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Is structural unemployment a negligible problem? A critical note on the use of mismatch indices

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Is Structural Unemployment a Negligible
Problem? A Critical Note on the Use of
Mismatch Indices*

by

Karl-Heinz Paqué

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I. Introduction

Since the mid-seventies, the general public of some European countries has been listening to a growing chorus of economists and politicians who lament the rising regional imbalances of unemployment. The chorus is especially large in Britain and West Germany where both an approximate north-south divide began to take shape, with the old industrial north and north-west apparently losing ground to the still flourishing south in the common fight against low growth and high unemployment.

Somewhat surprisingly, the main tune of this chorus about the growing importance of structural (above all, regional) components of unemployment did not find support in some pioneering empirical estimates of the intertemporal change of structural unemployment as presented i.a. by Jackman/Layard/Pissarides (1984), Johnson/Layard (1985), Layard/Nickell/Jackman (1985), Layard (1986), Jackman/Roper (1986, 1987) and Pissarides (1987) for the United Kingdom, and Franz/König (1986), Burda/Sachs (1987) and Franz (1987) for Germany. All these studies rely on measures of mismatch between unemployed workers and vacancies to account for the structural component of unemployment which, as a share of total employment, turns out to have not substantially increased in either country during the seventies and eighties. By now, these empirical studies have almost established a new consensus among macroeconomists that, after all, the growth of structural unemployment has been heavily exaggerated and that, as a consequence, research efforts should turn to aggregate, not structural matters to explain the secular employment malaise.

It is the purpose of this paper to show that these conclusions are not warranted since the underlying empirical evidence is seriously misleading. To establish this claim we shall proceed as follows. In Section II, we shall demonstrate that the commonly used measures of mismatch imply that, for all that matters empirically, no period with a significant share of structural in total unemployment is ever likely to emerge; hence, economists should literally stop worrying about structural unemployment altogether, not because it has not substantially increased in recent years in the countries in question, but because it is no relevant issue in any realistic setting. This is a conclusion which probably no economist would like to draw, but which he must draw if he relies on the commonly used measures. In Section III, we shall argue that this unfortunate conclusion is due to a misguided philosophy of what the term "structural" should mean if it is to be a sensible economic category; thereby, we shall make a case for an alternative philosophy of structural unemployment which conforms more to what economists actually mean in their daily use of the term.

II. Measures of Mismatch and Structural Unemployment

Following Turvey (1977), the modern literature identifies structural unemployment as the result of a mismatch between job vacancies and unemployed workers. Structural unemployment is taken to exist "if, given the configuration of vacancies, it would be possible to reduce unemployment, or more precisely, to increase the rate of job hiring by moving an unemployed worker from one sector

to another" (Jackman/Roper, p. 11), with the sector being an occupation, industry, region or any other structural category, and the rate of job separations assumed to be exogenously determined. Conversely, structural balance or zero structural unemployment is postulated to prevail whenever it is impossible to increase the rate of job hirings and thus to reduce unemployment through intersectoral movements of the unemployed. The rationale behind this definition has some intuitive appeal: only to the extent that the particular (mal-)distribution of unemployed workers and vacancies and the resulting mismatch across sectors in fact contributes to overall unemployment, does it make sense to speak of unemployment caused by an existing structural imbalance, i.e., of structural or better: mismatch unemployment.

In more technical terms, the state of structural balance can be described as that configuration of the existing stock of unemployment across sectors which, given the sectoral pattern of vacancies, maximizes aggregate hires. Hence, to obtain a set of operational first-order conditions for structural balance to hold, one has to postulate a hiring function $H(\cdot)$. If, for any sector i , this function is assumed to have the common form

$$(1) \quad H_i = H(U_i, V_i) \quad \text{with} \quad \partial H / \partial U_i, \partial H / \partial V_i > 0$$

where U_i and V_i are the numbers of unemployed workers and vacancies in sector i and $H(\cdot)$ is a convex, linear homogeneous function, then it can easily be shown that maximization of aggregate hires $H = \sum H_i$ subject to $\sum U_i = U = \text{constant}$ (taking V_i as given) requires the ratio of unemployed workers to vacancies to be

equal across all sectors and thus equal to the respective overall ratio.¹⁾ This implies that

$$(2) \quad U_i/U = V_i/V \quad \text{for } i = 1, \dots, n,$$

with U (and V respectively) being the aggregate number of unemployed workers (and vacancies respectively). Following the logic of equation (2), a measure of mismatch can be defined as

$$(3) \quad M := 1/2 \sum_i |U_i/U - V_i/V| .$$

M gives the share of the unemployed workers which would have to be moved across sectors to achieve structural balance at a given configuration of vacancies, or conversely, the share of vacancies which would have to be moved to achieve structural balance at a given configuration of unemployed workers. Multiplying M by U (or V) yields the respective absolute number of unemployed workers (or vacancies).

