Unemployment Convergence in Transition

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Some Stylised Facts on Unemployment Dynamics in Transition*

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Abstract

In this paper an attempt is made to inquire the dynamics of regional unemployment rates in transition economies. We use policy relevant NUTS4 unemployment rates for transition economies characterised by both relatively intense (Poland, Slovaka) and relatively mild labour market hardships (Czech Republic). We apply diverse analytical techniques to seek traces of convergence, including β and σ convergence as well as time-series approach.

Transition economies typically experienced rapid growth of the unemployment rates due to profound restructuring. Naturally, these processes affected local labour markets asymmetrically, since regions were diversified with respect to industry composition and economic outlooks. Results in each of the countries suggest that diverging unemployment rates seems nested in the data. Further, regions with both very high and very low unemployment show signs of high persistence and low mobility in the national distribution. Findings allow to define the patterns of local labour market dynamics, pointing to differentiated divergence paths. Importantly, these tendencies persists despite cohesion policies financing schemes, which allocate relatively more resources to deprived regions in all these countries.

Key words: unemployment dynamics, convergence, kernel density estimates, transition

JEL Codes: J64, E24, P21

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1 Introduction

In a seminal paper Blanchard and Katz (1992) argue that over the long run labour markets should adjust towards a common equilibrium through two main channels. Either unemployed workers can undertake employment in regions where labour demand exceeds supply or capital can flow to low-wage locations to take advantage of lower labour costs. Therefore, one should observe convergence of regional unemployment rates. On the other hand, the speed of adjustment may indeed be very slow - and differing - leading to relatively persistent unemployment disparities, as forcefully argued by Armstrong and Taylor (2000). Furthermore, "new" shocks may arrive before the consequences of the previous ones are fully absorbed, which may foster the process of regional unemployment rates converging towards differentiated equilibria.

Transition on the other hand, consists of both symmetric and asymmetric shocks, thus providing a turmoil of reasons - potentially counteracting each other - to both product and labour markets. The easing of transition consequences frequently involves cushion financing to regions and sectors that are expected to experience most hardships. Finally, considerable resources are devoted to fostering convergence across regions. Differences in regional unemployment rates are often used to describe regional economic inequality, while relative labour market hardships often serve explicitly as discriminating factors in resources allocation. Understanding the persistency of regional unemployment differences helps to asses how effective regional policies have been.

Empirical strategy for verifying the convergence hypothesis developed so far are varied. The most obvious tests β-convergence (unconditional and conditional), which corresponds to inquiring if *levels* of unemployment converge to a common target, while these levels themselves may be conditioned on structural parameters characterising particular local labour market. One can also inquire if the *dispersion* of unemployment lowers over time and this may be approached testing for σ-convergence. Finally, one can try to investigate how persistent the regional unemployment rate *differentials* are, by applying the concept of stochastic convergence.

In this paper we analyse unemployment rates for three transition economies: Czech Republic, Poland and Slovakia. The two latter are consistently scoring highest in the EU in as far as labour market hardships are concerned. Conversely, Czech Republic enjoys a more favourable situation. We resort to policy relevant NUTS4 level monthly data covering the time span of 1999-2007 for Poland and 1995-2007 period for Czech Republic and 1997-2004 for Slovakia. By applying the variety of convergence analysis tools we intend to inquire the dynamics of local labour markets evolutions. We demonstrate that these distributions are highly stable over time. Some evidence in favour of "convergence of clubs" is supported by the data, but only for high unemployment regions. Moreover, regional differentials seem to be highly persistent, which strongly undermines the effectiveness of the cohesion policies implemented over the last decade. Whereas this last finding

could potentially be attributed to relatively short time horizon, the conclusions concerning the dynamics do not seem to be all driven by temporary shocks.

The paper is structured as follows. Section 2 focuses on the brief literature review in order to justify the use of multiple empirical strategies. These are outlaid in section 3, while results for respective analyses are presented in section 4. Section 5 concludes with some indications of future research directions.

2 Literature review

Transition economies typically experienced rapid growth of the unemployment rates due to profound restructuring. Naturally, these processes affected local labour markets asymmetrically, since regions were diversified with respect to industry composition and economic outlooks. Generally, in the literature regional unemployment disparities have been more at the core of interests for regional researchers than for economists (see: Pehkonen and Tervo (1998) for the Finland, Dixon, Shepherd and Thomson (2001) for Australia and Gray (2004) for the UK), while to our best knowledge the transition context in convergence literature has not been explored[1]. In the similar spirit Buettner (2007) demonstrated that regional unemployment disparities are indeed profound across most of the CEECs countries, including Czech Republic, Poland and Slovakia. Whereas substantial regional disparities in unemployment are found for pre-accession EU member countries as well as for accession countries, an empirical analysis accounting for spatial effects shows that regional wage flexibility is significantly higher for accession countries[2] In an impressive volume on the evolution of the Czech labour market Flek, Galuscak, Gottvald, Hurnik, Jurajda and Navrati (2004) argue that over the period of ten years, a transition from over-employment to under-employment may actually have occurred.

