

Mismatches on the labour market and structural unemployment

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8 Summary and conclusions

This thesis examines the problem of structural mismatches on the labour market in relation to the measurement of structural unemployment. With the empirical contributions presented in this study, I seek to answer two fundamental questions:

1. What is the significance of mismatches and structural unemployment on the Dutch labour market, and
2. What is the nature of these mismatches or what causes them?

To this purpose, I concentrated on two macro approaches of markets in disequilibrium and a micro approach.

Why these three methods? First of all, to get a complete picture of the problem of mismatches in the Netherlands. Inevitably, this is achieved as a result of the complementarity of the methods: restrictive assumptions applying to the one method do not apply to the other, and *vice versa*. As a consequence, the combined outcomes are less dependent on the arbitrariness in the assumptions of the individual methods. Secondly, in as far the three methods share the measurement of some common effects, these can be compared.

The Chapters 1 and 2 put the present study in a proper theoretical perspective. Objectives are set out and the state of the art studies are discussed. The two macro approaches used in this study originate from the theoretical works of Barro and Grossman (1976), Muellbauer (1978) and Malinvaud (1980). Their models are in turn inspired by Keynes (1936). The common message is that prices and wages adjust too slowly to clear markets permanently in the short run, so that transactions are determined by supply or demand, while the other side of the market gets rationed. Another key feature of these disequilibrium models is that the effects of incomplete market clearing are not exclusively confined to one single market. If workers or firms can not realise their plans in, say, the goods market, they will change behaviour on the labour market and *vice versa*. Both the assumptions of fixed prices and spillover effects are at the core of this thesis. In the application of the two macro methods in this study, prices are assumed to be exogenously fixed. As such, the recent theoretical contributions which succeeded in bringing in endogenous prices in the disequilibrium analysis are not taken into account. I accept this as a shortcoming of the present study.

The two macro approaches which are used in this study, essentially are empirical model applications of the theoretical Keynesian disequilibrium model. Central is the assumption that aggregate markets such as the labour and goods market of an economy consist of a large number of micro markets on which supply and demand ratios differ. The minimum condition is applied to these micro markets, that is transactions are determined by the minimum of supply and demand. Consequently, either unemployment or vacancies exist in a specific market. Aggregation smoothes the “sharp edges” off the micro markets min-condition to get macro outcomes which are continuous in aggregate supply and demand. In this type of model, aggregate transactions are always smaller than the minimum of aggregate supply and demand, implying that unemployment (U) and job vacancies (V) are positive simultaneously. This feature implicitly defines the level of structural (or equilibrium) unemployment. It is equal to the unemployment level at $U = V$.

The first macro approach used in this study is an analytically-based variant. From this variant analytical expressions for aggregate transactions are obtained through integration over density functions that describe the distribution of supply and demand ratios across markets. The resulting aggregate specification is a continuous non-linear relationship which maps aggregate supply and demand onto aggregate transactions (employment or output). An approximate form of this aggregate specification is of the C.E.S. type. In the empirical application this variant takes it that supply and demand can be observed from the data. A clear advantage of the method is that it leads to an aggregate transactions specification which is readily interpretable and intuitively reasonable: the mismatch indicator is simply a parameter in the aggregate transactions function and the link with structural unemployment is easily established. Endogenising the mismatches is straightforward.

There are also problematic parts which underlie the method. Here I will mention two of them. The first relates to the assumed observability of labour supply and demand. Even when vacancy (and unemployment) data is improved from the early official register data and considered for empirical application, the “good quality of data” assumption still constitutes a critical element. An extreme example of the negative consequences of using official data applies to the situation of Switzerland, where the official figures indicate that unemployment hardly ever exceeded 1%, despite very volatile output and employment. It is not surprisingly that econometric models have difficulties in explaining developments over a longer period of time for Switzerland. From this Stalder (1989) concludes that structural modelling with unobserved and endogenous supply and demand should be preferred to a data-based approach as a device to explain these developments. When improved data on supply and demand are used, the method is probably less vulnerable, but the results should still be interpreted carefully, especially while the measurement of job vacancies is complicated, and the improved data are obtained from a **statistical** correction procedure applied to the official series. The second problematic part of

the method relates to the assumptions imposed to maintain the simple C.E.S. structure. These assumptions for instance lead to a less rigorous treatment of goods market spillovers. Full account of spillovers at the micro level would imply that analytical relationships cannot be derived (compare Kooiman, 1984). It is unclear how these assumptions influence the measurement of mismatches and structural unemployment. In the simulation-based method spillovers can be modelled rigorously at the micro level.

The second approach used in this study is based on simulation. Essentially this is an estimation technique which allows a full formalisation of a macro model with endogenous unobserved supply and demand at the micro market level. The key feature here is that spillovers are fully taken into account at the micro level. Inevitably, the method is very general as it hardly requires simplifying restrictions (contrary to the analytically - based method). It can *a priori* fit any distribution (log-normal or others) of micro supply and demand, which makes it powerful. Moreover, the simulation-based method allows the identification of the variances of the aggregate supply and demand variables in theory. These aggregate quantities operate as common factors on micro market supply and demand. In the analytically-based methods, these variances are not separately identified. On the other hand, however, the method requires a great deal of performance testing. Furthermore, the technique is neither user-friendly, nor easily adapted to new model specifications, while the numerical optimisation is a time consuming exercise. Moreover, it is impossible to test the assumptions formally for these type of methods. The simulation-based method is not sensitive to measurement errors in supply and demand as the data-based method.

