
LABOUR MARKET MISMATCHES IN THE EU AND OECD COUNTRIES *

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Abstract

The paper discusses labour market mismatches from the perspective of models commonly used for their analysis: matching functions and Beveridge curve. The paper deals with the presentation of the two models, stressing out their advantages and disadvantages. A distinctive part of the article is devoted to analyzing the results of some empirical studies carried out at national and regional level in the EU or OECD¹ countries.

Key-words: labour market, matching functions, Beveridge curve, cyclical and structural factors

The financial crisis has caused, among other things, significant income and jobs loss while the problem of increasing efficiency of financial, material and human resources has become acute.

This concern is reflected in the latest assessment of European Commission (*Europe 2020. A European strategy for smart, sustainable and inclusive growth*, COM 2010) on the crisis consequences and the possibilities of avoiding the pessimistic scenario by applying some measures specially designed in order to sustain a smart, sustainable and inclusive economic growth.

At the labour market level, one of the solutions proposed in the *New Skills for New Jobs: Action now* report (EU 2010) aims to increase the compatibility between the skills offered by the education system and labor market requirements, with emphasis on fostering creativity and entrepreneurship.

From the methodological point of view, the subject has been addressed by many authors in the international economical literature: Petrongolo and Pissarides (2001); Wall and Zoega (2002); Nickell, Nunziata, Ochel and

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Quintini (2002); Ahtonen (2004); Valetta (2005); Kenne (2005); Robson (2006); Bachmann and Burda (2007), Bouvet (2009). They have used matching functions and Beveridge curve in order to identify the determinants of the mismatches in the labour market.

A reference paper that addresses the theme of the tools which can be used to analyse the frictions in the labour market was written by *Petrongolo and Pissarides* in 2001. The paper covers all the theoretical issues related to aggregate matching functions and their connection with another instrument often used for the same purpose, the Beveridge curve.

The authors approach problems regarding the manner of defining the functions, analysing the results obtained in empirical studies conducted before 2000, the conceptual and measuring problems generated by the usage of these economic tools.

Other empirical studies carried out at local and regional level have improved the initially proposed models by including some control variables in the analysis, differentiated according to regional and local specificities.

At the **national level**, labour market analysis in terms of compatibility between demand and supply in the labour market has been addressed very recently, one possible explanation being the reduced availability of the necessary data.

Nowadays, National Institute of Statistics publishes data on annual and quarterly job vacancies both at national and local level. This allowed the Romanian authors to focus on studying the topic, dealing with both theoretical and methodological aspects: Paşnicu 2003, Lincaru, 2010, Korca and Dimian 2010, Dimian and others 2010.

The studies' results have showed that in Romania the problem of resources improper use is one of the most common, given the increasing rates of unemployment, especially among young people and the long term. Also, using Beveridge curve and matching functions in evaluating labor market functioning has shown that over long periods of time the qualifications and the competences held by the labour force tend not to be appropriate for the new vacancies requirements.

Matching functions

The problem of matching between the characteristics of those who are looking for a job and the job vacancies has been analysed in the specialised literature using Matching Functions².

The matching process can be described starting from the next assumptions (Yashiv, 2007):

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- Workers and firms are risk-neutral, many enough and homogenous;
 - Agents discount the future at a given rate;
 - They have rational expectations and engage in costly search activities.

Firms spend resources on advertising, making their vacancies known, looking for the candidates, their training, while the workers use resources for seeking a job, collecting the necessarily information and applying for the vacancies;

- Workers and firms are assumed to be marched in a random way and after that they start the bilateral bargaining over the wage;
- Matching process is influenced by the informational and location frictions.

Meeting between the labour force supply (U the number of the unemployed who are looking for a job) and labour force demand (V the number of the vacancies) is the process that is the subject of matching function:

$$M = m(U, V) \quad (1)$$

The function is non-negative, increasing in arguments, concave and supports the hypothesis of constant returns (most empirical studies have proved that it is a homogenous function of degree 1).

