



HAL
open science

Interest rates and convergence across Italian regions

Sheila Dow, Alberto Montagnoli, Oreste Napolitano

► **To cite this version:**

Sheila Dow, Alberto Montagnoli, Oreste Napolitano. Interest rates and convergence across Italian regions. *Regional Studies*, 2011, pp.1. 10.1080/00343404.2010.536760 . hal-00671642

HAL Id: hal-00671642

<https://hal.science/hal-00671642>

Submitted on 18 Feb 2012

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Interest rates and convergence across Italian regions

Journal:	<i>Regional Studies</i>
Manuscript ID:	CRES-2009-0156.R2
Manuscript Type:	Main Section
JEL codes:	C23 - Models with Panel Data < C2 - Econometric Methods: Single Equation Models < C - Mathematical and Quantitative Methods, E43 - Determination of Interest Rates Term Structure of Interest Rates < E4 - Money and Interest Rates < E - Macroeconomics and Monetary Economics, R11 - Regional Economic Activity: Growth, Development, and Changes < R1 - General Regional Economics < R - Urban, Rural, and Regional Economics, R15 - Econometric and Input-Output Models Other Models < R1 - General Regional Economics < R - Urban, Rural, and Regional Economics
Keywords:	interest rates , unit root, panel data, convergence, Italy

SCHOLARONE™
Manuscripts

1
2
3 Interest rates and convergence across Italian regions
4
5
6
7

8 Sheila Dow
9
10 Division of Economics,
11 University of Stirling,
12 FK9 4LA, UK
13 s.c.dow@stir.ac.uk
14
15
16

17
18 Alberto Montagnoli
19 Division of Economics,
20 University of Stirling,
21 FK9 4LA, UK
22 alberto.montagnoli@stir.ac.uk
23
24
25

26
27 Oreste Napolitano
28 Department of Economic Studies, S. Vinci
29 University of Naples "Parthenope",
30 Naples, 80133, Italy
31 napolitano@uniparthenope.it
32
33
34
35
36
37
38
39
40
41

42 (Received June 2009; in revised form October 2010)
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Abstract

The purpose of this paper is to investigate the evidence for economic convergence across Italian regions using trends in interest rate spreads and premia as indicators of regional credit conditions. Our results indicate the presence of persistent interest rate differentials, and thus an absence of convergence across the twenty political regions, but we observe a high degree of convergence within the four macroeconomic areas.

JEL Classification Codes: C23, E43, R11 and R15.

Keywords: interest rates, unit root, panel data, convergence, Italy.

For Peer Review Only

1
2
3
4
5
6
7
8
9
10 1. Introduction
11

12 The dualistic nature of the Italian economy is a well-known phenomenon which has
13 been analysed and debated in many studies. Moreover, there is a vast amount of
14 literature on the general issue of whether or not there is convergence across
15 economies or regions over time. These studies have mainly focused their attention on
16 the behaviour of different economies over the business cycle in order to uncover the
17 presence of real asymmetries between regions or nations.¹ Within this literature,
18 recently there has been a resurgence in the analysis of growth and convergence across
19 the Italian regions.²
20
21
22
23
24
25
26
27
28
29
30

31 The thinking underlying all of these studies can be illustrated by making
32 reference to Mundell's (1961) optimal currency area theory. He argued that, if
33 economic shocks have differential consequences for different economies, i.e. if they
34 do not impact on these economies homogeneously, then these economies would not
35 together constitute an optimal currency area in the absence of appropriate adjustment
36 mechanisms. Thus, we would expect such economies not to converge. It follows that,
37 for an economy which is not an optimal currency area, any macroeconomic policy
38 decision taken by central government would also be sub-optimal since it would *not fit*
39 *all*, and could contribute to divergence.
40
41
42
43
44
45
46
47
48
49
50
51

52 Later, however, Mundell (1973) focused his attention on the benefits of
53 monetary union as itself providing the basis for adjustment to asymmetric shocks. A
54 common currency and integrated financial markets would provide the means for
55 adjustment, at least to temporary asymmetric shocks, by means of capital flows, but
56 longer-lasting shocks would still need more price and wage adjustment. We would
57
58
59
60

