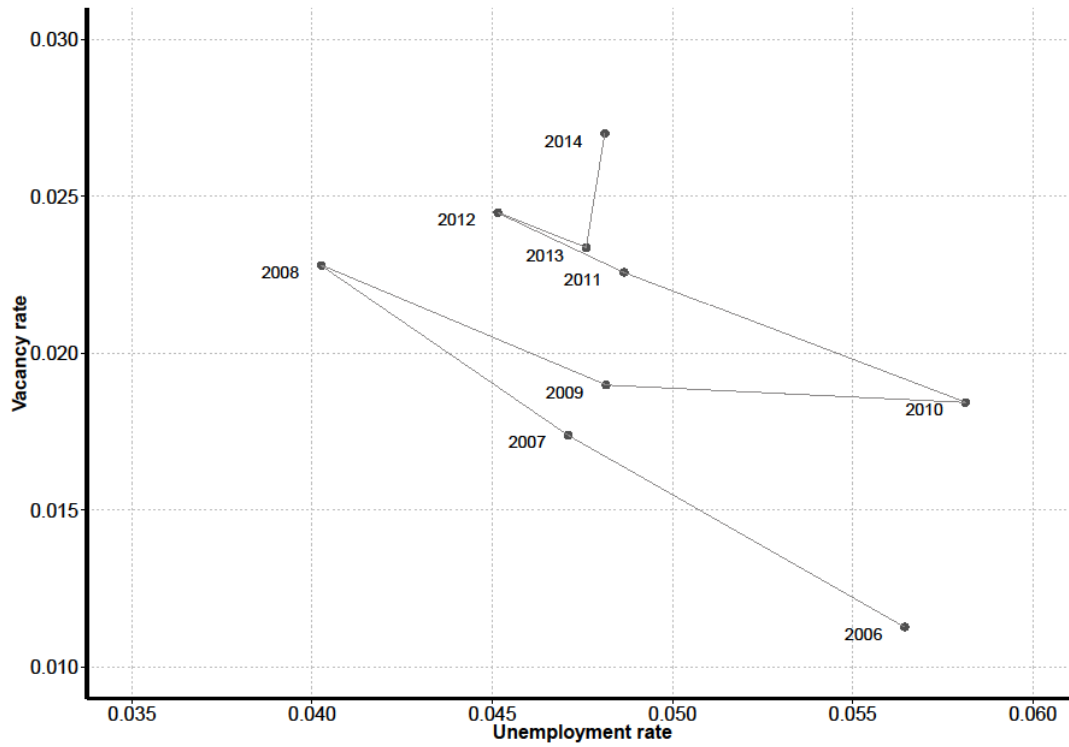
Figure A2: AVAM validation
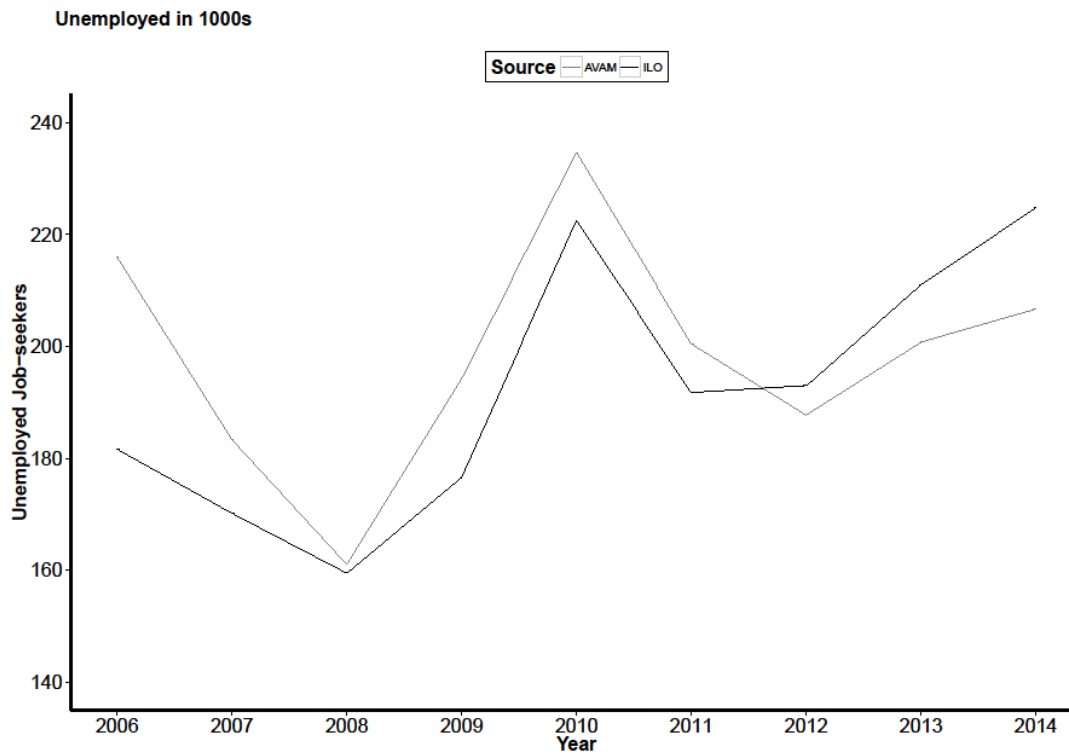
Figure A3: *SJMM validation*