It is obvious the assumption that in order to have a matching process the unemployed number and of course the existing vacancies must be different from 0:

$$m(0, V) = m(U, 0) = 0 \quad (2)$$

For discrete variables, where M is a flow of matches and U and V are stocks at the beginning period, the function is defined by the next relation³:

$$m(U, V) \leq \min m(U, V) . \quad (3)$$

The ratio $\theta = \frac{V}{U}$ is known as “labour market tightness”, in fact the vacancies number for each unemployed. Starting from the homogeneity assumption, the probability that an unemployed to find a job into a time unit is $p(\theta) = \frac{m(U, V)}{U}$, named transition probability or hazard rate, while the probability that a vacancy to be field is $q(\theta) = \frac{m(U, V)}{V}$. In a stationary environment, inverses of each of the two probabilities are the average duration

of unemployment or vacancies.

Denoting by η_U the function elasticity with respect to unemployment and by η_V the elasticity with respect to vacancies, the first term measures the positive externality from workers to firms and the second one the positive externality produced by the firms. $\eta_U - 1$ and $\eta_V - 1$ measure the negative externalities produced by unemployed and accordingly by the firms on each other.

Most empirical studies have shown that the matching function records constant returns to scale, but if there would be increasing returns to scale would be more than one equilibrium, due to very strong positive externalities.

The Beveridge curve is the main tool for assessing the effectiveness of labor market functioning in terms of compatibility between the demand and supply of labor. From the formal point of view, it can be defined as “the path formed by all those vacancies and unemployment rate combinations, where unemployment is stable, i.e. where the inflow into unemployment is equal to the flow out of it” (ECB 2002).

From a mathematic point of view, Beveridge curve model can be obtained starting from the equilibrium relation of the matching function⁴.

The unemployment rate dynamics (u) is given by the difference between inflows and outflows:

$$\dot{u} = \lambda(1 - u) - m(u, v) \quad (4)$$

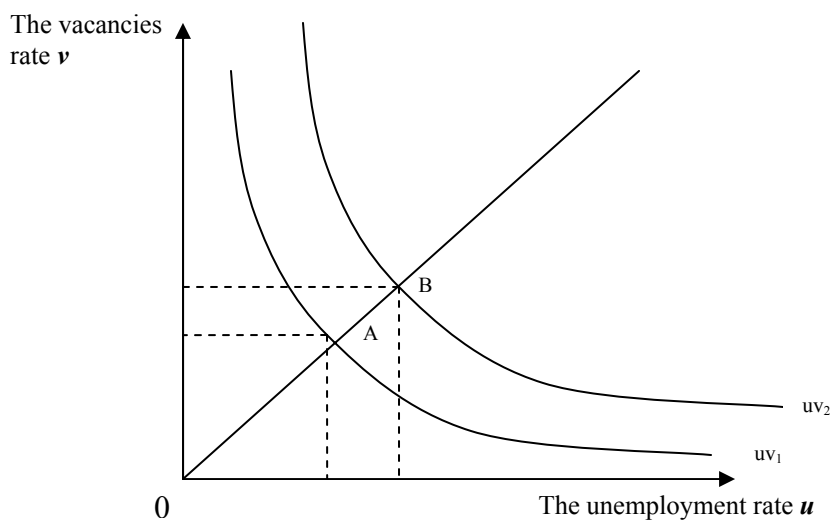
If $p = \frac{m}{u}$ is the job finding rate and $m = pu$, in the steady state the

unemployment rate is constant and making $\dot{u} = 0$ it can be obtained the next relation:

$$u = \frac{\lambda}{\lambda + p} \quad (5)$$

The graphic representation into the space $u - v$ is specific for the Beveridge curve, which describes the negative relation that comes up over time in the economy between unemployment and vacancy rate.

Beveridge Curve



Source: CEDEFOP and ILO (2010) *Skills for green jobs, European synthesis report*, Luxembourg: Publications Office of the European Union, 2010

When v the vacancy rate rises, both m - the matching rate and p - the finding a job rate are increasing, while u - the unemployment rate decreases.