The process of employment restructuring in most formerly centrally planned economies consisted mainly of the reductions in employment with growing average job tenure as well as average time spent in unemployment or inactivity, cfr. (Svejnar 2002). Dismissals - if compensated at all - found their outcome with hiring of young, better educated workers, but with standard obstacles youth faces when entering the labour markets in Europe. People who lost their employment usually became permanently unemployed or inactive (Grotkowska 2006). In Poland for example, currently less than 13% of the unemployed still retain the right to unemployment

[1]Most recently, Huber (2007) surveys empirical literature on the regional labour market developments in transition countries. Boeri and Terrell (2002) inquire if these differentials could be explained on the grounds of the optimal speed of transition theory (see: Ferragina and Pastore (2008) for an extensive review)

[2]However, Buettner (2007) research used differentiated levels for desaggregation (pre-reform NUTS2 for Poland. Although the paper is not explicit, this suggests that the data set ends with December 1998, essentially only the middle of transition, current NUTS3 for Slovakia and current NUTS4 for Czech Republic).

assistance, thus suggesting that most of the unemployed are either long-term unemployed (above 12 months) or have a long record of unstable employment.

Thus, on an individual level one can easily point the ideal type of winners and losers in the transition process. However, in terms of regional analysis the "conventional wisdoms" are no longer comparably relevant. Some of the highest unemployment regions are located relatively close to the "growth poles", while regions typically considered to lag behind exhibit average labour market indicators. Scarpetta and Huber (1995), Góra and Lehman (1995), Lehmann and Walsh (1998) and more recently Newell and Pastore (1999), suggest restructuring and heavy industry location as main differentiation factors.

On the other hand, there are sound empirical and conceptual reasons for resorting to NUTS4 level when analysing labour markets. First of all, in all of the three analysed cases, actual labour market policies are performed independently by local labour offices - operating for NUTS4 units. Both activisation instruments and cooperation with employers is settled in districts. Secondly, financing is allocated to NUTS4 regions based on the relative labour market hardships in each of this countries - more deprived regions have easier access to active labour market policies financing, with the main aim of targeting resources where they are mostly needed. Finally, one should be able to provide policy makers with clear policy recommendations at a regional and not target group basis, because problems of particular individuals at a labour market are frequently highly context specific, which implies no general tools will prove efficient.

For transition countries, studies from the beginning of the previous decade used fairly aggregate and not policy-relevant level data[3]. Moreover, at NUTS4 level none of the general findings concerning the determinants of unemployment levels and differentials hold. For example, rural NUTS4 regions tend to exhibit a whole spectrum of unemployment rates, with averages fairly similar to industrialised NUTS4 regions. Also, regions experiencing restructuring in the beginning of transformation perform currently both very well and very bad in terms of observed unemployment levels. Consequently, it seems that our understanding of the dynamic labour market processes experienced by the regions remains too superficial to provide satisfactory answers.

Finally, none of these studies takes into account that over the past fifteen years local labour markets of the transition countries were subject to many other context-specific shocks, positive (*e.g.* active labour market policies, sometimes specifically targeting one particular group of unemployed in a particular location) as well as negative (*e.g.* currency crisis in Czech Republic, Russian embargo on Polish exports, etc.)[4]. In this paper

[3]With the exception of Newell and Pastore (1999) who work on LFS data, all of the above papers for Poland use 49 voivodships (comparable to the current 44 regions at NUTS3 level), which currently are not even equipped in any authorities, let alone public employment service bureaus.

[4]See Martin (2006) for a case study of the impact decline in Danube transport is believed to have had on employment in all riparian countries, namely: Austria, Bulgaria, Croatia, Germany, Hungary, Moldova, Romania, Slovakia, Ukraine, Serbia and

we attempt to fill the gap in the literature on the evolution of local labour markets in transition by inquiring the dynamics at the policy relevant NUTS4 levels in Czech Republic, Poland and Slovakia.

3 Empirical strategies and data

One can imagine four main dynamic evolution patterns, as depicted by the Figure (1). The first is suggested by unconditional convergence, implying evolutions becoming alike both in terms of levels and in terms of the deviations from these levels (senario A). Secondly, convergence may still occur but to differentiated levels. Consequently, total sample deviations from average might persist, but within groups both levels and deviations converge (scenario B). In terms of policy evaluation, such findings may be interpreted as partially successful cohesion efforts (within groups) or a lack of success - if differences are driven by structurally dislike fundamentals as opposed to asymmetric shocks.