The third approach used in this study entails a micro study that focuses on the factors hampering (regional) mobility, the reverse side of (regional) mismatch. It seeks to explain which personal characteristics and economic variables influence individual mobility behaviour. Since the micro study makes it possible to examine the mobility behaviour of workers looking for a job in the face of a relative excess demand situation on their market, it is complementary to the analytically-based macro approach. The latter method cannot measure such an effect. I will come back on this below.

The empirical implementation of the analytically-based and simulation-based models are described in Chapter 4 and 6. Chapter 3 concentrated on the feasibility of the distribution assumptions underlying the models. The results corroborated the legitimate use of the log-normal and normal distributions to describe markets in disequilibrium. From this I decided to stay with common practice by adopting the log-normal distribution for the analytically-based variant and the normal for the simulation-based variant (the normal distribution is, however, not a necessary condition, since the simulation method can fit any distribution; in the larger model of Chapter 6 some disturbances are also log-normal). The choice of the log-normal distribution has been in favour of the Weibull and Pareto distributions, although the latter was initially regarded as superior in a dynamic

sense from the viewpoint of the theory of stochastic processes. I have shown that the three transactions functions from the Weibull, lognormal and Pareto distributions give rise to aggregate transactions functions which are nested, thereby allowing nested testing. In all this it should be kept in mind that the tests are specific. To obtain more conclusive results more work is needed.

In Chapter 4, an extension of the C.E.S. transactions function is suggested. The generalisation which is of the two-level form, accounts for goods market spillovers on the labour market. Under some simplifying assumptions a C.E.S.-type transactions function holds, which describes aggregate employment in terms of two labour demand variables (Keynesian and capacity demand) and labour supply, and two mismatch parameters. The mismatch parameters reflect the so-called mismatch on the labour market” and “mismatch on the goods market” (*i.e.* between the composition of the demand for goods and the composition of the available production capacity). The chapter provides new theoretical and empirical insights. As a theoretical result, an explicit relationship between micro dispersions and the C.E.S. parameters is made. This paves the way for more adequately endogenising the mismatch parameters for the empirical analysis. A point to note is that the theoretical analysis treats the labour and the goods mismatch as independent phenomena, while of course there may be close links between both. Surely more work is needed to understand the complex interactions between the supply and demand determinants.

Since aggregate Keynesian demand and capacity demand are not separately observed from the data, I had to fall back to the one level C.E.S. function with labour supply and one composite demand term when it comes to estimation. The spillover effects are indirectly accounted for through the endogenisation of the mismatch parameter. The results of the theoretical analysis which established the relationship between the mismatch indicator and the variances of Keynesian demand, capacity demand and labour supply across markets are used for this purpose. The empirical model specification incorporates search elements into the framework of micro markets in disequilibrium. Including search creates a matching inefficiency within a micro market, which has to be distinguished from the mismatch between markets. The resulting aggregate C.E.S. transactions structure is a function of aggregate supply and demand, a mismatch parameter, and of search unemployment. Search unemployment in turn is related to job search duration. The influence of the long-term unemployed on structural unemployment is accounted for through the modelling of aggregate effective labour supply. This impact depends on the ratio of effective labour supply to labour supply. It should be stressed that I assumed search and mismatch as distinct phenomena within the disequilibrium setting. This is probably a simplifying assumption. Is it imaginable that for example, search intensity is a function of the degree of labour mismatch perceived by labour and firms (Lambert, 1989). Future work should elaborate on this.

The estimation results indicate that structural unemployment is predominantly determined by mismatches between micro markets and not by

search. Furthermore, the long-term unemployed are not effective on the labour market, thereby maximally contributing to structural unemployment. Over time, the part of structural unemployment involving the long-term unemployed closely follows total structural unemployment.

The dominant role of the long-term unemployed has a clear implication for future research. It shows how important it is to consider why workers become long-term unemployed (because they lack adequate skills *e.g.*), to explain the mismatches. This is probably one of the key questions for future research! The estimated rate of structural unemployment rises from 2.3% in 1960 to 4.9% in 1989 and is positively influenced by the capacity utilisation rate, replacement ratio and the regional mismatch indicator. The two last mentioned variables are used *ad hoc*, not founded on the theoretical micro model. Nevertheless, the influence of these variables on labour market mismatch is convincing.

Before implementing the simulation-based, or Monte Carlo Pseudo Maximum Likelihood to the complete model of Chapter 6, the first and second order variants of MCPML estimation are evaluated in Chapter 5. It is however, on beforehand, that using the MCPML₁ variant only makes it possible to estimate an upper-bound for the level of mismatches. The application is to a very simple model of the labour market so that the simulation results can be compared with the analytical outcomes. In the actual testing, I distinguish a variant with observed data of supply and demand, and a Monte Carlo study with supply and demand generated from the model. The findings of this study are in favour of MCPML₂ estimation because (MC)PML₂ is more efficient than (MC)PML₁.