Factors considered responsible for movements along the Beveridge curve, up or down (e.g. vacancy rate and unemployment rate have different directions) are represented by the cyclical developments in the economy, while movements to the origin or to outside (e.g. when at the vacancy rate, unemployment rates are different) are the results of the structural factors, that affects the compatibility between the vacancies and unemployed.

Key factors of the labour market mismatches

The main advantage of using matching functions for analysing national or regional labour markets imbalances is that they summarize in a consistent manner the complicated process of matching between demand and supply. They use as variables the number of workers who are seeking for a job, the number of firms looking for workers and a set of control variables to estimate the number of jobs formed at a given point in time.

Another advantage of the matching functions and of the Beveridge curve function is that by their linearization or transformation into log-linear

functions can be used to test a series of hypotheses about the factors that put their mark on the matching process.

Bouvet (2009) in his paper *The Beveridge Curve in Europe: New evidence using national and regional data* tests the influence of four categories of factors on the Beveridge curve shifts that occur over time. The model was built for five European countries (Belgium, Germany, Holland, Spain and Great Britain) and 60 regions NUTS I and NUTS II for the period 1975-2004.

The four categories of factors considered to influence Beveridge curve shifts or unemployment steady-state in the already mentioned five states and their regions and whose influence has been tested are:

✓ *Composition of unemployment and labour force*

▪ The share of women in the total number of unemployed population is expected to have an effect of increasing the matching process efficiency. This is due to their greater willingness to accept fixed term contracts or part-time work, thus helping to reduce total unemployment;

▪ Long-term unemployment (unemployed for more than 1 year) exerts the so called “hysteresis” effect. Long-term unemployed experience a process of human capital deterioration, as it happened with the aging phenomena. In fact, their qualifications tend not to match those required by the vacancies. The abilities to find a job decrease over time and are less comparable with those of the younger people. In the meantime, they can become discouraged and give up seeking for a job. All these factors contribute the unemployment rate increase.

▪ The share of young people and women in the total workforce is expected to have a negative effect on the matching process, they being considered less attached to their jobs.

✓ *Institutional factors*

▪ The unemployment benefit system is expected to influence the equilibrium level of unemployment from many perspectives: level, coverage, the length of time of their availability, eligible categories and the limits in which the system functions (Nickell, Nunziata, Ochel și Quintini, 2002). The shorter the length of unemployment benefit, the shorter duration of unemployment is expected to be. The coverage of unemployment benefit is directly related to its level and tends to have the same type of influence on the unemployment outflows. Empirical studies have proved that the unemployment benefit system strict regulations are an important determinant of unemployment duration.

▪ The wage-setting system, namely the existence and the influence exerted by professional associations (labour unions), collective bargaining, the regulations regarding legal minimum wage, as well as the employment

protection legislation tend to affect the equilibrium level of employment by increasing it.

✓ *Structural shocks*

▪ Regional employment dispersion tends to have a negative influence on the equilibrium unemployment, due to the mismatch between the work force qualifications and those required by the job vacancies.

▪ It is expected that the structural changes to play the same role on equilibrium unemployment, determining a shift to the right of the Beveridge curve, more precisely an increase of the unemployment at the same level of the vacancies.

▪ Total factors productivity growth is going to have a contrary effect of the two mentioned factors, resulting in a shift of the Beveridge curve to the origin, reflecting the reduction of unemployment.

✓ *Business cycle*

▪ A country position on the Beveridge curve at a certain moment in time can indicate its economic situation, whether it is in a recession or economic boom period. A measure of this situation is represented by the difference between real GDP and potential GDP (output gap). If real GDP is above the potential, the country or region is in a period of economic expansion and unemployment rate is expected to decrease the rate at a given level of vacancies (the position on the Beveridge curve will be top left).

Analyzing the results of empirical studies

Beveridge curve function, usually a Cobb-Douglas type, depicts the negative relationship that exists between unemployment rate and vacancy rate. It can be computed by linearization or as a log-linear function.