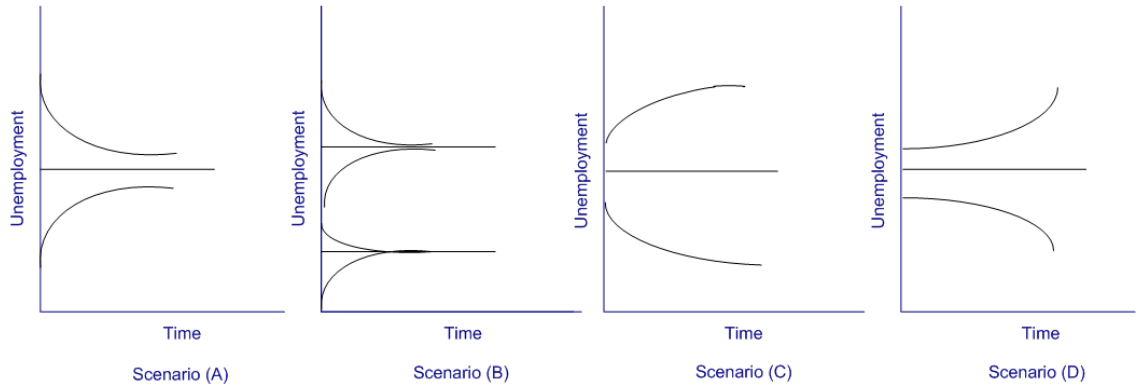

Figure 1: Dynamic evolution patterns

Finally, data may exhibit divergence, either limited or explosive in terms of deviations (scenario C and D, respectively). Importantly, in the case of scenarios C and D, computed average contains no useful information concerning the behaviour of the unemployment rates. In addition, even in scenario B the average may be computed, but in fact is nonexistent - it is a statistical artefact of two (or more) group averages.

We test for these concepts in three ways.

1. **Convergence of levels through β analysis**

   Convergence of levels is typically investigated through the β analysis. One expects a negative β coefficient in a regression $\Delta x_{i,t} = \alpha_i + \beta x_{i,0} + \epsilon_{i,t}$, which is equivalent to expecting $\tilde{\beta}$ to fall short of unity in case of convergence:

$$x_{i,t} = \alpha_i + \tilde{\beta} x_{i,0} + \gamma Z_{i,t} + \epsilon_{i,t},$$

Montenegro as well as some nonriparian ones.

where $Z_{i,t}$ denotes a set of variables structurally differentiating the $i's$. Finding a below unity $\tilde{\beta}$ coefficient is equivalent to scenario B or scenario A if γ coefficients prove insignificant.

Unfortunately, regression analysis does not allow to discriminate between scenarios C and D. Neither is it possible to effectively approach the situations in which some groups of $i's$ would exhibit convergence, while some other divergence.

2. **Convergence of variance through σ analysis**

The concept of variance covergence (σ-convergence), *cfr.* Sala-i Martin (2002), may be approached with the use of kernel density estimates[5]. If the initial unemployment rate is defined by x, while the one for the current period by $x+1$, the distribution of $x+1$ conditional on x may be written down as$f[x+1|x] = \frac{f[x,x+1]}{f_x[x]}$, where $f_x[x]$ is the marginal distribution of the initial unemployment rate, while $f[x, x+1]$ represents the combined distribution of x and $x+1$. Both numerator and denominator are replaced by non-parametric estimators of the kernel function[6].

This methodology has shorthand interpretative advantages. First of all, convergence / divergence may be easily detected from the graphs of the conditional density functions. Namely, vertical shape of this function suggests divergence, while horizontal vertical alignment is consistent with the convergence hypothesis. If the conditional density function follows the 45° line, overall density function exhibits stability, i.e. an observation drawn randomly at one point in time is highly unlikely to move towards relatively higher or lower values in any preceding or subsequent point in time.

3. **Stochastic convergence**

Carlino and Mills (1993) define a crucial condition is required for a stochastic convergence, namely that shocks to relative local levels should be temporary only. This is empirically approached by testing for a unit root in

$$u_{i,t} = ln\frac{U_{i,t}}{\bar{U}_t}.$$

To account for the slow speed of adjustment and numerous external shocks, cointegration tests should encompass considerations for possible structural breaks. Bayer and Juessen (2006) apply this approach for Germany and Gomes and da Silva (2006) for the case of Brazil.

[5]The values of the density function at some point are calculated as relative frequency of the observations in the nearest surrounding of this point (bandwidth window), while this relative frequency is estimated using a density function (kernel).

[6]The assumption about the kernel function only concerns the properties of the nearest surrounding of each point (within the bandwidth windows). Silverman (1986) provides the procedures for finding optimal bandwidth.