1
2
3 therefore expect greater convergence within a common currency area, other things
4 being equal. Some studies have addressed this issue by identifying differences
5 between saving and investment in each economy as indicators of the power of capital
6 flows to cushion economies from short-term shocks (see Bayoumi and Rose, 1993).
7
8 The capacity for financial account imbalances within a currency area would therefore
9 be expected to ease adjustment to shocks.
10
11
12
13
14
15
16

17 Regional economic theory has challenged this notion that integrated financial
18 markets tend to promote economic convergence. According to Dow (1982, 1992),
19 Dow and Montagnoli (2007), Martin (1989), Martin and Minns (1995) and MacKay
20 and Molyneux (1996), the spatial structure of an economy matters. This can be
21 summarized in three points: i) information imperfections and transaction costs
22 increase with distance from markets; ii) inadequate local credit markets mean that
23 SMEs face funding problems; iii) spatial differences in supply and demand may be
24 mutually reinforcing. These points are mainly drawn from Dow's (1992, 1999)
25 relative liquidity preference theory of the relationship between the spatial evolution of
26 a national banking system and the process of uneven regional development. Dow's
27 theory suggests that the free movement of capital and financial integration will lead to
28 spatial centralization of the financial system, which in turn will lead to uneven
29 economic development between the centre and periphery of the space economy.
30 Contrary to the neoclassical view, an integrated financial system will encourage a net
31 outflow of capital from the periphery to the core, and these flows in turn will fuel the
32 process of uneven economic development between the core and the periphery (Martin
33 and Minns, 1995).³
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56

57 Testing this hypothesis has frequently proved difficult given the lack of
58 available of regional data on the distribution of bank credit, and finance more
59
60

1
2
3 generally. Nevertheless, a few studies have attempted to analyse data on regional
4 money flows along these lines, for Australia and Canada (Porteous, 1995), for Brazil
5 (Amado, 1997), for Spain (Rodriguez Fuentes, 2005) and for various British regions
6 (see Dow, 1992, Dow and Montagnoli, 2007, Martin, 1989, Martin and Minns, 1995,
7 and MacKay and Molyneux, 1996). The common view running through this strand of
8 literature seems to be, first, that over-centralization of the financial system
9 disadvantages peripheral regions, and, second, a local financial infrastructure
10 characterized by local and regional based banks is better for those regions (Martin and
11 Minns, 1995). These points are summarized as follows in MacKay and Molyneux
12 (1996: 763): 'it seems that spatial diversity of financial structures will continue to
13 persist as long as economic diversity exists. The shocking suspicion that flows of
14 capital may add to rather than limit the regional inequality does not disappear.'

15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32 This study tries to contribute some empirical evidence to inform this debate.
33
34 We analyse the question of whether Italy, as an optimal currency area, has reached
35 convergence in the credit sector. We take a novel approach to regional credit markets,
36 facilitated by Italian data availability, by focusing on regional interest rates. Rather
37 than investigating net capital account imbalances for each region, we investigate
38 regional interest rate differentials as an alternative indicator of imbalances. In
39 particular, high demand for investment finance relative to supply in any region is
40 taken to be reflected in high long-term rates relative to short-term rates. Similarly,
41 tighter credit conditions in any region are taken to be reflected in higher loan rates
42 relative to deposit rates. If capital is mobile within the national economy, regional
43 convergence would be associated with a process of moving towards uniformity of
44 rates following any shock, while divergence would be reflected in persistent regional
45 rate differentials.