To capture the four categories of factors influence on unemployment, Bouvet (2009) uses an econometric model with panel data and fixed effects where the dependent variable is the unemployment rate and the independent variables are: *vacancy rate* and its square (to identify the shape of the curve), the composition of employment and unemployment X_{it} , institutional factors Z_{it} , changes in the business cyclical $outputgap_{it}$, structural change W_{it} .

$$u_{it} = \alpha_i + \beta_1 + \beta_2 v_{it} + \beta_3 v_{it}^2 + \beta_4 X_{it} + \beta_5 Z_{it} + \beta_6 outputgap_{it} + \beta_7 W_{it} + \varepsilon_{it} \quad (6)$$

At national level, the only factor with significant influence on the unemployment rate has proven to be long-term unemployment (which

confirms the effect of “hysteresis”). For regions, all other variables related to unemployment and work force structure have shown a significant impact in the sense of the made assumptions.

At regional level, institutional factors, total factor productivity growth and business cycle confirmed the assumptions made and proved to significantly affect the position on the Beveridge curve. The regions in the countries that give “generous” unemployment benefits and have minimum wage legislation are situated far from the origin point on the curve. In contrast, total factor productivity growth, i.e. a positive output gap cause inward changes on the Beveridge curve and reduce unemployment.

Nickell, Nunziata, Ochel and Quintin (2002) had previously tested hypotheses regarding the impact of institutional factors on the evolution of unemployment for OECD countries and the period 1960-1990. To this end, the authors used an econometric model with log-linear panel data. The unemployment rate u_{it} was the dependent variable, while independent variables are the previous year's unemployment rate u_{it-1} , vacancy rate v_{it} , separation rate s_{it} and a set of control variables Z_{it} (institutional factors):

$$\ln u_{it} = \alpha_i + \alpha_t + \beta_1 \ln u_{it-1} + \beta_2 \ln v_{it} + \beta_3 \ln s_{it} + \beta_4 Z_{it} + \varepsilon_{it} \quad (7)$$

The results confirm that for most OECD countries, institutional factors explain a significant part of the change in the evolution of unemployment: Belgium, Denmark, France, Italy, Spain, UK etc. An entirely different model had countries like Germany, New Zealand and the USA.

Among institutional variables, the largest contribution (about 39%) in unemployment rate growth have had changes in the unemployment benefits system, while labour taxation increase has contributed by 26%. Variables such as trade unions have contributed to rising unemployment by 19%, while employment protection laws explain 16% of this increase.

The conclusion is that long-term unemployment experienced by OECD countries during 1960-1990 was due by over 50% of these institutional factors and, especially, the unemployment benefits system and labor taxation.

In his paper *Sectoral Shifts, Employment Specialization and Efficiency of Matching: An Analysis Using UK Regional Data*, Robson (2006) tested the influence of **structural shocks** i.e. changes in employment structure and degree of specialization on the efficiency of the labour market for UK's regions. He analyzed 12 regions during 15 years (1986-2000).

The analysis is based on the following assumptions:

- Structural changes in the economy induce labour reallocation between industrial sectors, which causes frictional unemployment due to

labour movement from declining sectors to expanding ones.

- It is expected that mismatches between the qualifications held by the work force and those needed by employers to be more significant when hiring between different sectors of the economy than in the same sector, leading to a less efficient process of matching.

- Enhancing structural change will lead to an intensification of the process of finding a job in the work force already employed and an increased competition for those seeking employment. It is expected that people who already have a job to be favoured by employers at the expense of the unemployed, which will also result in reduced efficiency of matching.

- Unlike the effects of structural change on the efficiency of matching and on labour market functioning, it is expected that the degree of regional specialization to have the opposite effect, i.e. efficiency increase. This can be explained by the fact that specialization in a specific field will concentrate a large number of workers who possess the qualifications required by employers.