Unit-root tests are typically troubled by weak power. To circumvent this problem panel data unit-root tests are applied. Three most recently developed approaches to test stationarity in panel data include Breitung and Meyer (1994) (henceforth BM) Levin, Lin and Chu (2002) (henceforth LLC) and Im, Pesaran and Shin (2003) (henceforth IPS). When compared to the single ADF tests, both BM and LLC enjoy higher power by exploiting the cross-equation parameter restriction on the autoregressive parameter. By contrast, IPS assumes heterogenous adjustment paths, by formulating the alternative hypothesis to imply at least one non-stationary variable, but not necessarily all of them. Unfortunately, each of these tests requires a balanced panel, which is not always feasible due to relatively frequent administrative changes in transition economies. Therefore, whenever forced to do so by the data, we will resort to a Fisher test that combines the $p-values$ from N independent unit root tests, as developed by Maddala and Wu (1999).

We employ policy relevant NUTS4 level data for registered unemployment for Czech Republic, Poland and Slovakia. In total we use 77 units for Czech Republic, 374 units for Poland and 79 units for Slovakia. Since these are registry data, they suffer from many well-known shortcomings, including underreporting or overreporting (*e.g.* either due to forced passivity or in order gain access to social transfers, respectively). Unfortunately, for none of these countries LFS data can be reliably desaggregated to the NUTS4 level.

Data cover periods Jannuary 1995 till June 2007 for Czech Republic, Jan 1999 till August 2007 for Poland and January 1997 till October 2004 for Slovakia. The choice of time boundaries was dictated by the data availability and seems to bear no serious limitations for the possible results except for one obstacle. Namely, labour market evolutions have commenced in these countries in early 1990s. Unfortunately, NUTS4 data prior to 1999 are not accessible for Poland as the administrative reform establishing this level of local authorities was only implemented as of this year. For Czech Republic the consistency of data is destroyed by the change in unemployment definition prior to 1995. For Slovakia, the quality of data prior to 1997 after 2004 is not satisfactory since the definition of unemployment changed frequently. Hence, the data analysed commence roughly in the middle of the dynamic evolution patterns. Nonetheless, datasets cover periods of both increases and decreases in the national unemployment rates. Although rather worrying as a labour market phenomenon, this is rather fortunate from the empirical point of view, since results do not risk to be driven by short term uni-direction trends.

Table 1: Convergence of levels

Dependent variables	Czech Republic			Poland			Slovakia		
Initial unemployment (IU)	1.76*	1.72*	*0.41*	1.03*	0.70*	0.62*	1.11*	1.11*	0.51*
National unemployment		1.39*	1.40*		1.06*	1.05*		0.66*	0.49*
10^{th} Decimal group			15.69			6.38*			13.03*
No. of observations	11 538	11 538	11 538	32 578	32 578	32 578	7 365	7 365	7 365
No. of groups	77	77	77	428	428	428	79	79	79
R^2 within	n.a.	0.44	n.a.	n.a.	0.61	n.a.	n.a.	0.44	n.a.
R^2 between	n.a.	0.62	n.a.	n.a.	0.88	n.a.	n.a.	0.90	n.a.
Method	FGLS	FGLS	FGLS	FGLS	FGLS	FGLS	FGLS	FGLS	FGLS

Notes: FGLS estimation allows effectiveness even in the presence of AR(1) autocorrelation within panels and cross-sectional correlation and heteroskedasticity across panels. Individual or decimal group fixed effects. Estimates use robust standard errors. Constant not reported. Estimators for the effect of decimal group relative to the 1^{st} group, only 10^{th} reported, detailed results available upon request.
* and ** denote statistical significance at 1% and 5% levels, respectively. All χ^2 Wald statistics are highly statistically significant, *p-values* available upon request.

4 Results

For each of the countries estimations were performed separately not to impose logically redundant constraint of the common size in the estimated coefficients. In the extended version, to control for low and high unemployment regions, a synthetic proxy was generated, indicating to which of the ten decimal groups a district belonged in the initial period. Since this measure is constructed on the basis of empirical distribution moments, it can take simply the values of 1 to 10, without hazarding the correctness of estimates due to non-linear or non-monotonic effects. To control for cyclicality as well as changing labour market conditions, overall nation wide unemployment rates were incorporated.

Table 1 reports the findings for β-convergence analysis. Results clearly demonstrate strong divergence in all three countries, while the effect seems to be strongest for a country with lowest unemployment levels, *i.e.* Czech Republic. In the case of Poland, divergence chances to convergence for conditional analysis, while for both Czech and Slovak labour markets the estimate for the rate of divergence remains stable regardless of including the national labour market variables and decimal group indicators.

Consequently, it seems that divergence tends to be much more business cycle driven for Poland than the other two countries. The β coefficient drops from 1.03 to approximately 0.5 when conditionality is allowed for, whereas for Czech and Slovak republics inclusion of nation wide trends seems to have no effect on the β estimates. Being located in the 10^{th} decimal group boosts the divergence size by as much as approximately 16 percentage points in the case of Czech Republic, 16 percentage points in the case of Slovakia and additional 6-7 percentage points for Poland, *ceteris paribus*.

