A divided labour market – on matching on the Swedish labour market after the economic crisis

CHRISTINA HÅKANSON*

Christina Håkanson has a PhD in economics and works at the Monetary Policy Department, Sveriges Riksbank.

In the wake of the financial crisis, many countries noted that matching between employees and employers seemed to have deteriorated. In previous analyses, the Riksbank has shown the existence of signs that matching on the Swedish labour market has also deteriorated following the crisis.[1]

The aim of this article is to follow up the Riksbank's previous analyses of matching and shed light on developments in recent years, and also to contribute a deepened analysis, in which matching is described from several perspectives linked to current research discussing factors that may be potential explanations to the development of the labour market after the crisis.

The results of the analysis indicate that problems remain in matching. It also shows that a large part of the impaired matching after the crisis can be explained by changes in the composition of the category unemployed, an increasing proportion of which at present are persons with a weaker attachment to the labour market.

However, the picture varies depending on the data sources used. It is less positive when data from the Swedish Public Employment Agency (Arbetsförmedlingen) is analysed, whereas Statistics Sweden's Labour Force Survey gives a brighter view. Even if that data also reveals signs that matching deteriorated after the crisis, recent development is in line with historical patterns. One explanation for the varying results is that the sources, even if they give a coherent view of the extent of unemployment, to some degree cover different individuals.
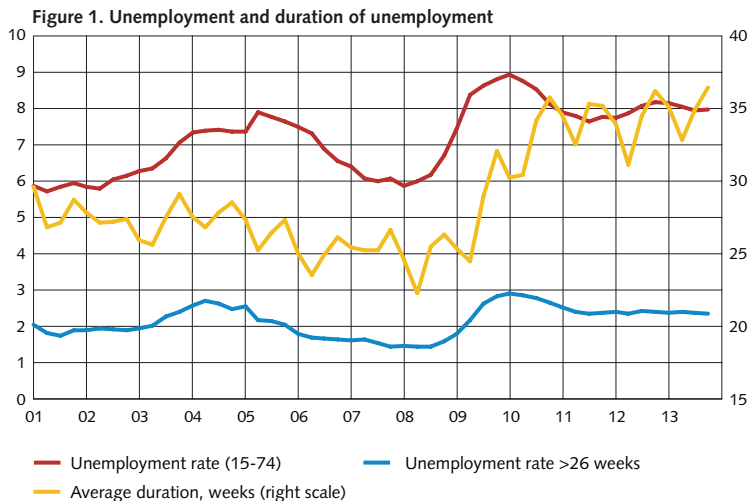
1 See the article on the functioning of the labour market in the Monetary Policy Report published in October 2012. Similar results for Sweden can also be found in analyses from the National Institute of Economic Research (2011, 2012), the Swedish Fiscal Policy Council 2012, the Organisation for Economic Cooperation and Development (OECD) 2012 and elsewhere.

Introduction

The labour market changes constantly. New jobs are created and old ones disappear. Individuals move between employment and unemployment, but also in and out of the labour force. As it takes time for employers and potential employees to come into contact, both unemployment and vacant jobs exist simultaneously. In economic theory this process is commonly called matching. A situation in which it is easier for employers and potential employees to find each other and form a match, i.e. in which matching efficiency is higher, contributes to shorter duration of unemployment, lower levels of unemployment and a higher employment rate. And, in a reversal of the situation, unemployment becomes higher and unemployment duration increases when matching is impaired. The number of matches between jobseekers and employers normally varies with the business cycle. When demand for labour is higher, it is easier for jobseekers to find work, while the opposite is true in downturns.

Both the percentage of long-term unemployed and the average duration of unemployment spells rose in Sweden in conjunction with the prolonged downturn following the financial crisis (see Figure 1). Long-term unemployment has fallen back from the highest levels and is now in line with the historical average, but it is still considerably higher than it was prior to the crisis. At the same time, the average duration of unemployment spells remains at a higher level than it was in the period 2001-2009 (see Figure 1).[2]

Figure 1. Unemployment and duration of unemployment

Unemployment rate (15-74)   Unemployment rate >26 weeks
Average duration, weeks (right scale)

Sources: Statistics Sweden and the Riksbank

---

2   Long-term unemployment is measured here as the number of individuals who have been unemployed for at more than six months as a percentage of the labour force.

A LONG PERIOD OF UNEMPLOYMENT CAN AFFECT CHANCES OF FINDING WORK

Longer unemployment spells can affect the functioning of the labour market for several reasons. If being unemployed is interpreted as a signal that an individual has low productivity, longer periods of unemployment will strengthen this signal.[3] This can lead to a vicious circle arising in which the individual becomes trapped in unemployment.[4] This hypothesis is supported, for example, by experiments demonstrating that the probability of being called to an interview declines according to the length of unemployment for unemployed people with otherwise identical qualifications.[5]

Longer duration of unemployment can also affect individuals' behaviour. Empirical results indicate that individuals reduce their search effort as time passes. One reason for this could be that individuals lose motivation and confidence the longer they are unemployed.[6] Another aspect is that knowledge and competence can depreciate when an individual is out of work for a longer period of time. All in all, this can contribute to lower matching efficiency and that the job finding rate declines further in certain groups.

The duration of unemployment is related both to demand in the economy and to how well the matching process between employers and jobseekers works. At the same time, the average duration of unemployment and matching efficiency are also affected by the composition of the category unemployed. If groups with a weaker average attachment to the labour market, which are thereby harder to match, increase in size, both the average matching efficiency and duration of unemployment will increase.

The outline of the article is as follows: First, a theoretical framework and its empirical application are presented. This analysis is mainly based on simple matching functions estimated from data provided by the Swedish Public Employment Agency (SPEA) and Statistics Sweden's Labour Force Surveys. The data is described in the following section. Following this, the results of the empirical analysis are presented, together with a discussion of factors that may contribute towards explaining the development of the labour market after the crisis. Figures are presented at relevant points in the text, while tables with regression results are placed at the end of the article.