M is the most frequently used index of structural mismatch in the modern literature.²⁾ As has been recognized, it does not measure the extent of structural unemployment in the sense that, if structural balance were established, unemployment would fall by the share M; rather, it measures the share of unemployed workers which would have to be moved to achieve a maximum of hirings, with yet no quantifiable implications on how much employment could be thus gained. However, it is this potential employment gain which gives us an idea of the dimension of a structural unemployment problem, and not the sheer number or share of people

to be moved. Unfortunately, this employment gain cannot be determined without fully specifying a model of the labour market. Nevertheless, the hiring function may serve as the basis for an operational - albeit partial - measure of structural unemployment: one may ask by how much total unemployment could be reduced if structural balance were achieved at a given level of aggregate hirings.

To answer this question, one has to specify the parametric shape of the hiring function. In the literature the most widely used sectoral hiring function is of the linear-homogeneous Cobb-Douglas-type

$$(4) \quad H_i = \beta U_i^{1/2} V_i^{1/2} \quad \text{with } \beta > 0,$$

which goes back to Holt (1970) and which has received some empirical support in a number of more recent empirical studies (Hannah, 1983; Jackman/Layard/Pissarides 1984; Jackman/Roper 1986, 1987).³⁾ In aggregate, we obtain

$$(5) \quad H = \sum_i H_i = \beta U^{1/2} V^{1/2} \sum_i (U_i/U)^{1/2} (V_i/V)^{1/2}.$$

It can now be shown⁴⁾ that the share of unemployment which could be removed at a constant level of hirings if structural balance were established through intersectoral mobility, is given by

$$(6) \quad S := 1 - \sum_i (U_i/U)^{1/2} (V_i/V)^{1/2}.$$

Note that the index S does not quite measure the potential employment gain of achieving structural balance; rather it measures the 'cost' of structural imbalance in terms of the share of aggregate unemployment which could be 'spared' at a given level of hirings if only structural balance were established. This seemingly awkward measure makes much economic sense: unlike M, the index S does give a clue to how important structural compared to non-structural factors are in hampering the process of hiring additional labour. In this sense, S (and not M) is the relevant measure of the share of structural in total unemployment.

To get an impression of the quantitative range of S for different parameter configurations, let us drastically simplify the analysis by assuming an economy of just two sectors (1, 2), with sector 1 having a share a ($0 < a < 1$) in total unemployment and a share b ($0 < b < 1$) in the total number of vacancies, and sector 2 having shares of $(1 - a)$ and $(1 - b)$ respectively. In this setting, the mismatch index can simply be written as

$$(7) \quad M = |a - b| ,$$

and the corresponding index of structural unemployment S as

$$(8) \quad S = 1 - [(ab)^{1/2} + (1-a)^{1/2}(1-b)^{1/2}] .$$

**Table 1: The share of structural unemployment (index S, in %) for
for selected configurations of a and b**

b	a										
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
0	0	5	11	16	23	29	37	45	55	68	100
0.1	5	0	1	3	7	11	16	22	29	40	68
0.2	11	1	0	1	2	5	9	14	20	29	55
0.3	16	3	1	0	1	2	5	8	14	22	45
0.4	23	7	2	1	0	1	2	5	9	16	37
0.5	29	11	5	2	1	0	1	2	5	11	29
0.6	37	16	9	5	2	1	0	1	2	7	23
0.7	45	22	14	8	5	2	1	0	1	3	16
0.8	55	29	20	14	9	5	2	1	0	1	11
0.9	68	40	29	22	16	11	7	3	1	0	5
1	100	68	55	45	37	29	23	16	11	5	0

Table 1 shows the values of S for different parameter configurations of a and b. The striking fact is that, for a wide range of a ($0.2 < a < 0.8$) and b ($0.2 < b < 0.8$) and a correspondingly wide range of M ($0 < M < 0.6$), the index S stays below 20 %. Only for extremely unequal distributions of unemployment and vacancies, with a being close or equal to 0 (or 1) and b being close to 1 (or 0), does structural unemployment amount to a share of total unemployment in the magnitude of the non-structural part.