Results do not seem susceptible to the method of estimation used. The sign and the size of the estimated coefficients remain essentially unaffected when possible heterogeneity in the data is controlled for (cross-sectional time-series FGLS with heteroscedastic panels instead of OLS with robust standard errors).

To analyse the dynamics of unemployment rates dispersion kernel density estimates were calculated for yearly, *i.e.* 12-month-rolled transitions. In this approach, axes correspond to the unemployment rate vis-a-vis a national average. The horizontal envisages the "current", while the vertical serves the "next" period distributions. The contours demonstrate the relative intensity of the distributions at every point in this space. In principle these shapes correspond to the relative density functions when transformed orthogonally. The graphs in Figure (2) demonstrate estimates of kernel density functions for 12-month rolled data for Czech Republic, Poland and Slovakia. In all three cases the shape is located along the diagonal, demonstrating that distributions are highly stable over time.

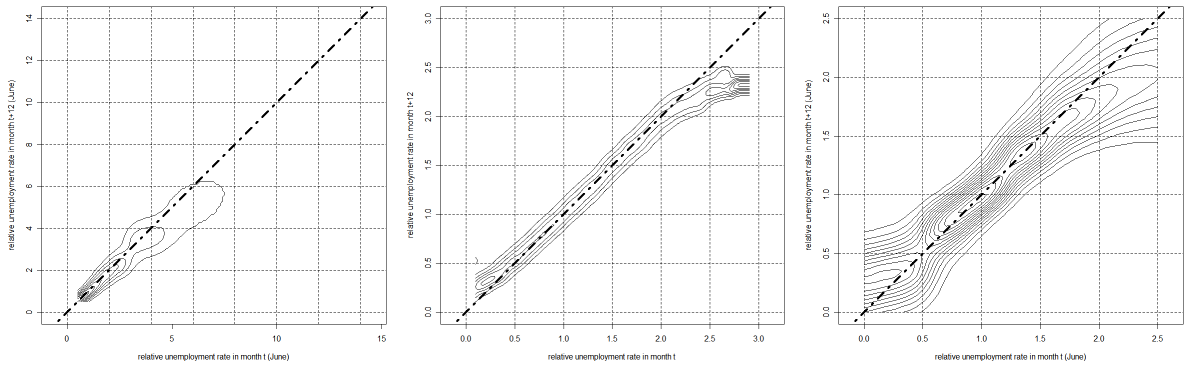

Figure 2: Kernel density estimates - Czech Republic (left panel), Poland (middle panel), Slovakia (right panel)

The shapes are thicker for Czech and Slovak republics, suggesting less homogeneity, thus less conformity in responding to nation-wide shocks more mobility in the distributions in these two countries. However, all shapes lean along the diagonal. This implies the potential transitions are not stable and distributions are highly stable. Convergence may be traced only among highest unemployment rates units in the case of Poland and on both ends of the distribution in Slovakia. For the case of Poland, the shape lies slightly below the diagonal, which suggests that convergence occurs to slightly lower levels. On the other hand, it is 2.5-fold the national average, which is equivalent to 30-50% unemployment rate. Especially in the case of regions, whose unemployment rates are already extremely high, one might expect some boundaries as to how much more this rate may still increase. Therefore, it seems that this observation may be just a statistical artefact, since even small cyclical upswings in the national unemployment rates with stable high unemployment in these districts would produce exactly the same pattern. In the case of Slovakia, convergence seems to occur at both

ends of the distribution. Low-end units seem to converge to slightly higher levels (the shape lies above the diagonal), while the opposite holds for the high-end districts. Convergence in this group seems much weaker though. Again, the former effect should probably be attributed to the general trends, *i.e.* the markets with largest hardships relatively improve with general worsening of the labour market outlooks. At the same time, those least struggling observe some increases in relative unemployment rates in the moments of employment contraction.

These results are thus consistent with the analysis of β convergence findings. Correspondingly, Table 2 reports the estimated transition probabilities. For Czech Republic, one can state that so to say "downgrading" is more likely than "upgrading", since larger probabilities are found below than above diagonal. Very high and very low unemployment regions exhibit high persistence, while the middle ones tend to demonstrate higher mobility. This is especially visible when looking at the 6^{th} and 8^{th} decimal groups, which have virtually almost switched places. For both highest and lowest unemployment districts persistence seems to have strengthened remarkably over time (from 70% to 82%).

In the case of Poland as well, on average 93% of districts remain in the same group on the monthly basis, while 68% are likely not to change the decimal group for rolled, 12-monthly changes. Probabilities above the diagonal are slightly higher than the ones below, suggesting that moving to higher decimal group (group of higher unemployment) is more likely. Importantly, the majority of transitions on an annual basis happens around 4^{th} to 6^{th} decimal groups, mostly among themselves over nine years. For high unemployment regions the probability of remaining in the same decimal group reaches 70% to 88% over eight-year period.