Matching – a simple theoretical framework

A common way of describing the functioning of the labour market and the efficiency of matching is to use the Beveridge curve, which relates the unemployment rate to the vacancy rate (see Figure 2). Normally, there is a negative correlation between vacancies and unemployment. In a period of high economic activity, the proportion of vacant jobs increases while unemployment decreases, while the reverse applies in a downturn. A

---

3   As it is more likely that individuals with lower productivity will become unemployed, an employer comparing two candidates, one in work and the other not, will quite rationally interpret unemployment as a signal of lower productivity, given that it is not possible to observe productivity perfectly.
4   See Blanchard and Diamond (1994).
5   See Kroft, Lange and Notowidigdo (2013).
6   See Krueger and Mueller (2011).

movement up or down the same curve is usually interpreted as cyclical variations, while a shift outwards (or inwards) *may* indicate a deterioration (or improvement) of matching efficiency. However, such a shift may also be part of a cyclical development, in which case the Beveridge curve forms a loop and eventually returns to the old relationship.[7] In Sweden, the curve showed a clear outward shift in 2009 (see Figure 2). For each given level of the vacancy rate, unemployment became higher than it had been previously. In 2012 and early 2013, the curve then moved inwards again, but this movement has halted over the last year.

Figure 2. The Beveridge curve
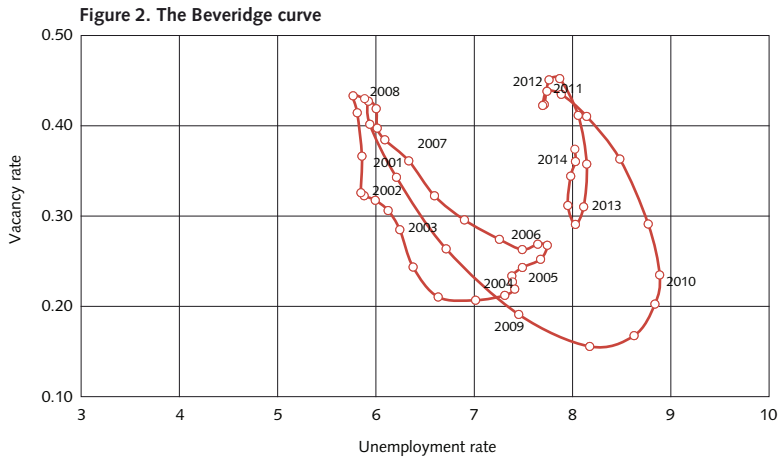
Note. The vacancy rate is defined as the number of vacancies as a proportion of the labour force. Seasonally-adjusted and smoothed data. The markings indicate the first quarter of each year.
Sources: Statistics Sweden and the Riksbank

A more direct way of studying matching efficiency is to estimate matching functions. A matching function relates the number of matches, which is to say individuals finding work, to the number of vacancies and jobseekers in the economy. In its simplest form, it assumes that matching between employer and jobseeker occurs randomly. The number of matches (M) is determined by the number of jobseekers (U) and the number of vacancies (V).

$$M=f(U,V)$$

Assuming that the matching function is Cobb-Douglas type with constant return to scale, the function can be written so that the aggregate job finding rate, i.e. the number of matches as a percentage of the number of jobseekers, depends on the tightness of the

---

7   See also National Institute of Economic Research (2013).

labour market, defined as the number of vacancies as a percentage of the number of jobseekers according to [8]

(1) $$ln\left(\frac{M_t}{U_{t-1}}\right)=\mu+(1-\sigma)*ln(\frac{V_{t-1}}{U_{t-1}})+\varepsilon_t.$$

In equation (1), the matching function is constant, with all variation in the job finding rate being driven by fluctuations in vacancies and unemployment. The matching efficiency on the labour market is then given by the parameter μ and $(1-\sigma)$ is the elasticity with respect to the tightness of the labour market. The Riksbank estimated such a relationship using SPEA monthly data in the article "Has the functioning of the labour market changed?".[9] The results indicated that matching had deteriorated considerably since the crisis. For a given labour market tightness in terms of jobseekers and vacancies, fewer persons found work than the historical relationship would suggest.

However, there are several reasons why the matching function does not have to be constant. For example, Barnicon and Figura (2013) discuss how the composition of the unemployment pool affects matching efficiency. If groups with a weaker average attatchment to the labour market, and which are thereby harder to match, increase in proportion, the average matching efficiency will decrease mechanically. They demonstrate that the simplest matching function, such as in equation (1), works well in normal circumstances, but struggles to capture major fluctuations on the labour market, and that a functional form that takes composition into account could better capture the relationship.

Another possibility is that changes in productivity and companies' recruitment behaviour may affect matching efficiency.[10] In downturns, matches that had previously been favourable cease to be so, as a result of lower productivity in the economy. For the unemployed, this is expressed as increased demands on jobseekers, with companies only being willing to employ relatively more productive individuals. With a given number of unemployed and vacancies, this implies a decrease in the number of recruitments and thus matching efficiency varies with economic activity.

Random matching is also a strong simplification of reality. Unemployed persons examine many vacancies before deciding which job to apply for. Once a vacancy has been rejected, there is little chance that the unemployed person will change his or her mind and apply for that particular job as opposed to instead screening new vacancies. Gregg and Petrolongo (2005) capture this notion in a stock-flow matching approach and show that this better describes how matching on the labour market is created.[11] Using such an approach, the inflow of jobseekers will search among all vacancies. Those not finding a job (being

---

8 The Cobb-Douglas function is written $M_t=\mu_0 U_{t-1}{}^\sigma V_{t-1}^\gamma$ in which μ_0 is a scale parameter (matching efficiency) and σ and γ are elasticities. With constant return to scale, $\sigma+\gamma=1$, i.e. $M=\mu_0 U^\sigma V^{(1-\sigma)}$. In equation (1), both sides are logarithmised. $\mu=ln(\mu_0)$ and ε_t is an error term.

9 See the Riksbank's Monetary Policy Report, October 2012.

10 See Sedlacek (2014).

11 Forslund et al. (2007) test random matching and stock-flow matching according to the same specifications as Gregg and Petrolongo for Sweden using SPEA data and find support for stock-flow matching more correctly describing the Swedish labour market.

matched) in the first period will only look among newly posted vacancies in following periods. This means that the probability of going from unemployment to employment is greater for those who have recently become unemployed and it then decreases when the next inflow of new vacancies must be awaited. Similarly, vacancies not filled straight away will have a lower probability of being filled, as only newly unemployed people will search among them. The analysis in this article is based on the simpler approach, with random matching, but similar results have been achieved using a stock-flow approach.