Clearly, the index S is very sensitive to changes in a and b in the ranges of already extreme inequality: e.g., with $b = 1 - a$, a shift from $a = 0.8$ to $a = 0.9$ increases the share S from 20 to 40 %; a further shift from 0.9 to 1 even leads to a most dramatic rise of S from 40 to 100 %.

What does all this mean in the more familiar language of unemployment and vacancy rates? If one assumes the two sectoral units to have an equally-sized labour force L with an average unemployment and an average vacancy rate of 10 %, the restrictions $a = 0.8$ and $b = 0.2$ imply that, in sector 1, the unemployment rate is 16 % and the vacancy rate 4 %, in sector 2 vice versa. Any casual observer would interpret this as a situation of severe structural imbalance, but the index S does not classify more than 20 % of the unemployment as structural. Other numbers from Table 1 are quickly picked to support the general impression that, relative to a still vague intuitive standard (to which we return in Section III), S is a very conservative measure of structural unemployment in the empirically relevant ranges.

Let us now go back to the real world with its much greater number of sectoral units than two. Table 2 presents some actual indices of regional unemployment for Great Britain and West Germany. For

Table 2: Indices M and S for regional unemployment in Great Britain and West Germany (selected years)

country	year	regional units		M	S
		number	type		
Great Britain	1987	10	regions	0.133	0.013
West Germany ¹	1987	8	LAA ²	0.224	0.031
West Germany ¹	1987	141	AA ³	0.243	0.043
West Germany ¹	1950	7	states ⁴	0.347	0.091
West Germany	1950	2	polar states ⁵	0.609	0.207

¹Berlin not included.

²LAA = Landesarbeitsamtsbezirk ('state labour district').

³AA = Arbeitsamtsbezirk ('local labour district').

⁴Schleswig-Holstein incl. Hamburg; Lower Saxony incl. Bremen; Saar excluded.

⁵Schleswig-Holstein (incl. Hamburg); Baden-Württemberg.

[Source: for Britain, Employment Gazette, August 1988; for Germany, Amtliche Nachrichten der Bundesanstalt für Arbeit, Jahreszahlen 1987; Bundesminister für Arbeit, Statistik 1950; M and S calculated on basis of annual average figures for 1987 and March figures for 1950.]

1987, the indices show that regional mismatch as measured by M and regional unemployment as measured by S were more severe problems in Germany than in Britain. However, the outstanding feature is again the low level of the index S: in Germany, less than 5 %

of actual unemployment can be identified as structural; in Britain, the respective share turns out to be even smaller, a negligible 1.3 %. To check whether the index S is ever likely to indicate a substantial share of structural in total unemployment, we turn to the early post-war period which is commonly viewed as a time of extreme regional imbalance of unemployment in Germany - probably the worst ever - since the refugees from the former eastern provinces had flooded the rural north (above all, the states Schleswig-Holstein and Lower Saxony) while some industrial states (Northrhine-Westfalia, Baden-Württemberg) enjoyed full employment, sometimes even labour shortages. Nevertheless, for the year 1950, the index S stays below 10 %; even if one selects the two polar states in terms of unemployment and vacancy rates (Schleswig-Holstein, Baden-Württemberg) to form an artificial two-state country to be subject to interstate movements of labour to achieve regional balance, the index S rises just above 20 %, not more. All this supports our prior contention that, for all that matters empirically, it is very hard to find any period in which regional or, more generally, structural unemployment of the kind described above plays more than a marginal part in the overall unemployment picture.

As to the development of the indices in recent years, it has been shown by Jackman, Roper (1987) that, for Britain, M and S have been constant or even decreasing in recent years.⁵⁾ Thereby, it is worth noting that the share of structural unemployment as measured by S has never exceeded about 7 % since the early seventies. For West Germany, the picture is somewhat different (Table 3): taking five-year averages, there has been a notable increase

of the regional mismatch index M which was more pronounced across states than across local labour districts (implying that the structural imbalance underwent a kind of qualitative shift away from intra-state towards inter-state imbalances). In the same vein, the share of structural unemployment S increased from about 1 to 3 or 3.5 to 4.5 %, depending on which sectoral units are used. Still then, the main message of these measures remains their surprisingly low level, not their intertemporal change: if, at present, regional as a share of total unemployment does not amount to more than 4 % in West Germany and less than 2 % in Britain, one should definitely stop worrying about it altogether, even if it could be shown that it has doubled in the last 15 years.