1
2
3
4 We take Italy as our case study, a country for which data on regional interest
5 rates are available. To investigate whether there are synergies across the twenty Italian
6 regions we look in particular at the behaviour of interest rate spreads and premia. We
7
8 define the interest rate spread as the difference between the long-term and short-term
9 rates; the interest rate premium is defined as the difference between the interest rate
10 on loans and the interest rate on deposits. We take these series as alternative indicators
11 of regional credit conditions. We employ panel data unit root tests to examine the
12 dynamics of interest rate spreads and premia across Italian regions.
13
14
15
16
17
18
19
20
21

22 The remainder of the paper is organized as follows; the next section presents a
23 brief discussion of the dualistic nature of the Italian economy and of financial
24 convergence in Italy; Section 3 presents the data and econometric methodology;
25 Section 4 reports the results of four tests for convergence, section 5 considers
26 evidence on speed of convergence, section 6 considers some policy implications of
27 our results, and Section 6 concludes.
28
29
30
31
32
33
34
35
36
37
38

39 2. Brief literature review on dualism and financial convergence in Italy

40
41 The concept of duality implies the existence, within the same economic system, of
42 areas that follow different paths of development, both in terms of growth of real per
43 capita income, and in terms of socio-economic transformations, leaving these
44 differences unchanged over time. If the process of integration does not occur, the
45 economic system as a whole will be characterized by distorted and inefficient social
46 and economic development. This economic dualism can take a triple configuration:
47 the first is called territorial dualism, indicating a difference in the development from
48 the spatial perspective; the second is industry/sector dualism in the productive
49 structure, representing a dichotomy between types of company or sector; the final one
50
51
52
53
54
55
56
57
58
59
60

1
2
3 is dualism in the labour market, to signal a labour market structure characterized by
4
5 regular and irregular (i.e. black labour market) employees.
6
7

8 The peculiarity of the Italian case is found in the fact that the three identified
9
10 types of dualism tend to coexist, creating a fairly clear separation between the North
11
12 and South of the country (Lutz 1958, 1962; Vinci 1967; Singer 1970; Graziani 1969,
13
14 2000). Recent studies have pointed out the importance of the dualistic nature of the
15
16 Italian economy in terms of unemployment, income growth, public finance and a
17
18 technological gap. The latter studies showed that the clear gap in technological
19
20 endowment and capacity for innovation has been one of the main factors behind the
21
22 divergence between Italian regions (see Evangelista *et al.*, 2002, and Iammarino *et al.*,
23
24 2004).
25
26
27
28

29 Furthermore the understanding of the problem seems crucial for the
30
31 effectiveness of economic policies both in the short and on the long-term. Mauro
32
33 (2004) explains the importance for the Italian economy of the lack of convergence
34
35 between North and South. For instance, using a well accepted definition of
36
37 convergence, the standard deviation of per capita GDP, he shows that the process of
38
39 convergence has been in operation in Italy since the 1960s. However 'once the GDP
40
41 net of public sector value added is considered, the picture appears dramatically
42
43 different. There is now evidence of divergence from the 1980s onward once this
44
45 variable has been corrected' (Mauro, 2004 p.929). Finally, it is worth mentioning the
46
47 important role played in the divergence process by the way in which the public
48
49 finances are managed across Italy. Guerrieri and Iammarino (2003) show that from
50
51 the early 1990s the Southern regions have gone through a deterioration of their
52
53 economic fundamentals due to the lack of public finance support. This has induced
54
55 the economic literature to speak about '*many Mezzogiorni*', referring to the fact that,
56
57
58
59
60

1
2
3 in the last twenty years, economies within the southern macro area have been based
4
5 on different industrial sectors from the rest of the country, and are characterized by a
6
7 different speed of economic growth.
8
9

10 With a simple exercise Mauro (2004) shows that in 1996 the lack of
11
12 convergence precluded a rise in GDP for the South of almost 20% when the
13
14 benchmark considered is the average GDP in the North and South, and 16% of GDP
15
16 when the Centre is the benchmark. When economic dualism assumes such a scale, the
17
18 imbalances between areas highlight different trends and divergent economic
19
20 developments. This implies that differences are not automatically resolved, but they
21
22 require substantial and sustained economic policies which would induce the
23
24 transformation of a vicious cycle into a virtuous process of development.
25
26
27
28

29 Recently, a renewed interest in the economic literature has been devoted to the
30
31 importance of the sound functioning of financial institutions as a growth factor, and
32
33 for regional differences in economic development. An efficient financial system can
34
35 help to overcome market frictions by reducing the costs of transferring information
36
37 and wealth between savers and investors. Undoubtedly, when financial systems carry
38
39 out their functions well, the cost of financial intermediation is lower and economic
40
41 growth increases.
42
43
44