Data – many sources shed light on the labour market

The labour market is multi-faceted and there are a number of statistical sources that describe various aspects of it. This article uses data from the SPEA register together with Labour Force Surveys and vacancy statistics from Statistics Sweden.[12] These sources differ in several ways. They have different purposes, different definitions and different structures. This means that a somewhat different picture emerges depending on which statistics are being used. Statistics from the Labour Force Surveys probably provide a fairer view of the labour market as a whole, as the survey is a representative sample of the population of working age, while the basis of SPEA statistics is formed of those people registered as unemployed. However, SPEA statistics are constructed in such a way as to shed light on important groups facing particular difficulties on the labour market. There are thus good reasons to use both sources. The appendix describes the differences between the Labour Force Surveys and SPEA statistics in greater depth.

One advantage of SPEA data is that a relatively long period, from 1992 onward, can be studied and that the frequency is high (monthly data). Statistics Sweden's current flow statistics within the Labour Force Surveys only go back to the third quarter of 2005. However, it is possible extend data to 1997 by linking data from older flow statistics, although the results should be interpreted with caution as the definitions and methods differ between the two vintages.

Job opportunities vary along with labour market tightness

To shed light on recent years' development, equation (1) is first estimated for the period January 1992-June 2008 (see Table 1 for results).[13] The estimated elasticity with respect to the labour market is 0.41 and is in line with previous empirical results.[14] Figure 3 shows fitted values from the estimated equation together with a projection of how job opportunities should have developed given the historical relationship and the actual

---

12 Statistics Sweden's vacancy statistics go back to 2001. For this analysis, vacancies prior to 2001 have been extrapolated with the use of SPEA data for remaining vacant positions.

13 Corresponding estimates have also been made in which the matching function is instead assumed to follow a stock-flow relationship. The results resemble those obtained from random matches in the sense that matching efficiency shows the same deterioration after the financial crisis.

14 From a review of literature, Petrolongo and Pissarides (2001) reach a span of 0.3-0.5 for elasticity $(1-\sigma)$. Barnicon and Figura (2013) estimate elasticity at 0.33 and Sedlacek (2014) at 0.35.

development of vacancies and unemployment (the green line in Figure 3).[15] As Figure 3 shows, the actual job finding rate (the red line) is significantly lower than suggested by the model projection and is below the 95 per cent forecast interval from 2010 and on.[16]

Figure 3. Job finding rate using SPEA data – estimated relationships until June 2008 and subsequent forecast

— Job finding rate   — Fitted values   ···· Model projection
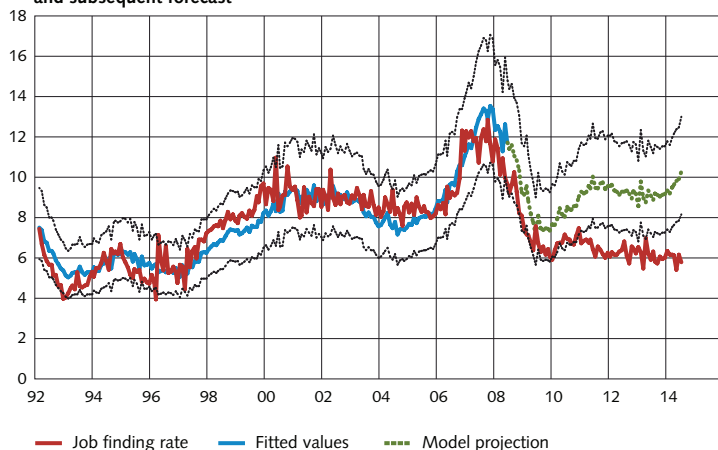
Note. The relationship is estimated until the end of June 2008. After this, the equation is projected given the actual development of vacant positions and unemployment according to the Swedish Public Employment Agency. Job finding rate as a percentage. The broken lines indicate a 95 per cent forecast interval. See Table 1, column 1 for the regression results.
Sources: Swedish Public Employment Agency and the Riksbank

If the model is instead estimated for the entire period January 1992 to July 2014, which is to say also including the years after the crisis, the estimate changes considerably (see Table 1, column 2). Elasticity falls to 0.32. The estimate also becomes less precise, with the coefficient of determination decreasing from 0.81 to 0.52. One reason for this may be that the assumption of a constant matching efficiency places too heavy a restriction on the model. For example, changes in the composition of the unemployment pool may affect the aggregate matching efficiency (Barnicon and Figura, 2013). It may also vary cyclically as in Sedlacek (2014). This means that the unemployed find it harder to find work during a downturn for two reasons. Firstly because there are fewer jobs in relation to the number of unemployed people and secondly because matching efficiency declines.

To reflect that matching efficiency may change over time, the model is thus re-estimated with annual time effects (see Table 1, column 3). This does not significantly change elasticity with respect to the tightness of the labour market, but the coefficient of determination rises to 0.91. One way of illustrating this is by studying the residuals, the unexplained part,

---

15 The same approach is taken in Employment Outlook (OECD, 2012). The matching function is estimated for data predating the crisis and the model is adjusted using the actual development of the labour market situation. The OECD also notes that there are signs that matching deteriorated after the financial crisis in a number of countries, including Sweden.

16 The choice of cut-off point for how long the model is estimated is arbitrary and chosen to exclude the financial crisis. The results are not affected notably if the date is instead moved forwards or backwards by six months.

from the estimates with both constant and time-varying matching efficiency (see Figure 4). When matching efficiency is forced to be constant, the residuals are positive from the end of the 1990s until the crisis and then become large and negative after the crisis. In contrast, when matching efficiency is instead allowed to vary, there is no clear pattern in the residuals.