For Slovakia the regional differentials seem to be of even higher range than for Poland. This last conclusion especially is corroborated by the analysis of the transition matrices. Out-of-diagonal percentages are much higher than in the case of Poland. Moreover, especially if 12-month rolled estimates are considered (right panel), lower unemployment decimal groups districts consistently loose, while higher unemployment ones consistently increase. Although, again as in the case of Czech Republic, decimal groups contained on average only few districts, 11% to 15% transition for the 10^{th} group suggests that over the 1997-2004 time span, this group grew from approximately 8 to 12 districts, which is by all means considerable. In addition, there seems to be a lot of rotation in the middle-range groups, with diagonal values of approximately 50%. This effect can stem from two phenomena - either middle range groups experience a lot of volatility or their unemployment rates remain fairly stable over the nation-wide range. For groups 8 and 9 the latter seems to be the case, while for groups 4 to 7 it is rather the former.

The ergodic values confirm the above statements. Namely, although the size of this effect is not very large,

Table 2: Convergence of dispersions

	Czech Republic										Poland									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
1	74	11	6	4	4	0	0	2	0	0	86	13	1	0	0	0	0	0	0	0
2	6	38	32	21	2	0	2	0	0	0	14	64	18	4	0	0	0	0	0	0
3	7	18	29	18	22	5	0	0	0	0	0	21	54	21	3	0	0	0	0	0
4	4	6	19	23	23	13	13	0	0	0	0	1	22	50	23	4	0	0	0	0
5	2	6	20	20	17	20	6	7	2	0	0	0	1	23	50	22	0	4	0	0
6	2	0	0	11	24	28	22	6	7	0	0	0	0	3	25	48	3	21	0	0
7	0	2	0	2	16	24	31	16	9	0	0	0	0	0	2	27	15	56	1	0
8	0	0	2	0	6	6	24	28	35	0	0	0	0	0	0	1	62	19	18	0
9	0	0	0	0	0	9	4	34	38	15	0	0	0	0	0	0	16	0	72	12
10	0	0	0	0	0	0	0	4	13	83	0	0	0	0	0	0	0	0	12	88
E	7	6	10	9	12	12	11	11	12	11	8	8	8	10	11	11	10	11	12	11

	Slovakia										
	1	2	3	4	5	6	7	8	9	10	
1	93	7	0	0	0	0	0	0	0	0	Table reports the probabilities in percents.
2	16	78	7	0	0	0	0	0	0	0	For Czech Republic boundaries were 40.5%, 52.9%,
3	0	29	58	11	2	0	0	0	0	0	66%, 79.5%, 98.9%, 123.1%, 154.2%, 197.3%, 297.7%.
4	0	2	26	52	17	2	0	0	0	0	For Poland boundaries were 68.3%, 81.3%, 91.2%,
5	0	0	11	24	47	16	0	0	2	0	101.2%, 112%, 123.6%, 136.9%, 154%, 176%.
6	0	0	0	7	33	48	7	4	2	0	For Slovakia the boundaries were 42.8%, 70.4%, 82.8%,
7	0	0	0	0	0	20	48	26	7	0	92.5%, 103.9%, 115.9%, 132.3%, 145.3%, 166.1%
8	0	0	0	0	0	4	13	47	33	2	Based on the empirical distributions in initial period.
9	0	0	0	0	0	0	2	15	57	26	Numbers were rounded, do not add up to unity.
10	0	0	0	0	0	0	0	0	2	98	Line E denotes values for ergodic vector.
E	13	8	6	7	9	9	10	11	11	15	

lower unemployment groups loose districts, while the higher ones gain. In addition, out-of-diagonal numbers are considerably smaller in the case of Poland, when compared to Czech Republic or Slovakia. This suggests that the countries differ in as far as the stability of the the distribution is concerned, but mobility - if it occurs at all - happens predominantly in the middle of unemployment range.

Summarising, one can compare this analysis to the following exercise: considering the ranking of the districts along their relative unemployment rates we tried to inquire whether they switch places in the ranking, like the steps in the ladder. We already know from the β analysis that this ladder - if anything - gets wider in terms of unemployment levels. σ analysis inquired the mobility of local labour markets in nation-wide distributions. In the case of Czech Republic transitions seem to be more frequent, but at the same time less sustainable - movements up and down the ladder occur for the same districts. For Poland, there appear to be virtually no movements - if anything, *poviats* move to higher unemployment levels. For Slovakia analysis suggests reduction of low unemployment clubs and considerable volatility in the middle range. In all three cases, however, kernel density estimates failed to provide evidence in favour of general convergence.