Two matching functions of log-linear type, have been used, one for unemployed and the other for job vacancies⁵:

$$\ln M_{it} = \kappa + \theta \ln U_{it} + \phi \ln V_{it} + \lambda \ln Lilen_{it} + \mu \ln CARS_{it} + \varphi X_{it} + \tau_i TREND_i + \varepsilon_{it} \quad (8)$$

$$\ln F_{it} = \kappa' + \theta' \ln U_{it} + \phi' \ln V_{it} + \lambda' \ln Lilen_{it} + \mu' \ln CARS_{it} + \varphi' X_{it} + \tau'_i TREND_i + \varepsilon'_{it} \quad (9)$$

Testing these assumptions has led to the conclusion that the impact of structural change is much stronger for the process of filling a vacancy, than of finding a job by the unemployed. One explanation is that structural change increases the gap between the qualifications held by the workforce and those required by employers.

At least for UK's regions, the degree of regional specialization hasn't proved to have a significant impact neither on filling a vacancy nor finding a job by the unemployed. The result can be attributed to the fact that specialization in a particular area can have a short or medium term effect on the functioning of labour markets. In the long-term structural changes may make it become a factor in rising unemployment.

Conclusions

Matching functions and Beveridge curve are among the most useful tools for analyzing the efficient functioning of the labour market in terms of compatibility between the characteristics of people looking for a particular job

and the requirements of job vacancies.

The main advantage of matching functions is the ability to capture in an integrated and easy manner the complex relationships established on the labour market, using a relatively small number of variables. The number of filled jobs at a certain moment in time is obtained from the number of persons seeking employment, the number of firms that are looking for employees and a number of control variables.

Beveridge curve is the main tool (graphic form) used to describe the negative relationship between the vacancy rate and unemployment rate. Although some problems of data availability and reliability can occur when using Beveridge curve for country or regional analysis, its construction can provide some additional information related to the state of labour market and the determinant factors.

Matching functions and Beveridge curve have been used by Romanian and foreign authors to test hypotheses about the conditions that led to imbalances in the functioning of national and regional labour markets.

The main factors considered were the structural and cyclical one and testing hypotheses about them led to the following conclusions:

- ✓ In times of recession, unemployment is rising and the vacancy rate tends to decrease. This process is reflected by the shifting Beveridge curve outwards, the result of the influence of cyclical factors.

- ✓ In periods of economic recovery the process is reversed, but in some countries may occur the rise of vacancies at the same rate of unemployment. This may be an indication of inefficiency of the matching process due to the structural factors.

- ✓ Changes in the economic structure of a country reduce the efficient functioning of labour markets because newly created jobs are more difficult to fill due to the scarcity of appropriate skills.

- ✓ The “hysteresis” effect is present in most examined countries. In all these countries long-term unemployment share affect the matching process as human capital deteriorate over time.

- ✓ Institutional factors have been shown to have a significant impact on the labour market. Unemployment benefits, collective agreements, minimum wage setting and employment protection legislation can explain over 50% of the variance in long-term unemployment.

Notes:

1. Organisation for Economic Co-operation and Development
2. Model presentation is based on the paper „Looking into the black box: A survey of the matching function”, Journal of Economic Literature, vol. 39, pp. 390-431 (Petrongolo and Pissarides, 2001)

3. In the continuous time, M is the instant employment rate and U and V the instant stocks of unemployed and the vacancies. In the constant return to scale assumption, the values M , U , V are normalized by the labour force value (into the model they are written by lower letters).

4. Model presentation is based on the paper The Beveridge Curve (Yashiv, 2007), accessed at the address http://eprints.lse.ac.uk/19703/1/The_Beveridge_Curve.pdf

5. Where dependent variables are: M – the level of outflow from unemployment and F – number of filled vacancies. Independent variables: U – the stock of unemployed workers, V – the stock of unfilled vacancies, Lilien index, coefficient of absolute regional specialization (CARS), a set of control variables (X) in the form of long term unemployed workers and the proportion of the unemployed aged under 25 and the proportion of the unemployed aged 50 and over and a set of regional specific time trend (TREND).

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