Figure 4. Unexplained part of the variation in job opportunities

Residuals, constant matching efficiency

Residuals, time varying matching efficiency
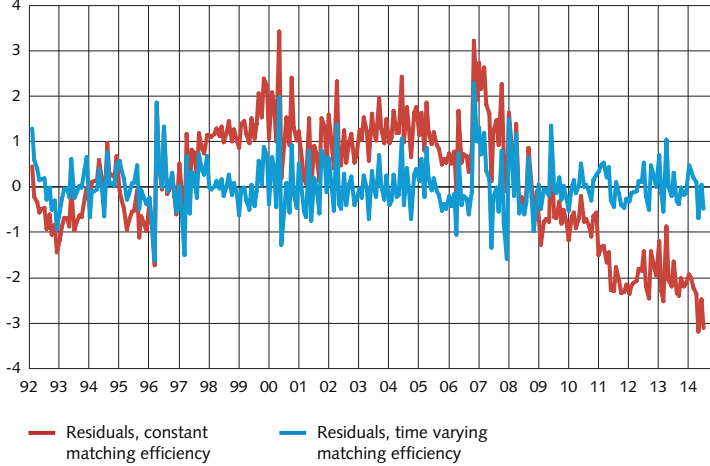
Note. Unexplained part in the variation in aggregate job opportunities. Residuals from regressions January 1992-July 2014. See Table 1, columns 2 and 3 for the regression results.
Sources: Swedish Public Employment Agency and the Riksbank

To illustrate how the estimated matching efficiency changes over time, Figure 5 shows how the time dummies deviate from their mean value. From 2010 on, matching efficiency is more than one standard deviation lower than its mean value and shows no sign of recovering.[17] From the end of the 1990s until the crisis, the deviations are instead positive, which indicates that matching efficiency was then above average.

---

17 The pattern largely follows the development of productivity growth as discussed in Sedlacek (2014). In the period 1993-2008, average productivity growth was 2.6 per cent, while the average for 2009-2013 was significantly lower at 0.5 per cent.

**Figure 5. Estimated deviation in matching efficiency**
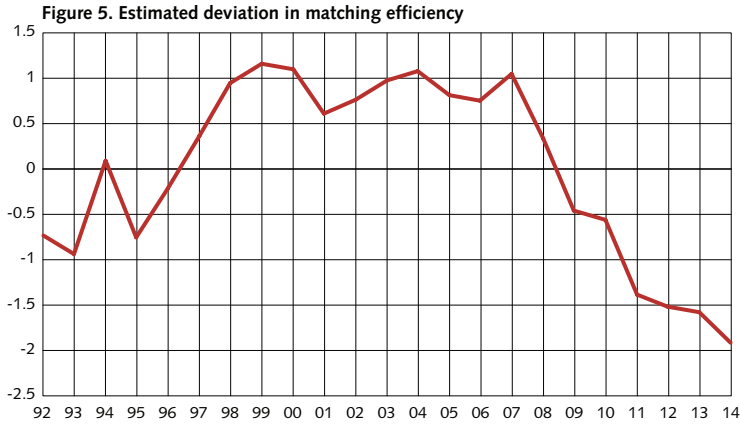
Note. Standardised deviation from mean value. See Table 1, column 3 for the regression results.
Sources: Swedish Public Employment Agency and the Riksbank

LABOUR FORCE SURVEY STATISTICS GIVE A BRIGHTER VIEW

Table 1, columns 4 and 5, present the results of corresponding analyses using flow data from the Labour Force Surveys. Interestingly, these results do not indicate the same deterioration of matching, regardless of whether the relationship is estimated for the entire period or the shorter one. The coefficient of determination is certainly higher when the crisis period and following years are excluded, but the difference is not as clear as in the estimates from SPEA data. It can also be seen in Figure 6, in which the fitted values 1997-2008:2 are shown together with a projection of the model given the actual development of vacancies and unemployment according to Statistics Sweden. Following the crisis, the actual development of the job finding rate was weaker than indicated by the historical relationship, but the deviation is significantly smaller than in SPEA data and falls within a 95 per cent forecast interval. Unlike the analysis of SPEA data, it also shows that the job finding rate over the recent period again is in line with historical relationships. However, the estimate is subject to significant uncertainty as historical data has been linked.[18]

---

18 For more information, see the section describing the data.

Figure 6. Job finding rate in the Labour Force Survey – estimated relationships until the end of 2008:2

Job finding rate ——   Fitted values ——   Model projection ·····
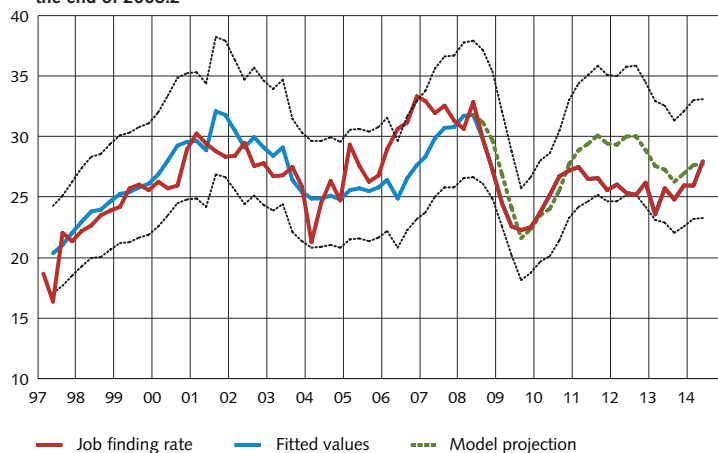
Note. Linked quarterly data, Labour Force Survey. The relationship is estimated until the end of the second quarter. 2008. After this, the equation is projected given the actual development of vacancies and unemployment according to Statistics Sweden. Job opportunities as a percentage. See Table 1, column 4 for the regression results. The broken black lines indicate a 95 per cent forecast interval around the green line.
Sources: Statistics Sweden and the Riksbank

One possible explanation for the difference in results from data from SPEA and the Labour Force Surveys may be that the different sources partly capture different persons.[19] For example, the Labour Force Surveys include more full-time students than SPEA data. At the same time, some individuals who are unemployed according to SPEA are outside the labour force according to the Labour Force Surveys, which indicates that they have a weaker connection to the labour market. It is also likely that unemployed persons with high employability, such as individuals with good educations, for example, may be less inclined to register at SPEA, while weaker groups register to a greater extent, which may be reflected in the results.