45 At a regional level, many studies have emphasized the importance of local
46
47 finance for regional economic growth. For example, Guiso *et al* (2004) study the
48
49 effects in Italy of differences in local financial development within an integrated
50
51 financial market. They build a new indicator of financial development which
52
53 considers the probability that a household is precluded from accessing the credit
54
55 market. Their results show that financial development improves the probability of an
56
57 individual starting a new business, increases competition, and promotes economic
58
59
60

1
2
3 growth. Financial development is, with different effects, important for both large and
4
5 small firms. However, despite the fact that large firms will become gradually more
6
7 indifferent to the conditions of the local financial system, small firms will continue to
8
9 rely on it.
10
11

12
13 Usai and Vannini (2005) examine the role that various types of bank played in
14
15 promoting Italy's regional economic growth. Over the period 1970–1993, while the
16
17 real sector was still characterized by the presence of a large number of small- and
18
19 medium-sized enterprises, the financial sector showed a large and varied set of credit
20
21 organizations with different ownership, size and lending styles. Their results can be
22
23 summarized as follows: the size of the financial sector as a whole is irrelevant to
24
25 growth; but looking at the size of each single intermediary, they found that size
26
27 matters. Small banks, like cooperative banks or local banks, play a positive role while
28
29 national banks can have a negative impact on peripheral regions; furthermore, the
30
31 reform and subsequent consolidation of the financial system can lead to a reduction of
32
33 availability of credit in such regions.
34
35
36
37

38
39 Empirical evidence on the interaction between the banking system and
40
41 economic growth is also investigated by Lucchetti *et al* (2001); they suggest a new
42
43 indicator based on a measure of bank microeconomic efficiency. The empirical results
44
45 for the Italian regions show the existence of an autonomous effect on regional growth
46
47 supported by the efficiency of the banking system.
48
49

50
51 Coccoresse (2008) focuses his analysis on the importance of the consolidation
52
53 process that has characterized the banking industries in many industrialized countries.
54
55 He assesses the level of competition in the Italian banking industry at a regional level,
56
57 in order to identify the main factors that could help to explain differences in
58
59 competition among areas. He finds that Italian banks globally benefit from modest
60

1
2
3 market power, but the level of this power is quite different from region to region.
4
5 Further the structure of local banking markets matters. The level of competition
6
7 decreases when regional markets are concentrated.
8
9

10 The relationship between banks and firms in Italy differ among the four macro
11 areas; this point is presented in Ferri and Messori (2000). They demonstrate that
12 except for the Northwest, which is characterized by larger banks and firms, the rest of
13 the country has an economic structure based on small banks and firms, which have a
14 closer and more lasting customer relationship. This close relationship is able to
15 promote a more favourable allocation of credit for the Northeast and the Centre but a
16 less favourable one for the South.
17
18
19
20
21
22
23
24
25
26

27 Finally Vaona (2008) tries to test the hypothesis that there is a positive
28 relationship between the size of the banking sector and economic growth of a region.
29 In particular he investigates whether the former can be considered a good predictor of
30 future growth. The empirical evidence shows clearly that there is an indirect
31 relationship between the size of banking system and economic growth. In particular,
32 since the size of the bank sector is an indicator of the banks' aptitude to allocate
33 capital and to activate savings, he concluded that 'the more the financial system is
34 able to provide these functions, especially to firms belonging to non-financial sectors
35 of the economy, the more the economy will benefit from it in terms of enhanced
36 growth' (Vaona, 2008, p. 198).
37
38
39
40
41
42
43
44
45
46
47
48
49

50 All these studies consider, directly or indirectly, the issue of banking
51 regulation. Guiso *et al* (2006) study the cost of Italian regulation across Italian
52 provinces. The main finding is that limits to competition have a double effect: they
53 both diminish the supply of credit and reduce the percentage of bad loans.
54
55
56
57
58
59
60 Deregulation can have opposite effects, that is, increasing the supply of credit and also

1
2
3 increasing the percentage of bad loans. In general, restrictions on competition have
4
5 negative effects on aggregate growth.
6
7