Job vacancies standardized
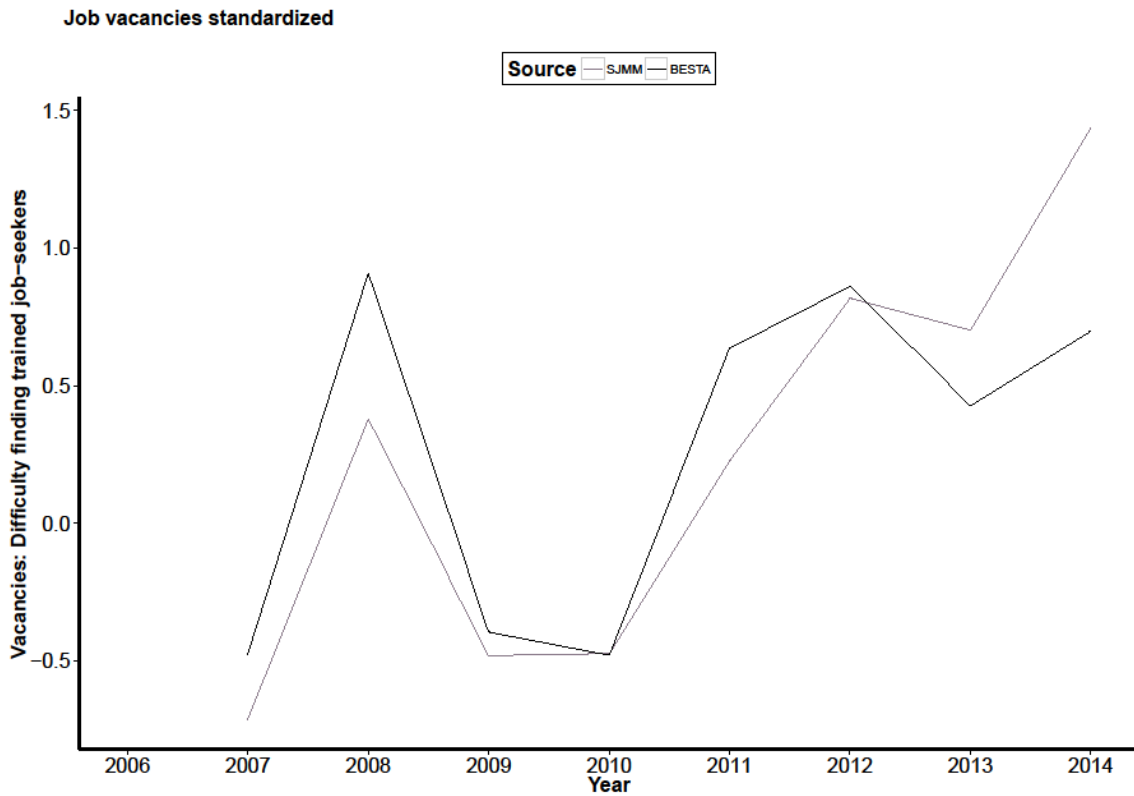
Note: The slight falling apart of the two curves for the year 2014 is no concern for the present study, as the relatively high number of vacancies in the SJMM data should not vary across submarkets and thus not bias mismatch measures.