What possible explanations are there for the deteriorated matching?

The pattern shown in Figure 3 is not unique to Sweden.[20] Barnichon and Figura (2013) study data for the United States and find support for the view that the common matching function (random matching), that has shown itself to be a fairly good approximation of the labour market in normal times, works significantly less well in times of major fluctuations on the labour market. One reason is that the matching function finds it difficult to capture the effects of the changing composition of the unemployment pool. Another is that different occupations, industries and geographical areas are affected in different ways. If groups with poorer employability (i.e. below average matching efficiency) increase as a share of the unemployed, matching efficiency will decrease mechanically.

---

19 See Statistics Sweden 2013 and the appendix.
20 See, for example, Employment Outlook 2012.

THE CHANGED COMPOSITION OF THE LABOUR FORCE HAS AN EFFECT

In recent years, changes have taken place on the Swedish labour market, leading to changes in the composition of the labour force. Firstly, demographic developments have contributed towards groups with a weaker attachment to the labour market increasing as a percentage of the working age population, for example younger people, older people and immigrants. Secondly, a series of economic policy reforms aimed at increasing the labour supply and incentives to work have been carried out, for example the earned income tax credit and changes to unemployment and sickness insurance.[21] As an illustration, these measures have led to over 70,000 people previously on sick leave being transferred from the Swedish Social Insurance Agency to the Public Employment Agency since 2010, thus being included in the labour force. In October 2013, 32,000 of these individuals remained registered with SPEA[22]. In recent years, labour force participation has developed strongly even though demographic developments suggest it should instead have decreased. The labour market reforms implemented over the past decade have probably contributed to this.

In the long term, an increased supply of labour will form the basis for a long-term higher employment rate, but in the short term it may entail major challenges, particularly if there is an imbalance between the qualifications of the labour force and employers' demands. This, in turn, is expressed as impaired matching. An adjustment, which may involve everything from training and education to mobility and changes in production, may take a long time.[23]

The SPEA usually speaks of four groups that are more vulnerable on the labour market. These are people who

- have at most compulsary school,

- were born outside Europe,

- are older (55-64 years), or

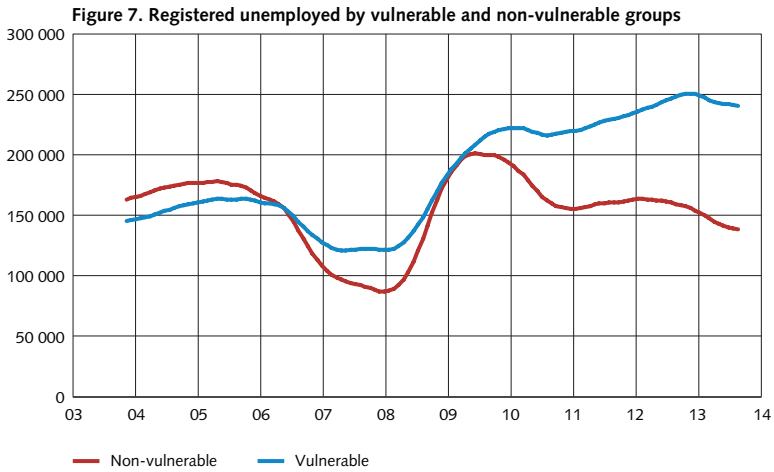- have a disability entailing a reduction of working capacity.

In these groups, job finding rates are generally lower and/or unemployment higher than in other groups.[24] Figure 7 shows how the number of people registered by SPEA in vulnerable and non-vulnerable groups has changed over time. While members of vulnerable groups were fewer than those of non-vulnerable groups in the early years of the last decade, over 60 per cent of registered unemployed are now in the vulnerable groups. Moreover, while the size of the non-vulnerable group is now almost back on the same level as before the financial crisis, the vulnerable group has increased by about 100,000 persons.

---

21 See also Sveriges Riksbank (2011) and National Institute of Economic Research (2012).

22 See Arbetsförmedlingen, 2013.

23 One method of studying how imbalances between job-seeking and vacant positions affect unemployment has been developed by A. Sahin, et al. (2012). The same method has been applied to Swedish data by Marthin (2013). This concludes that mismatches between professions are important as regards total unemployment. In a comparison between 2002 and 2011, he also finds indications that mismatches between professions have increased over time.

24 It is possible to follow several of these groups in SPEA's register from 1992 onwards. Those without upper-secondary educations are reported separately from November 2000 and those born outside of Europe from November 2003.

Figure 7. Registered unemployed by vulnerable and non-vulnerable groups

— Non-vulnerable   — Vulnerable

Note. Vulnerable groups means older people between 55 and 64, those without
upper-secondary educations, those born outside Europe and persons with disabilities.
Number of persons, trend values.
Source: Swedish Public Employment Service

JOB FINDING RATES VARY OVER TIME AND BETWEEN DIFFERENT GROUPS

Job finding rates, defined here as the percentage of jobseekers finding unsubsidised work,
have developed differently for different groups (see Figure 8). The average job finding rate
decreased from 10 per cent in 2004 to about 6.5 per cent in 2013 (red line). Part of the
decline can be explained by a change in the definition of unsubsidised work.[25] According
to SPEA, this change in definition implies a decrease of the average job finding rate by
about one percentage point. This means that the reduction in the job finding rate for all
jobseekers is less in reality, about 2.5 percentage points.

---

25 The statistics from 2007 on exclude jobs lasting for less than six months for jobseekers covered by the job and
development guarantee scheme and the job guarantee for young people. The data has been corrected for this in
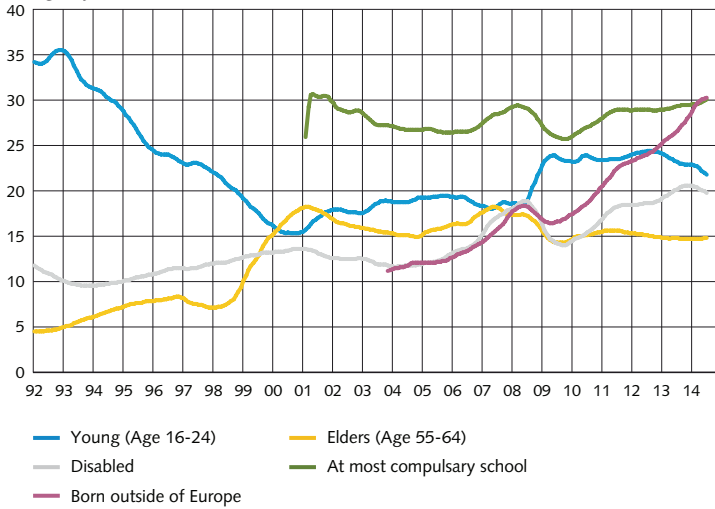all estimates.