Clearly, our conclusion depends on the parametric shape of the hiring function: with other hiring technologies than Cobb-Douglas⁶⁾, somewhat less disturbing results may emerge. However, in view of the empirical evidence which supports a hiring function of the type given in equation (5), any adjustments of the functional form remain ad hoc attempts to escape unpleasant implications of an otherwise plausible model specification. Therefore, it appears to be more promising to take the results as a warning of the far-reaching consequences of a mismatch approach to structural unemployment and as reason enough to rethink the whole philosophy behind it.

Table 3: Indices M and S for regional unemployment in West Germany¹ 1973-87

	M		S	
	8 LAA ²	141 AA ³	8 LAA ²	141 AA ³
1973-77	0.116	0.209	0.011	0.035
1978-82	0.181	0.242	0.021	0.044
1983-87	0.224	0.250	0.030	0.046

¹Berlin not included.

²LAA = Landesarbeitsamtsbezirk ('state labour district').

³AA = Arbeitsamtsbezirk ('local labour district').

[Source: Amtliche Nachrichten der Bundesanstalt für Arbeit, Jahreszahlen 1987]

III. Alternative Philosophies of Structural Unemployment

Does the mismatch philosophy of structural unemployment really capture the essence - not the manifold ambiguities - of what is meant by a structural imbalance in the economic policy debate? In our view, it does not, as we shall explain in the following.

When the average economist speaks of a structural imbalance between two sectoral units, say, in regional terms, the regions "north" and "south-east" in Britain or the states "Lower Saxony"

and "Baden-Württemberg" in Germany, he may do so from two different analytical angles, depending on whether he focuses on the performance of the economy as a whole (the "holistic approach") or on the comparative performance of the sectors (the "comparative sectoral approach").⁷⁾

The holistic approach defines a structural imbalance as a distortion within an economy which does at least some harm to the aggregate performance of this economy and which can only be cured by an appropriate rearrangement between sectors of the economy to achieve a state of maximum aggregate performance defined as structural balance; if at all, the quantitative relevance of the structural imbalance can be measured by the extent of its doing harm to the performance of the whole. It is clear that the indices M and S are children of this holistic approach as they are based on the idea that a structural imbalance is nothing but a mismatch (or distortion) in the allocation of unemployed workers and vacancies over the sectors of an economy leading to a less than maximum aggregate level of hirings and thus a higher than minimal aggregate level of unemployment.

Although elegant and intriguing as a theoretical conception, this holistic approach has a double-edged consequence: it implies that any differences in the individual performance between sectors - however large they may be - are only classified as structural imbalances to the extent that they hamper the aggregate performance of the whole. A deliberately biased example with the commonly used measures M and S may clarify what is at stake. In an economy with two sectors, say regions (1, 2), which have equal-

sized labour forces $L = 100,000$, we assume the number of unemployed workers to be 0 in region 1 ($U_1 = 0$) and 100,000 in region 2 ($U_2 = 100,000$), the number of vacancies to be 0 in region 1 ($V_1 = 0$) and 1 in region 2 ($V_2 = 1$). This configuration makes the indices M and S (equations 7 and 8) indicate no structural unemployment at all ($M = S = 0$) since aggregate hirings cannot be increased through intersectoral movements of labour. However, the individual performance of each region in terms of unemployment is vastly different, with the unemployment rate being 0 % in region 1 and 100 % in region 2 while the vacancy rate is exactly 0 % in region 1 and very close to 0 % in region 2. No doubt, region 1 performs much better in supplying its labour force with jobs than region 2, and any economist looking at an economy with these characteristics would naturally conclude that he observes an extreme structural imbalance. Nevertheless, if he sticks to the holistic approach imbedded in the measures M and S , he would have to diagnose the economy to be in structural balance simply because there is no potential for improving the aggregate performance by intersectoral movements of labour.