Figure A4: *Trends in the numbers of unemployed per occupation*

Unemployed in 1000s

Figure A5: *Trends in the numbers of vacancies per occupation*

Figure A6: Empirical versus gamma fit of commuting times

Figure A7: *Validation of monthly vacancy imputation*

Table A1: *Raw v/u ratios for Regions and Occupations*

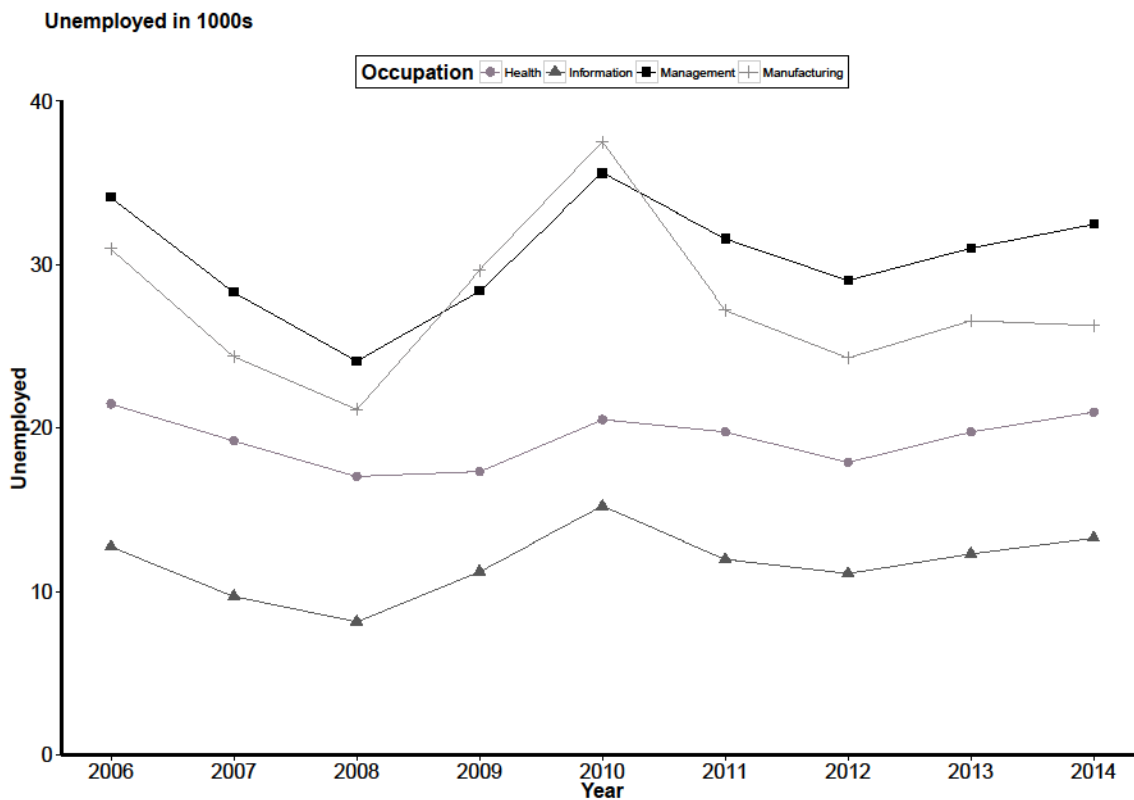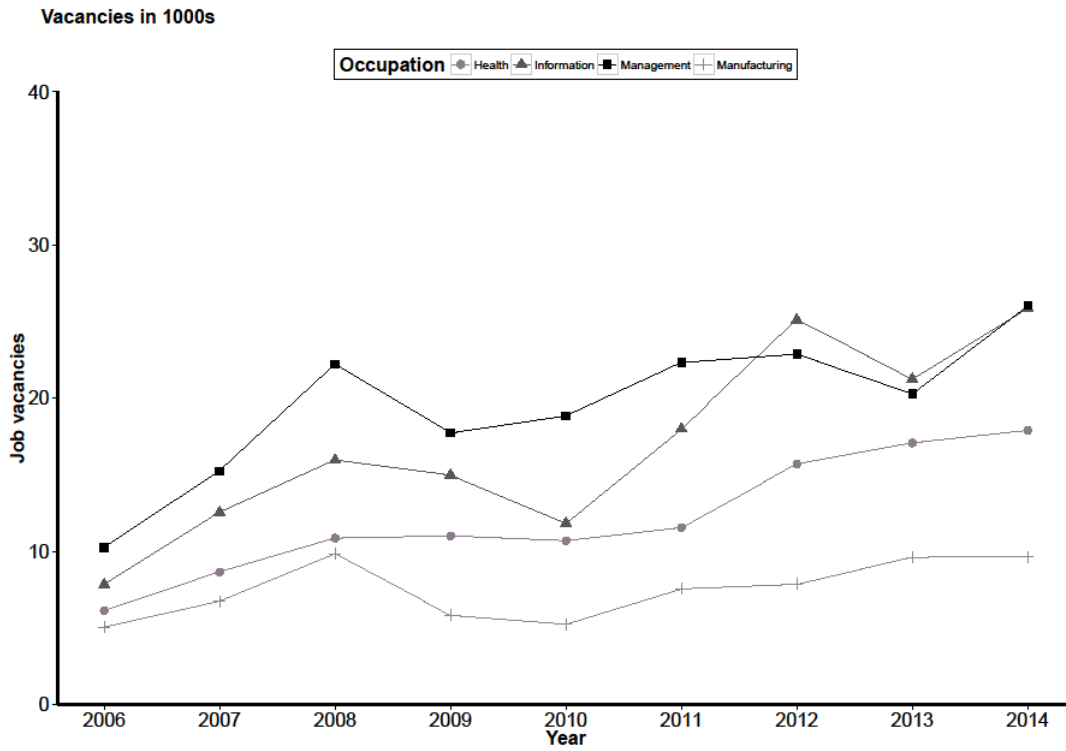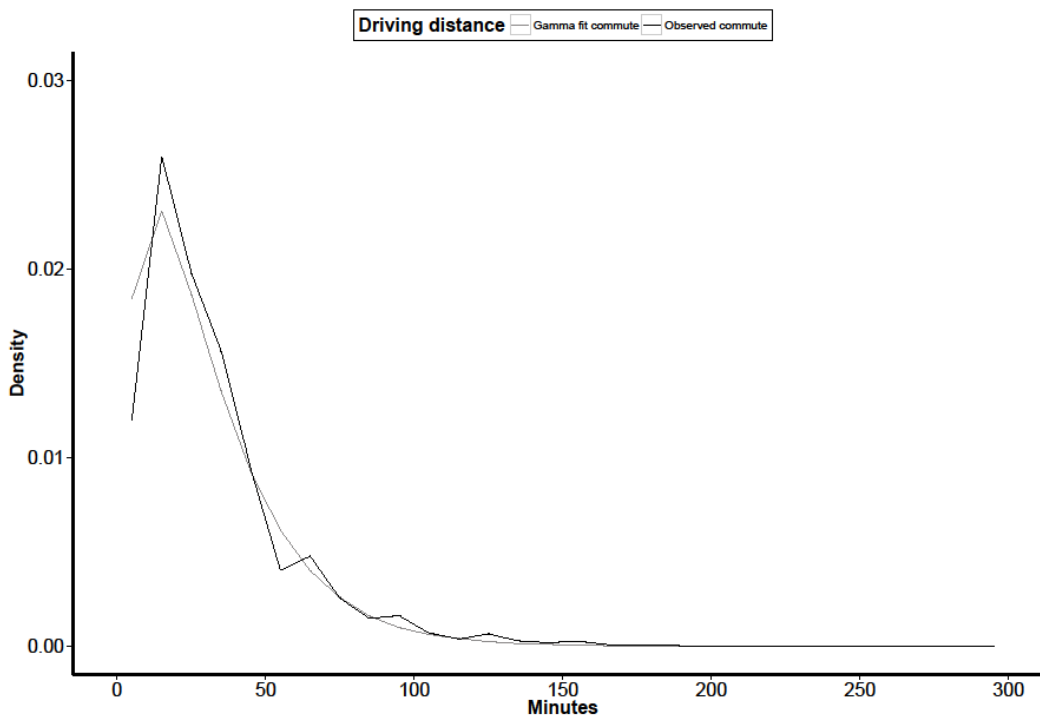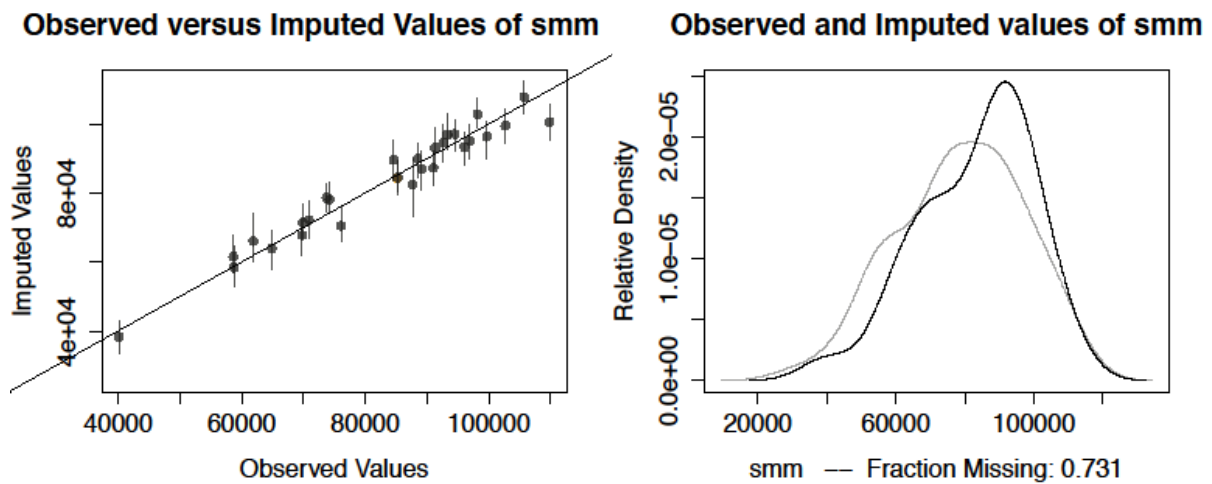|	2006	2007	2008	2009	2010	2011	2012	2013	2014
Labor Market Regions									
Geneva	0.14	0.23	0.28	0.22	0.18	0.29	0.26	0.25	0.23
Lausanne	0.05	0.12	0.18	0.16	0.17	0.18	0.20	0.18	0.20