8 It is in the light of these studies that we approach the issue of the effect of
9
10 financial conditions in Italy on regional convergence in a different way, using regional
11
12 interest rate data. To our knowledge it is the first time an empirical study has tried to
13
14 investigate the degree of financial integration using regional interest rates.
15
16

17 18 19 20 21 22 3. Data and econometric methodology 23 24 25 26

27 Our dataset is comprised of quarterly time-series on short-term and long-term interest
28
29 rates on loans and on interest rates on banks' deposits.⁴ All data were obtained from
30
31 the *Regional Bulletin* published by the Bank of Italy. The dataset covers all twenty
32
33 Italian administrative regions and the full sample period under investigation is
34
35 1998Q1-2008Q4, providing 44 observations per region, with a cross-section of
36
37 twenty.
38
39
40
41
42

43 [TABLE 1]
44
45
46
47

48 Table 1 presents the summary statistics for the two series for each political and
49
50 economic region.⁵ There is a large heterogeneity in the mean and standard deviation
51
52 across the various regions for both variables. An important feature emerges; there is a
53
54 clear dichotomy between the North and the South of the country: the premia, i.e. the
55
56 cost of borrowing for the southern regions exhibit values above the national average.
57
58
59
60

The benchmark model that defines whether a region is converging can be written as:

$$(i_{it} - i_{it}^*) = \alpha_i d_{mt} + \phi(i_{it-1} - i_{it-1}^*) + \varepsilon_{it} \quad (1)$$

where i_{it} is a measure of regional credit conditions (measured either by the interest rate spread or interest rate premium in region i). i_{it}^* is the corresponding value at national level, d_{mt} is a set of deterministic variables which can take a value of $\{1\}$ or $\{1,t\}$, α_i is the corresponding coefficient, and ε_{it} is an *iid* error.

Equation (1) can be reformulated as:

$$\Delta x_{it} = \alpha_i d_{mt} + \rho x_{it-1} + \sum_{L=1}^n \beta_{iL} x_{it-L} + \varepsilon_{it} \quad (2)$$

where $x_{it} = (i_{it} - i_{it}^*)$, $\rho = \sum_{i=1}^n \phi_i - 1$, and $\sum_{i=1}^n \phi_i = \phi$.

ρ in Equation (2), corresponding to ϕ in Equation (1), is the parameter of interest. If its value is $|\phi| < 1$ then Equation (1) is said not to have a unit root. In this case the interest rate is stable and any economic shock, to which a region is subject, will over time be absorbed by the system, reducing regional interest rate differentials again. Moreover if $\alpha \neq 0$ the process is stable around a non-zero mean. On the contrary, if $|\phi| = 1$, the time series follows a random walk and any economic shock will be permanently incorporated in the series. Finally, if $|\phi| > 1$, the process is explosive.

We can therefore use unit root tests to investigate whether the parameter of interest in Equation (2) is statistically different from one. If it is statistically different from one, we cannot reject the hypothesis that the regions are converging.

Given that our time dimension comprises eleven years, univariate unit root tests may suffer from low power in such a small sample. Here, alongside the traditional test, we therefore consider more powerful panel approaches to examine the degree of non-stationarity across regional interest rates differentials. The four tests implemented are presented below.

We utilise panel unit root tests which assume that the residual error term in the panel regression is $\sigma^2\mathbf{I}$, where \mathbf{I} is the identity matrix. This is consistent with the idea that the cross-sections are not affected by common shocks, an approach adopted by Culver and Papell (1997) when examining aggregate inflation data.

We start our analysis by assuming that ρ in Equation (2), i.e. the persistence parameter, is common across regions. Following Levin, Lin and Chu (2002) (LLC hereafter), we use Equation (2) to test the null hypothesis that the common slope has a unit root ($H_0 : \rho = 0$) against the alternative that all series x_i are stationary.