Performance testing reveals three specific problems. First, both PML₁ and PML₂ estimates are biased downwards in all cases. PML₂ performs superior to PML₁, as the downward bias and the standard deviations are considerably less. Second, large standard deviations of the parameter estimates were found under MCPML₂. It was conjectured from the results of Laroque and Salanié (1990) that this could be due to a small variability of the supply and demand data, so that the region of a "one-sided" spurious maximum is approached. Third, the required number of replications in the Monte Carlo part of the estimation should not be smaller than 400. Unfortunately only for the MCPML₁ variant I could establish a bias-corrected variant of MCPML estimation which requires a far fewer replications. Since I decided to use the MCPML₂ method for estimation of the model in Chapter 6, this was not much help, especially because the estimation of the larger model is only feasible for a maximum of 50 replications. Given the positive findings of Laroque and Salanié (1989), I decided not to be discouraged by this and estimate the larger model of Chapter 6 using MCPML₂.

The model of Chapter 6 takes full account of the endogeneity of incomplete market clearing at the micro level, including spillovers, to estimate mismatches and structural unemployment. Additionally, lagged variables are included in the micro specifications. The estimation of the model turned out to be very demanding. Moreover, some creative solutions to problems met in the course of the optimising

process were necessary. The final results, however, seem to be satisfactory. There were no serious problems with respect to spurious maxima, and the estimated regime proportions seem to have reasonable values. I suggested some practical solutions for the computation of the standard errors of the parameters, since the matter has not been solved theoretically for these type of models.

The relevant mismatch parameters are identified through a set of identification restrictions. As a result, the structural mismatch indicator is a derived measure. The estimations of this measure indicate the presence of structural mismatches on the labour market (and the goods market). In the absence of an analytical expression for structural unemployment I computed the structural unemployment rate from the estimates of unobserved supply and demand to develop some intuition about the importance of structural problems. For the two periods 1959-1962 and 1976-1979 for which supply almost equalled demand, the structural unemployment rate computed is 0.8% and 0.9%, respectively. These estimates are lower than those that followed from the C.E.S. method of Chapter 4. I conjectured that this may be the result of a relatively high search coefficient in the labour supply equation. This result is consistent with the relatively great importance that my estimates of the regime proportions attribute to the excess demand for labour regime. The study I used for reference in this respect is Kooiman and Klok (1985). Laroque and Salanié (1989) did not find evidence for labour market mismatches using the simulation-based model for France.

Chapter 7 presents a micro study to examine mismatches on the spot. The mere fact that a micro market supply and demand is considered as statistical constructs in the macro approaches, justifies such a micro approach. Opting for the regional dimension of mismatch in this chapter was motivated by the result of Chapter 4 which established the significant influence of a regional mismatch indicator on structural unemployment. I had to approach the phenomenon of mismatches from its reverse side, that is from the perspective of mobility behaviour of job entrants for reasons of empirical implementation. Estimation results are obtained from a cross sectional logit model.

A remarkable finding is that there is no conclusive relationship for (previously unemployed) job entrants between a weak labour market position and mobility. On the one hand, job entrants with highly valued professions or higher education are more mobile across regions. On the other hand, increasing age, a flexible job, being a foreigner, a long search period, or specific personal characteristics commonly associated with a weak labour market position, had no influence on regional mobility and thus on regional mismatch. The effect of search period cannot be compared with that of Chapter 4, which indicated a great contribution of the long-term unemployed to structural unemployment. This is because in my sample the long-term unemployed who did not find a job at all are not included. Although my sample includes job entrants who had been out of work for a long time, I do not regard these results representative for all long-term unemployed. The strong influence of the relative vacancy position on regional

labour mobility is striking. Hence, there is a declining effect on regional mismatches from high (relative) vacancies. On average people move (or commute) from a region with a small number of vacancies to a region with a large number of vacancies. This result is particularly interesting since it provides information that cannot be obtained explicitly from the macro analyses.

To measure mismatches on the labour market this book brings together two, in the literature opposing, empirical macro methods of markets in disequilibrium. I called them the analytically-based method and the simulation-based method. Both methods have their advantages and disadvantages. The simulation method is more general since less restrictive assumptions are required on the micro model specification. Still, the analytically-based method is not simply a special case. It allows a direct interpretation of mismatches in terms of causes. This is not possible with the simulation method. Therefore, it seems wise not to put the emphasis on what separates the methods but what brings them together, and so to benefit the most. I suggest the following.

The intriguing point that follows from this thesis is that both methods lead to different estimates of the extent and development of labour market mismatches. For this, I could not give a well-founded explanation. Therefore I opt for a research project to analyse the topic more rigorously. This would undoubtedly increase our understanding of mismatches on the labour market and structural unemployment. As a result, I hope, Keynesian disequilibrium analysis could regain the place in the literature that it deserves so much.