Sion	0.12	0.16	0.23	0.22	0.28	0.23	0.51	0.31	0.27
Fribourg	0.06	0.10	0.18	0.24	0.16	0.16	0.32	0.29	0.24
Neuchatel	0.15	0.34	0.46	0.27	0.16	0.16	0.28	0.24	0.29
Biel/Bienne	0.18	0.31	0.53	0.36	0.18	0.42	0.45	0.35	0.56
Bern	0.38	0.51	0.98	0.81	0.58	1.01	0.90	0.84	1.00
Basel	0.24	0.50	0.74	0.67	0.38	0.55	0.66	0.70	0.79
Aarau Olten	0.16	0.47	0.60	0.33	0.27	0.39	0.69	0.78	0.92
Zurich	0.30	0.61	1.02	0.56	0.52	0.75	0.87	0.69	0.89
Winterthur Schaffhausen	0.25	0.48	0.76	0.57	0.42	0.54	0.75	0.69	0.56
St. Gallen	0.16	0.32	0.55	0.26	0.19	0.41	0.53	0.49	0.54
Chur	0.23	0.51	0.82	0.48	0.51	0.69	0.78	0.81	0.50
Luzern	0.27	0.53	0.49	0.52	0.36	0.67	0.56	0.68	0.80
Bellinzona	0.08	0.11	0.17	0.07	0.13	0.10	0.11	0.09	0.13
Lugano	0.04	0.07	0.16	0.07	0.05	0.04	0.05	0.12	0.13
Occupations (SBN 1-digit)									
agriculture	0.04	0.12	0.25	0.16	0.15	0.22	0.26	0.27	0.53
production/industry	0.16	0.28	0.46	0.20	0.14	0.28	0.32	0.36	0.37
technical and informatics	0.61	1.29	1.96	1.33	0.78	1.50	2.26	1.73	1.95
construction	0.13	0.25	0.35	0.16	0.18	0.25	0.30	0.30	0.41
trade and transport	0.22	0.48	0.73	0.57	0.39	0.62	0.53	0.53	0.56
hospitality and services	0.10	0.18	0.27	0.20	0.20	0.21	0.18	0.14	0.15
management, banking, insurance, law	0.30	0.54	0.92	0.62	0.53	0.71	0.79	0.65	0.80
health, education, culture, science	0.29	0.45	0.64	0.64	0.52	0.58	0.88	0.86	0.85