The limit of the LLC test is the assumption of homogeneity of the persistence parameter (ρ); thus, we employ the tests of Im, Pesaran and Shin (2003) (hereafter IPS). This test utilises a panel version of the Dickey Fuller model, which can be specified as follows:

$$\Delta x_{it} = \alpha_i d_{m,t} + \rho_i x_{it-1} + \sum_{i=1}^N \beta_i x_{it-1} + \varepsilon_{it}$$

The IPS test has a null hypothesis that all regional interest rate rates differentials are random walks with drift:

$$H_0 = \rho_1 = \rho_2 = \dots = \rho_i = 0 \quad (3)$$

against the alternative that all series are stationary:

$$H_1 = \rho_1 < 0, \dots, \rho_i < 0 \quad (4)$$

The test statistic, $Z_{\tilde{t}bar}$ is based on an average of the individual cross-section ADF test statistics. In particular,

$$Z_{\tilde{t}bar} = \sqrt{N} \{ \tilde{t}bar_{NT} - E(\tilde{t}_T) \} / \sqrt{Var(\tilde{t}_T)} \Rightarrow N(0,1) \quad (5)$$

where $N(0,1)$ is the standard normal distribution. Also $\tilde{t}bar_{NT} = 1/N \sum_{t=1}^N \tilde{t}_{iT}$ and \tilde{t}_{iT} are the standard cross section unit root test statistics.

The third test we implement uses the Breitung (2000) method. This test corrects for the loss of power associated with the IPS when individual ADF tests include a trend in the specification; the basic approach is similar to the LLC test, but it modifies it in two ways. First the exogenous component is not removed when the standardized proxies are computed. Then the proxies are transformed and detrended.⁶

The first step is the same as in the LLC test, but only $\Delta y_{i,t-1}$ is used to obtain the residuals; they are then adjusted for the individual-specific variances. In the second step, the estimated residuals are transformed and detrended as:

$$\varepsilon_{it}^* = \sqrt{\frac{T-t}{(T-t+1)}} \left(\tilde{\varepsilon}_{it} - \frac{\tilde{\varepsilon}_{it+1} + \dots + \tilde{\varepsilon}_{iT}}{T-t} \right)$$

And

$$v_{it}^* = \tilde{v}_{it-1} - \tilde{v}_{it} \text{ with intercept and no trend}$$

$$v_{it}^* = \tilde{v}_{it-1} - \tilde{v}_{it} - \frac{t-1}{T} \tilde{v}_{iT} \text{ with intercept and trend}$$

The final step consist in running the following pooled regression

$$\varepsilon_{it}^* = \rho v_{it-1}^* - \varepsilon_{it}^*$$

The null hypothesis of no unit root will be determined using the derived t-statistic which is distributed as $\mathbf{N}(0, 1)$.

Finally, we implement the Maddala and Wu (1999) test. They show that under the null-hypothesis of unit root for all the cross-section N , the following asymptotic result holds true:

$$-2 \sum_{j=1}^N \log(\pi_j) \rightarrow \chi_{2N}^2$$

where π_j is the p-value for the unit root test for any cross-section j .

The results of the tests are presented in the next section.

1
2
3
4
5
6 4. The four tests: empirical results
7
8
9

10 The unit root tests presented above are implemented using three different cross
11 sections for both interest rate premium and spread. We first test for the presence of a
12 unit root between region i and the national value. The number of lags in each model is
13 determined by the Schwarz (SIC) information criterion.
14
15
16
17
18

19 The results for the premium are presented in Tables 2a-3d, while the results
20 for the spread are in Tables 4a-5d. Both sets of results indicate that we cannot accept
21 the alternative hypothesis that shocks to interest rate premia and spreads are not
22 persistent across the regions. This is a clear indication of non-convergence across
23 Italian regions.
24
25
26
27
28
29
30
31
32
33

34 [TABLES 2, 4, 5]
35
36
37
38

39 We then test whether this persistence is present across regions within the
40 groupings of regions according to macro areas; thus, we consider the differential
41 between the premium (spread) in region i and the value of the corresponding macro
42 area. The results are set out in Tables 3a-3d for interest rate premia, and 5a-5d for
43 interest rate spreads. In all cases except two (the North-east and South), we can safely
44 reject the unit root hypothesis at the usual statistical level of confidence. Hence there
45 is a clear indication that interest rate premia and spreads do not tend to converge with
46 the national value, but rather they follow the dynamics of the relevant macro areas. To
47 determine whether the final results are driven by some of the regions, we can look at
48 the Maddala and Wu (1999) intermediate test; the results are reported in Table 6. For
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 the spread the results indicate that the only two regions which accept the null of unit
4
5 root are Umbria and Liguria. For the premium, we can say that the North West and
6
7 the South accept the null hypothesis for all regions, however in the other two macro
8
9 areas we have two regions which are stationary; these are Liguria and Lombardia for
10
11 the North West and Emilia Romagna e Marche for the Centre.
12
13
14
15