Unfortunately, σ convergence analysis does not permit to asses the absolute scale of the differentials persistence. This shortcoming of the kernel density estimates comes directly from their nature - one needs distributions (relative unemployment levels) to estimate them. To see how these differentials behave across time, stochastic convergence analysis is applied. As discussed earlier, stochastic convergence essentially implies that one should confirm random walk hypothesis in the analyses of the relative (local) unemployment rate univariate time series. In order not to exclude scenario B from Figure (1), one can impose weaker constraint of trend stationarity with a constant to account for potentially differentiated steady state levels. In order to assure validity of the results one needs to control for sufficient number of lags. In as far as number of lags is concerned, we followed the findings of Bayer and Juessen (2006), who typically found two to maximum four lags on annual data. Hence, we universally imposed 36 monthly lags. In most cases up to 8 lags was supported by data. Table 3 reports the results of this analysis.

We first report multivariate augmented Dickey-Fuller (MADF) panel unit root test, as specified by Sarno and Taylor (1998), on a variable that contains both cross-section and time-series components. Findings suggest that the null hypothesis is strongly rejected. Similarly, Fisher's test as developed by Maddala and Wu (1999) clearly demonstrates that the null hypothesis of non-stationarity cannot be rejected for all these three countries. Fisher's test assumes that all series are non-stationary under the null hypothesis against the alternative that at least one series in the panel is stationary. Consequently, in the Phillips-Perron version of this test, when the null hypothesis is that all variable in the panel contain a unit root, and the alternative is

Table 3: Stochastic convergence

	Czech Republic	Poland	Slovakia
Total number of districts	78	374 (428)	77
No of observations	11 550	32 579	7 426
Multivariate ADF (MADF)	0.00	0.00	0.00
Fisher (Phillips-Perron)	0.00	0.00	0.00
Fisher (ADF)	0.78	1.00	0.37
No. of null rejections at 5%	45	71	45
LLC for panel time-balanced	0.00	0.26	1.00
No of observations	10 472 (76)	24 500 (370)	4606 (73)
Trend	No	Yes (2)	Yes (2)
Structural breaks	No	No	No
LLC for panel unit-balanced	0.00	1.00	1.00
No of observations	11 324 (77)	26 305 (379)	5451 (79)
Trend	No	No	No
Structural breaks	No	No	No
IPS for panel time-balanced	0.049	1.00	0.334
No of observations	10 716 (76)	24 420 (370)	6205 (73)
Trend	No	No (2)	No (2)
Structural breaks	Yes (4)	Yes (2)	Yes (2)
IPS for panel unit-balanced	0.014	0.469	0.872
No of observations	9 856 (77)	16 297 (379)	6715 (79)
Trend	No	No	No
Structural breaks	Yes (4)	Yes (2)	Yes (2)
Non-stationarity	Not rejected	Not rejected	Not rejected

Notes: Optimal number of lags obtained by sequential $t - tests$ as suggested Ng and Perron (1995). Structural breaks forced on data based on the analysis of national unemployment rate behaviour. Indication "no" with reference to trend and structural breaks implies that specification with these components consistently failed to reject the null of non-stationarity.

To obtain time-balanced panels periods for which not all units are yet available were eliminated (hence, maximum possible time series length). To obtain unit-balanced panels, units for which data is not available for all periods were eliminated (hence, maximum possible abundance of districts).

MacKinnon $p - values$ reported.

that at least one of the variables in the panel was generated by a stationary process, we find strong rejection of the null in the case of all three countries, which suggests that regions are strongly diversified in the underlying dynamics.

Summarising, although on average null hypothesis of convergence is strongly rejected, there exist units in each of the three countries which seem to demonstrate reversion after initial shock. This conclusions is further confirmed if one analyses the number or cases in which null was rejected. Approximately two thirds of Czech and Slovak districts exhibit stationarity, while in the case of Poland this share drops to as low as approximately 20%.

As frequently raised, Fisher-type test may have too little power to effectively reject the non-stationarity in all relevant cases. This is why reportedly more powerful IPS and LLC tests were applied as well. Unfortunately, this had to come at the expense of data reductions, since these tests require balanced panels. Results seem to be consistent with the unbalanced tests outcomes. However, in the case of Czech Republic the null was consistently rejected, while in the case of Slovakia and Poland data suggest strong persistence of regional unemployment rate differentials despite inclusion of trend and allowing for structural breaks. These contradictions may owe to the fact that either units or timeperiods had to be eliminated to obtain balanced panels. Therefore, the findings of MADF and Fisher's tests seem more reliable.

5 Conclusions

The main purpose of this paper was to inquire the convergence patterns of local labour markets in three transition economies: Czech Republic, Poland and Slovakia. Our findings suggest that if anything, divergence hypothesis is supported by the data. Despite a 10-year horizon, we are not able to demonstrate any effect of the cohesion policies. For all three countries, whenever job prospects get better all the way through the country, already disadvantaged regions benefit less. Further, regions with both very high and very low unemployment show signs of high persistence and low mobility in the national distribution, while the middle ones tend to demonstrate higher mobility and essentially no regional unemployment differentials persistence. For Czech Republic transitions seem to be more frequent, but at the same time less sustainable, while movements up and down the ladder occur frequently for the same districts. For Poland and to some extent Slovakia, there appear to be virtually no movements - if anything, districts move to higher unemployment levels.