Table A2: *Cox regression for unemployment duration by job opportunities*

	Basic	6 Months	Past 6 Months
	B	b	b
ln(regional job opps)	0.10***	0.14***	-0.02
ln(occupational job opps)	0.04***	0.06***	0.00
Mid stage (ref: early stage)	-0.26***	-0.26***	-0.26***
Late stage (ref. early stage)	-0.70***	-0.68***	-0.72***
VET (ref. basic edu)	0.13***	0.15***	0.07***
PET (ref. basic edu)	0.12***	0.13***	0.11***
University(ref. basic edu)	0.07***	0.06***	0.09***
West Europe (ref. swiss)	0.01***	0.01*	0.02***
South and East Europe (ref. swiss)	-0.12***	-0.14***	-0.06***
Other countries (ref. swiss)	-0.37***	-0.43***	-0.24***
Women (ref. men)	-0.04***	-0.03***	-0.08***
N	1'164'586	1'164'586	325'082
N failures	893'695	651'832	241'863
LR chi2	47084	43587	15705
Prob>chi2	0.000	0.000	0.000

Sources; AVAM, SJMM 2006-2014; Notes: Models control for region and occupation; ***p < .01; **p < .05; *p < .1

Table A3: *Cox regression for unemployment duration by job opportunities and social groups*