Figure 8. Job opportunities in all groups
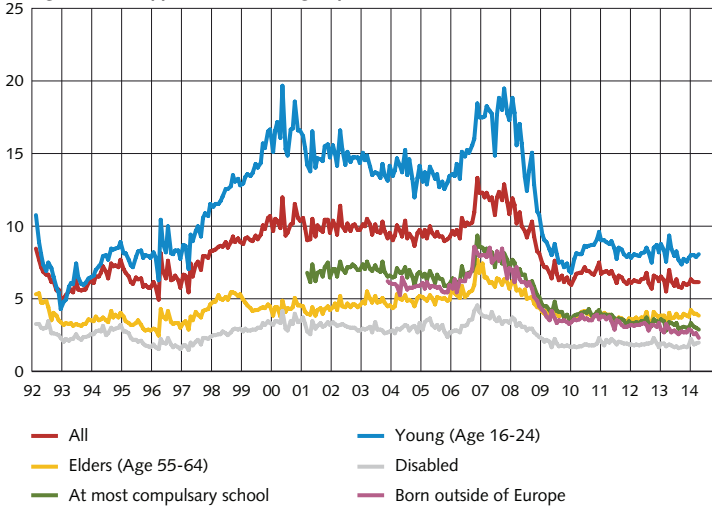
Note. Unemployed persons gaining unsubsidised work in various groups. Per cent.
Source: Swedish Public Employment Service

At the same time, major changes have taken place in the composition of unemployed individuals registered with SPEA. Figure 9 shows how the proportion of unemployed people who are young, older, without upper-secondary educations, born outside Europe or disabled has changed over time. Note that these percentages do not add up to 100 per cent as an individual may be included in more than one group.

The percentage of young people has varied widely. From having formed almost 35 per cent of the unemployed at the start of the 1990s, this group decreased to form just below 20 per cent for the greater part of the present century. The great expansion of higher education has probably been a major contributory factor to this. However, the percentage increased again in conjunction with the crisis before declining again over the last year to just over 20 per cent (see Figure 9). Although young people are not included among the vulnerable groups, this group saw a major deterioration of its job finding rate in conjunction with the crisis (see Figure 8). Another major change is that the percentage of older people (55-64 years) increased, particularly in the 1990s, from about 5 per cent to almost 15 per cent at present. The percentage born outside Europe has been reported separately since the end of 2003. At this point, they formed about 10 per cent of the unemployed but have since increased to about 30 per cent. At the same time, this group has a low job finding rate compared to the other groups.

All in all, groups with lower job finding rates have thus increased significantly in size, which affects the development of the overall job finding rate. With regard to the division between vulnerable and non-vulnerable, a simple decomposition shows that about two-thirds of the decline in the total job finding rate can be explained by changes in the composition of the unemployment pool and the remaining part by a reduced job finding rate given that composition.

Figure 9. Composition of registered unemployed at the Swedish Public Employment Agency

Note. Unemployed in different groups. Per cent.
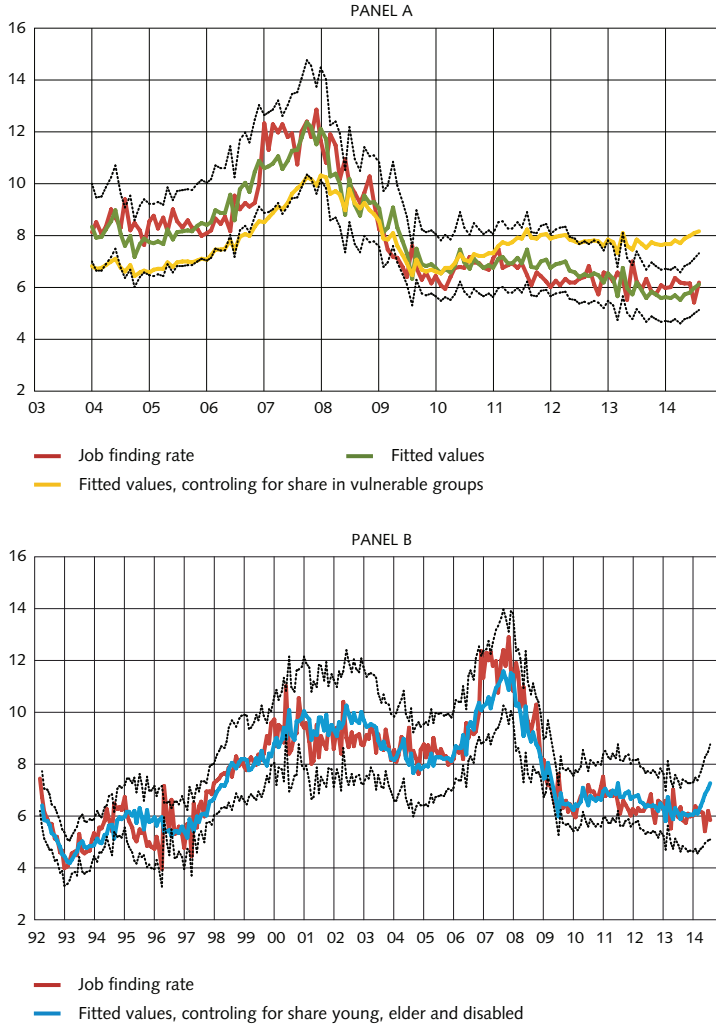Source: Swedish Public Employment Agency

WHAT PART DOES THE CHANGED COMPOSITION PLAY IN ESTIMATES OF THE MATCHING FUNCTION?