The alternative philosophy which we call comparative sectoral approach avoids this unfortunate pitfall by defining as structural any difference in performance between the sectors of an economy, whether they harm the aggregate performance or not. The rationale behind this approach is straightforward: in an economy, there are good performing and bad performing sectors; provided that the best performing sector (S) can sensibly be assumed to deliver an a priori acceptable maximum standard for the economy as a whole, the negative deviation of the remaining sectors from

this standard can be taken as the informational basis for measuring the extent of the "structural problem". Note that the performance of the economy as a whole is per se irrelevant; only the intersectoral differences in performance count.

In our view, it is this comparative sectoral and not the holistic approach which really addresses the main structural question of the economic policy debate, namely the question whether an economy is integrating or disintegrating in terms of the performance of its different sectors, be they regions, industries or even occupations. For example, when a British (German) economist speaks of the regional imbalance of unemployment between the region north (the state Lower Saxony) and the south-east (the state of Baden-Württemberg), he is very unlikely to have in mind the holistic issue of how much overall unemployment could hypothetically be reduced by a reshuffling of labour between these regions; he rather compares the performance of both regions in supplying their labour with jobs, thereby implicitly taking the best performing region as a kind of reference standard for the rest of the country.

To check whether this philosophy does in fact avoid the uncomfortable empirical diagnosis of the holistic approach that structural unemployment is virtually irrelevant, one has to operationalise the idea of comparative sectoral performance in some aggregate index of structural unemployment. There is a straightforward, almost trivial way of doing so: the logic of the approach implies that a state of structural balance or zero structural unemployment can be defined as that configuration where all

sectors of the economy have the unemployment rate u_{\min} of the best performing sector n . Hence, structural unemployment (SU) in sector i ($i = n$) amounts to the excess of actual unemployment over the hypothetical unemployment prevailing if the unemployment rate of sector i were equal to the rate of sector n . Formally, this means

$$(9) \quad SU_i = U_i - u_{\min} L_i \quad \text{for } i = 1, \dots, n$$

with L_i being the labour force in sector i and u_{\min} being the unemployment rate of the best performing sector n (expressed as a share of the labour force). Hence, aggregate structural unemployment is given by

$$(10) \quad \sum_i SU_i = \sum_i U_i - u_{\min} \sum_i L_i \\ = U - u_{\min} L,$$

with L being the total labour force. Note that the best performing sector n can be included in the summation since $SU_n = 0$. Dividing (10) by U yields the share P (P for "performance") of structural in total unemployment as

$$(11) \quad P = 1 - u_{\min}/u,$$

with u being the economy-wide unemployment rate.

The main practical difficulty is to find an appropriate sector (or group of sectors) which can be taken as a reasonable

benchmark of best performance. Clearly, this is an exercise in reasonable a priori judgement. Obviously, the sector chosen should not be altogether untypical for the country's economy as a whole or too small to matter at all. As to our illustrative example of the regions in Britain and Germany, there are no serious problems in this respect: in both countries, a large and clearly identifiable region has consistently outpaced the others in recent years, namely the South-East and East Anglia in Britain and Baden-Württemberg in Germany.^{B)}

Taking these regions as benchmarks, Table 4 presents the index P for Britain and Germany in 1987. The most striking fact is that P indicates a much higher share of regional unemployment for both countries than does S in Table 2: about 30 % of Britain's and about 40 % of Germany's unemployment are to be classified as regional on this account. Hence, if measured in terms of comparative sectoral performance, regional unemployment is a significant problem in both countries, with Germany again having the lead over Britain. As to the intertemporal development of regional unemployment over the last 15 years in Germany, the five-year averages of P indicate a virtually constant share of regional in total unemployment. Note, however, that despite the constant share, the problem of regional unemployment has moved into very dramatic dimensions in absolute terms, from less than 400,000 unemployed workers in 1973 to more than 900,000 in the last three years of the sample period. On the basis of these numbers, regional unemployment must be considered as a very important issue,

Table 4: Index P for regional unemployment in Great Britain and West Germany (selected years)

country	year(s)	regional units	P
Great Britain	1987	regions (10)	0.291
West Germany ¹	1987	LAA ² (8)	0.427
West Germany ¹	1973-77	LAA ² (8)	0.387
West Germany ¹	1978-82	LAA ² (8)	0.398
West Germany ¹	1983-87	LAA ² (8)	0.401
West Germany ¹	1950	states ³ (7)	0.619

¹Berlin not included.