	Basic	Education	Stages	Nation	Gender
	b	B	b	b	b
ln(regional job opps)	0.10***				
ln(occupational job opps)	0.04***				
Mid stage (ref: early stage)	-0.26***	-0.26***	-0.29***	-0.26***	-0.26***
Late stage (ref. early stage)	-0.70***	-0.70***	-0.74***	-0.70***	-0.70***
VET (ref. basic edu)	0.13***	0.18***	0.13***	0.13***	0.13***
PET (ref. basic edu)	0.12***	0.21***	0.13***	0.12***	0.12***
University (ref. basic edu)	0.07***	0.13***	0.07***	0.08***	0.07***
West Europe (ref. swiss)	0.01***	0.01***	0.01***	-0.04***	0.01***
South and East Europe (ref. swiss)	-0.12***	-0.12***	-0.12***	-0.22***	-0.12***
Other countries (ref. swiss)	-0.37***	-0.37***	-0.37***	-0.44***	-0.37***
Women (ref. men)	-0.04***	-0.04***	-0.04***	-0.04***	0.03***
VET # ln(regional job opps)		0.11***			
PET # ln(regional job opps)		0.13***			
University # ln(regional job opps)		0.09***			
VET # ln(occupational job opps)		0.04***			
PET #ln(occupational job opps)		0.05***			
University # ln(occupational job opps)		0.09***			
Mid stage # ln(regional job opps)			0.10***		
Late stage # ln(regional job opps)			0.12***		
Mid stage # ln(occupational job opps)			0.04***		
Late stage # ln(occupational job opps)			0.02***		
West Europe # ln(regional job opps)				0.13***	
South and East Europe # ln(regional job opps)				0.05***	
Other countries# ln(regional job opps)				0.09***	
West Europe # ln(occupational job opps)				-0.02**	
South and East Europe t# ln(occupational job opps)				0.02***	
Other countries # ln(occupational job opps)				0.02***	
Women # ln(regional job opps)					0.09***
Women # ln(occupational job opps)					0.08***
N	1'164'586	1'164'586	1'164'586	1'164'586	1'164'586
N failures	893'695	893'695	893'695	893'695	893'695
LR chi2	47343	59121	47310	47806	47637
Prob>chi2	0.000	0.000	0.000	0.000	0.000

Sources; AVAM, SJMM 2006-2014; Notes: Models control for region and occupation; ***p < .01; **p < .05; *p < .1

Table A4: *Unemployment duration by ALMPs and job opportunities*

	ALMP b	ALMP Edu b
Course (ref.: Internships)	-0.29***	-0.28***
Transient employment	0.15***	0.15***
Course # ln(occupational job opps)	0.05***	
Transient employment # ln(occupational job opps)	0.10***	
Course # ln(regional job opps)	0.20***	
Transient employment # ln(regional job opps)	0.05***	
Mid stage (ref: early stage)	-0.28***	-0.28***
Late stage (ref. early stage)	-0.62***	-0.62***
VET (ref. basic edu)	0.09***	0.12***
PET (ref. basic edu)	0.09***	0.14***
University (ref. basic edu)	0.04***	0.06***
West Europe (ref. swiss)	-0.02***	-0.02***
South and East Europe (ref. swiss)	-0.08***	-0.08***
Other countries (ref. swiss)	-0.25***	-0.25***
Women (ref. men)	-0.02***	-0.02***
Course # VET # ln(occupational job opps)		0.04***
Course # PET # ln(occupational job opps)		0.04***
Course # University # ln(occupational job opps)		0.10***
Transient employment # VET # ln(occupational job opps)		0.11***
Transient employment # PET # ln(occupational job opps)		0.13***
Transient employment # University # ln(occupational job opps)		0.18***
Course # VET # ln(regional job opps)		0.21***
Course # PET # ln(regional job opps)		0.22***
Course # University # ln(regional job opps)		0.18***
Transient employment # VET # ln(regional job opps)		0.08***
Transient employment # PET # ln(regional job opps)		0.09***
Transient employment # University # ln(regional job opps)		-0.02
N	552'440	552'440
N failures	457'570	457'570
LR chi2	37903	38195
Prob>chi2	0.000	0.000

Sources; AVAM, SJMM 2006-2014;

Notes: Models control for number of ALMP, region and occupation; ***p < .01; **p < .05; *p < .1