Figure 10, panel A shows the fitted values when equation 1 (random matching) is re-estimated for the shorter sample from November 2003 to 2013 (yellow line), i.e. from the point in time at which the vulnerable group as a whole can be identified in the data. This fit is poor and the simple function cannot capture the large decline in the job finding rate after the crisis. The model underestimates the job finding rate before 2008 and overestimates it afterwards. The green line shows fitted values where the estimated equation is expanded to include the proportion of unemployed belonging to one of the vulnerable groups. The idea is to thereby take the changed composition of the unemployment pool into consideration. The results indicate that the increase in the share belonging to vulnerable groups can explain a large part of the decline in the job finding rate (see Table 3, column 2 and Figure 10, panel A). Given the composition of unemployment and the tightness of the labour market, the estimated job finding rate is then in line with actual developments.

One weakness is that the estimation period is relatively short as the vulnerable group as a whole cannot be traced back further than to the end of 2003. However, it is possible to study the part played by composition over a longer perspective by controlling for the percentages of young people, older people and disabled people, all of which are reported separately in SPEA data as far back as January 1992 (see also Figure 9). This is done in the lower panel (B) in Figure 10. Here too, simple checks for composition show that the fitted values are more in line with actual developments. The results thus indicate that the

composition can also explain a large part of the decrease in job opportunities after 2008 over the longer sample period (see also Table 2, column 2 for the regression results).[26]

Figure 10. Job finding rate – estimated relationships with controls for the composition of unemployment

PANEL A

— Job finding rate — Fitted values
— Fitted values, controling for share in vulnerable groups

PANEL B

— Job finding rate
— Fitted values, controling for share young, elder and disabled

Note. See Table 2 for the regression results.
Sources: Swedish Public Employment Agency and the Riksbank

_____

26 To take consideration of variations in composition and labour market situation on local labour markets, the relationship has also been estimated using data from SPEA by county and over time. The results are in line with those received from aggregated data and are therefore not reported here, although they are available from the author.

Discussion – a divided labour market?

This analysis describes the factors that have contributed to the development of the Swedish labour market: both the economic downturn connected to the financial crisis and the changes in the composition of the labour force due to both demographic developments and various economic policy measures. Since the end of 2009, the number of vacant jobs in relation to the number of persons unemployed has risen without opportunities for the unemployed to find work having recovered to the same extent. A certain decline in matching efficiency is natural in conjunction with a downturn, but other factors have probably also played a role.

Labour force participation has developed strongly in recent years. The labour market reforms implemented over the past decade have probably contributed to the strong development. But this has also meant that groups closer to the periphery of the labour market are participating to a greater degree. For example, this can be seen in SPEA's statistics, in which the number of unemployed persons belonging to vulnerable groups now forms the majority of the registered unemployed. The analysis shows that it is difficult for a simple random matching function to capture the decrease in job finding rates following the crisis and the results indicate that at least a part of the explanation lies in a change in the composition of the unemployment pool.

At the same time, it is important to point out that the picture varies depending on which data is analysed. SPEA's data gives a less positive view, in which matching efficiency deteriorated significantly and has shown no sign of recovering as yet. If the statistics from the Labour Force Surveys are used instead, the deterioration is not as clear and estimated job finding rates in the recent period are again in line with actual developments. This divergence of results depending on the source is probably due to the inclusion, to a greater extent, of individuals on the periphery of the labour market in SPEA's register. At the same time, the estimates in the Labour Force Surveys are associated with great uncertainty.

When estimates of the matching function using SPEA's data take consideration of the composition of the category unemployed, the results are closer to those received when the years following the crisis are excluded. The estimated values of the job finding rate then fall into line with the actual development given the labour market tightness.

So what are the implications of this changed composition for unemployment in the future? In the long term, the increased supply of labour will form the basis for long-term higher employment, but in the short term it may entail major challenges, particularly if jobseekers' qualifications do not match companies' demands. The large supply of labour could then contribute to keeping unemployment at a high level.

The Riksbank's assessment is that labour force participation will decrease somewhat over the coming years.[27] This is mainly explained by the fact that the population of working age (15-74 years) increasingly consists of groups with lower average workforce participation. An expansionary monetary policy is contributing to the strengthening of

---

27 See the Riksbank, Monetary Policy Report, July (2014).

economic activity, which is also boosting demand for labour and expectations of continued rising employment. Unemployment will thus successively decrease over the years ahead. However, monetary policy cannot affect structural factors on the labour market such as the composition of the labour market or matching efficiency. Other measures than an expansionary monetary policy are needed to significantly bring unemployment down.

Without measures to improve matching efficiency, for example, there is a risk that the labour market will become more divided. Labour shortages in certain industries and professions may arise at the same time as many people with other skills or the wrong skills remain unemployed. In such a situation, the risk may arise that inflationary pressures rise via wage increases at the same time as there is slack in parts of the labour market.

Tables

Table 1. Estimated job opportunities

	AF	AF	AF	LFS	LFS
	(1) 1992:1-2008:6	(2) 1992:1-2013:12	(3) 1992:1-2013:12	(4) 1997q1-2008q2	(5) 1997q1-2014q2
ln (V(-1)/U(-1))	0.41*** (0.02)	0.32*** (0.03)	0.28*** (0.05)	0.27*** (0.04)	0.23*** (0.04)
Constant	-1.58*** (0.06)	-1.88*** (0.08)		-2.92*** (0.06)	-2.95*** (0.05)
Annual effects			X		
N	197	270	270	45	69
Adj R2	0.83	0.52	0.91	0.61	0.53

Newey West corrected standard error in parentheses

*** p<0.01, ** p<0.05, * p<0.10

Note. V represents the number of remaining vacant positions according to Arbetsförmedlingen (columns 1-3) and vacancies according to Statistics Sweden (columns 4-5). U represents the number of jobseekers according to the Swedish Public Employment Agency (columns 1-3) and number of persons unemployed according to Statistics Sweden (columns 4-5)

Table 2. Estimated job opportunities with checks for composition

	(1) 2003:11-2013:12	(2) 2003:11-2013:12	(3) 1992:1-2013:12
ln (V(-1)/U(-1))	0.31** (0.08)	0.56*** (0.03)	0.48*** (0.03)
Proportion aged 16-24			-2.56*** (0.21)
Proportion aged 55-64			-1.64** (0.39)
Proportion disabled			-4.66*** (0.40)
Proportion in vulnerable groups		-3.86*** (0.24)	
Constant	-1.96*** (0.17)	0.64*** (0.217)	-0.07 (0.15)
Number of observations	129	129	263
Adj R2	0.27	0.85	0.86

Newey West corrected standard error in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note. V represents the number of remaining vacant positions and U is the number of jobseekers according to the Swedish Public Employment Agency.