Returning to the scenarios discussed in the opening of this paper, it seems that this paper provides evidence in support of stylised patterns presented in Figure (3). In the case of Czech Republic, rejection of non-stationarity is the weakest. This may follow from both relatively lowest unemployment levels and relatively

high proportion of districts not experiencing labour market hardships. There are quite a few districts in case of which non-stationarity is associated with significantly lower than average unemployment, which suggests that differentials persistence found is generally a positive sign. At the same time, some districts with generally more profound labour market problems seem to remain at the higher thresholds. Czech districts seem to maintain stability in absolute levels.

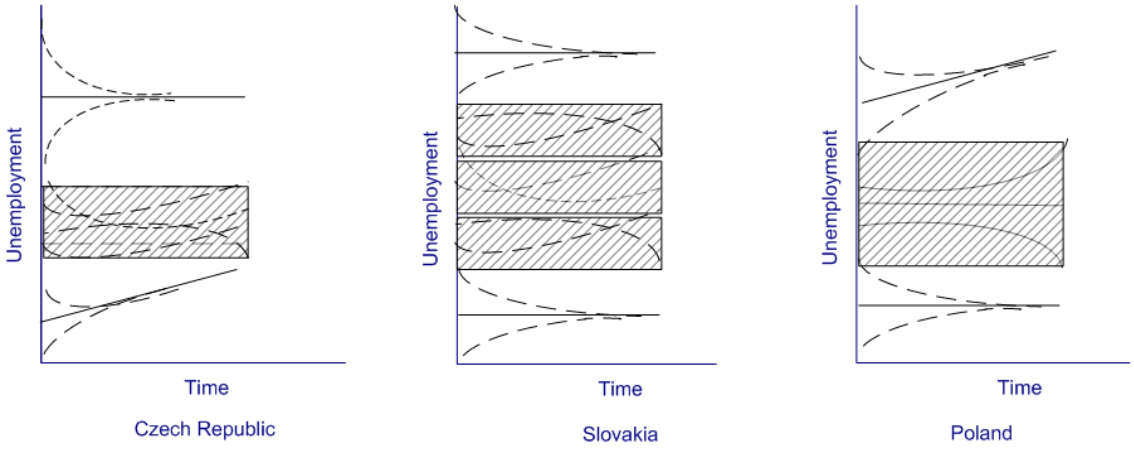

Figure 3: Stylised facts based on findings

The picture seems different for the two countries with with relatively more difficult labour market situation. For the Poland persistence holds mainly high unemployment districts, while for Slovakia low unemployment ones demonstrate high differential persistence as well. At the same time, Slovakia seems to demonstrate higher mobility. Over the analysed period in both these countries highest unemployment regions demonstrate convergence of "clubs".

There are some evident shortcomings of our study, though. Firstly, due to data limitations it was not possible to cover the whole transition period. The relevant district data for earlier years do not exist or have too low quality. Therefore, the time-span is relatively short, especially in the context of stochastic convergence studies in the literature (Bayer and Juessen (2006) use 40 years for Western Germany, Gomes and da Silva (2006) have at disposal 22 years, while Camarero, Carrion-i Silvestre and Tamarit (2006) study the validity of the hysteresis hypothesis with yearly unemployment rates data from 19 OECD countries for the period between 1956 and 2001). Consequently, our results should be interpreted with caution.

At the same time, in search of integrity with actual policy developments, NUTS4 level data are used. The findings of this paper effectively suggest that the very notion of "national" unemployment rate is highly uninformative for these countries. Namely, the average is actually only a statistical operation on strongly differentiated processes with sometimes even diverging dynamics. Consequently, however, computations of

adjustment speed could not be undertaken in a meaningful way. With potentially 80 different regional evolutions for Czech and Slovak republics and 350 for Poland, obtaining informative and statistically robust results seems virtually impossible.

This paper has also some important policy implications. Over the decade, in each of the countries, considerable resources have been devoted to social cohesion. This research demonstrates that either these activities lack necessary effectiveness, or are largely inappropriate. Namely, higher level administrative authorities in neither of the countries seem to make use of the financing instrument in an effective way. Each of the regions - despite disposing of the resources for active labour market and cohesion policies - contain districts from the highest unemployment groups. A natural policy implication of this finding is that financing should be geared towards alleviating the situation in most deprived regions by fostering higher effectiveness of the cohesion efforts. National authorities too, do not seem to exert sufficient monitoring activities promoting improvements in the most deprived regions.

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