²LAA = Landesarbeitsamtsbezirk ('state labour district').

³Schleswig-Holstein incl. Hamburg; Lower Saxony incl. Bremen; Saar excluded.

[Source for Britain, Employment Gazette, August 1988; for Germany, Amtliche Nachrichten der Bundesanstalt für Arbeit, Jahreszahlen 1973-1987; Bundesminister für Arbeit, Statistik 1950; P calculated on basis of annual average figures for 1973-1987 and March figures for 1950]

although its growth has not outpaced the growth of overall unemployment. For the early post-war period, the index P gives a picture which is consistent with the common view of this time in

Germany: for 1950, a share of more than 60 % of total unemployment is classified as regional.

Of course, the simple measure proposed here has its drawbacks as well, even within its own scope of comparative sectoral performance: for example, if the fast growth of a region sucks in foreign labour or mobilizes labour reserves, simple unemployment rates would give a distorted picture of a region's performance in supplying its labour force with jobs since the size of this labour force itself is endogenously determined. Hence, to obtain a more complete view of comparative regional performance, one would have to consult additional data on employment growth and immigration. Still then, such efforts would remain within the spirit of the comparative sectoral approach rather than the mismatch philosophy. After all, it is the shift of philosophies, not some more or less imperfect operationalisation of the philosophies which matters in the economic policy debate.

Finally, as a general warning, it should be kept in mind that a measure of structural imbalance at any point in time or any fixed period must be limited in scope simply because, by its very nature, structural change is dynamic. When economists speak of a structural imbalance between the south and the north in Germany or in Britain, they do not necessarily refer to all these unemployed and vacancies which are to be counted right now or even the employment growth in the recent past; rather, they often implicitly anticipate all the new employment patterns which can reasonably be expected to emerge in the near and not so near future, with structural change proceeding according to some

sectoral pattern predictions which depend on the change in the international division of labour, the structure of demand and productivity growth. This is particularly relevant in circumstances as they prevail in Europe where the governments of various countries keep ailing industries alive by heavy subsidization which, at some time in the future, may have to be given up due to fiscal constraints and international accords.⁹⁾ In short, when speaking about structural change, economists often mean potential, not actual employment and unemployment patterns. Of course, to estimate anything like these complex potential effects of structural change in the future is a very ambitious task going far beyond any short-hand descriptive measures of structural imbalance. Nevertheless, if ever operationalized, this approach would also come closer in spirit to the comparative performance framework than to the mismatch philosophy since it would raise questions of how different regions, industries or occupations can be expected to perform in the structural race. The question of how much a redistribution of labour would improve the performance of the whole economy would remain subordinate at best.

References

- 1) See Jackman, Roper (1987), pp. 11 f.
- 2) See i.a. the publications listed in the opening paragraph of this essay.
- 3) More precisely, the empirical evidence shows that the so-called Beveridge-curve can be reasonably well approximated by a rectangular hyperbola which is consistent with a hiring function of the form given by equation (4).
- 4) See Jackman, Roper (1987), p. 13.
- 5) See Jackman, Roper (1987), pp. 20 f., Tables 1, 2.
- 6) Alternative parameter configurations within the Cobb-Douglas framework either reinforce our conclusion or make no economic sense at all: for example, assuming different "partial hiring elasticities" of unemployed and vacancies while keeping linear homogeneity (i.e., $a \neq b$, but $a + b = 1$) ceteris paribus leads to lower levels of M and S ; assuming increasing returns, but keeping equal partial hiring elasticities (i.e., $a = b$, but $a + b > 1$), invalidates our conclusion, but has the economically unacceptable implication that hirings are maximised by concentrating all unemployed and vacancies in one sector (i.e., an equal number of unemployed and vacancies in all sectors is not sufficient to yield structural balance). Leaving the Cobb-Douglas framework makes the whole approach technically much less tractable, since

unemployment then ceases to be attributable to structural or non-structural factors according to a simple formula like equation (6).

7) Of course, other angles are possible, but not relevant for our purposes.

8) In Britain, small East Anglia which recently outperformed the South-East should not be taken as a reference standard alone, simply because it is not large enough. In Germany, Baden-Württemberg may be joined by southern Bavaria and the southern part of Hesse to form a larger south/central reference region; this would hardly change the results.

9) For a discussion of these matters, see Klodt (1988).

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