Appendix

DESCRIPTION OF DATA FROM THE LABOUR FORCE SURVEYS AND SPEA

The Labour Force Survey (LFS) is a sample survey based on about 29,500 individuals every month and providing Sweden's official labour market statistics. The survey describes current labour market conditions and also provides a view of developments. The definition of unemployment and employment complies with the guidelines of the International Labour Organization (ILO). SPEA's statistics are instead based on data concerning those individuals registered at SPEA. A review of the correspondence between the statistics from SPEA and the LFS, produced by Statistics Sweden last year, concluded that there is strong correspondence as regards the number of unemployed persons but that there are large differences in composition. There are individuals registered as unemployed at SPEA who are classed as employed or outside the labour force by the LFS. There are also unemployed individuals in the LFS who are not registered as unemployed at SPEA.[28] One reason for these differences is that the LFS and SPEA have different definitions of unemployment.[29] The comparison also revealed large differences in age distribution. The LFS covers young people to a greater degree, for example unemployed full-time students not registered as unemployed by SPEA (Statistics Sweden, 2013). As SPEA's statistics are based on a person actually being registered at SPEA, the willingness to do this also plays a part.

Statistics from both the LFS and SPEA are also used to measure the tightness of the labour market. From Statistics Sweden, economic statistics regarding job vacancies are used. Vacancies refer to unmanned vacant positions in the private sector that can be filled immediately. SPEA instead uses remaining and newly reported vacancies registered at SPEA. SPEA's measure covers all sectors but probably suffers from a number of measurement errors. Firstly, there is a delay in the deregistration of vacancies after they have been filled and, secondly, newly reported vacancies may be duplicated, above all as regards seasonal short-time work (see Arbetsförmedlingen 2012).

---

28 In the first quarter of 2011, about 60 per cent of those registered as unemployed at SPEA were classified as unemployed according to the LFS. Twenty per cent were classified as employed and the rest were outside the labour force (Statistics Sweden, 2013).

29 To be classed as unemployed by the LFS, a person must be without work, be available for work and have actively looked for work or have been offered and accepted work starting within three months. A person is classed as employed if he or she has worked at least one hour during the week of measurement. However, under certain circumstances, a person registered at SPEA can work up to 8 hours per week and still be classed as unemployed.

References

Arbetsförmedlingen (2012), "Nyanmälda lediga platser – ett mått på arbetskraftsefterfrågan" in *Arbetsmarknadsutsikterna våren 2012.*

Arbetsförmedlingen (2013), *Arbetsmarknadsutsikterna hösten 2013, prognos för arbetsmarknaden 2013–2015.*

Barnichon, R. and A. Figura (2013),"Labor Market Heterogeneity and the Aggregate Matching Function, Barcelona GSB Working paper, no. 727.

Swedish Fiscal Policy Council (2011), *Swedish Fiscal Policy 2011.*

Forslund, A. and K. Johansson (2007), "Random and stock flow models of labor market matching – Swedish Evidence", IFAU Working Paper, 2007:11.

Gregg, P. and B. Petrolongo (2005), "Stock-flow matching and the performance of the labor market", *European Economic Review vol.* 49, no. 8, pp. 1987-2011.

Petrolongo, B. and C. Pissarides (2001), "Looking into the Black Box: A Survey of the Matching Function", *Journal of Economic Literature*, vol. 39, no. 2, pp. 390-431.

National Institute of Economic Research (2011), "Long-Term Effects of Economic Policy Reforms on the Labour Market" *Swedish Economy*, December.

National Institute of Economic Research (2012), *Wage Formation Report.*

National Institute of Economic Research (2013), *Wage Formation Report.*

Kroft, Kory, Fabian Lange, and Matthew J. Notowidigdo (2013), "Duration Dependence and Labor Market Conditions: Evidence from a Field Experiment", *Quarterly Journal of Economics* , vol. 128, no. 3, pp. 1123-1167.

Krueger, A.B. and A. Mueller (2011), "Job Search, Emotional Well-Being, and Job Finding in a Period of Mass Unemployment: Evidence from High-Frequency Longitudinal Data" *Brookings Papers on Economic Activity.*

Marthin, G. (2012), "Measuring Mismatch in the Swedish Labor Market", *Studier i Finanspolitik*, 2012:3, Swedish Fiscal Policy Council.

OECD (2012), Employment outlook, chapter 1.

Sveriges Riksbank (2012), *Monetary Policy Report*, October.

Sveriges Riksbank (2013), *Monetary Policy Report*, October.

Sveriges Riksbank (2014), *Monetary Policy Report*, July.

Sahin A., Song J., Topa G. and G. Violante, "Mismatch Unemployment" (2012), Federal Reserve Bank of New York Staff Reports no. 566.

Statistics Sweden (2013), "Arbetskraftsundersökningarnas (AKU) och Arbetsförmedlingens (Af) arbetslöshetsstatistik– En jämförande studie", *Arbetsmarknads- och utbildningsstatistik, bakgrundsfakta,* 2013:8.

Sedlacek, P. (2014), "Match Efficiency and Firms' Hiring Standards" *Journal Of Monetary Economics,* vol. 62, pp. 123-133.

Shimer, R. (2005), "The cyclical behavior of equilibrium unemployment and vacancies", *American Economic Review,* vol. 95, no. 1, pp. 25-49.

Petrongolo, B., and C.A. Pissarides, (2001). "Looking into the Black Box: A Survey of the Matching Function." *Journal Of Economic Literature*, vol. 39, no. 2, pp. 390-431.