16
17 [TABLE 6]
18
19
20
21

22 The persistence of wide spreads can be explained by a number of systemic
23
24 problems that, for instance, can be applied to the majority of the southern Italian
25
26 regions. These could include a lack of adequate competition in the region's banking
27
28 sector, the apparent market risk, bank unreliability, diseconomies of scale due to the
29
30 small (regional) markets, high fixed and operating costs and the lack of development
31
32 of regional economies and their financial markets.⁷
33
34
35

36 Having shown that the interest rate spreads and premia are stationary in all
37
38 cases but two, we can now estimate a simple AR(1) fixed effect model to verify
39
40 whether we are in the presence of conditional or unconditional convergence.⁸ The
41
42 fixed effect estimation is reported in Table 7. The resulting *F-test* strongly rejects the
43
44 null hypothesis that the effects are redundant. Since we cannot accept the hypothesis
45
46 that all fixed effects are equal to zero, we can conclude that there is evidence of
47
48 conditional convergence of regional interest rate premia/spreads.
49
50
51
52
53
54

55 [TABLE 7]
56
57
58
59
60

5. Speed of convergence

The above results indicate that there is convergence towards some common mean. In this section, we extend the analysis further, and ask how quickly the spread (premium) reverts back to that mean following a shock. The starting point is the traditional AR(1) equation:

$$p_{i,t} = \alpha_i + (1 - \beta)p_{i,t-1} + \varepsilon_t$$

where $p_{i,t}$ is the difference between the spread (premium) between region i and the macro-area average, α_i a region specific fixed effect, ε_t the error term. The one period lag ($j=1$) is usually employed in empirical studies (see Dobado and Marrero, 2005, and Wolszczak-Derlacz, 2008). The estimated coefficient is an indicator of β -convergence. In particular, two parameters of interest can be immediately revealed from the regression results. The speed of convergence (λ) and the half lives (HL) of shocks are calculated as:

$$\lambda = -\ln(1 - \beta)$$

$$HL = -\frac{\ln(0.5)}{\lambda}$$

HL indicates how many years it takes for the impact of a unit shock to halve.⁹ In the case of higher autoregressive orders in the convergence model, the absolute value of the first order coefficient is a suitable approximation to obtain measures for the speed of convergence and half lives.

1
2
3 A further methodological consideration concerns the choice of estimators to
4 accommodate the joint presence of dynamics and unobserved heterogeneity in
5 individual regions. In previous literature, the first difference-IV estimators, the
6 General Method of Moments (GMM) estimators and system GMM are usually
7 applied to solve the first order dynamic panel data models. However, these methods
8 are only efficient asymptotically and thus are not suitable for small data samples.
9 Bruno (2005) pointed out that the weakness of these estimators is that their properties
10 hold for large N, so they can be severely biased and imprecise in panel data with a
11 small number of cross-sectional units. For our data the GMM estimator does not seem
12 advisable since we have small N and large T. Therefore we use the least squares
13 dummy variable corrected (LSDVC) method proposed by Kiviet (1995 and 1999),
14 and extended by Bruno (2005a and 2005b). The LSDVC offers a method for samples
15 where N is small or only moderately large. This methodology has been proved to be a
16 suitable to correct the bias in the LSDV estimator and in the case of small samples
17 where GMM cannot be applied efficiently.
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40

41 [TABLE 8]
42
43
44
45

46 The results are shown in table 8. Our estimates of the speed of convergence
47 suggest that it is higher in the North West compared to the other macro areas and it
48 takes about 1.5 quarters for the spread and less than two quarters for premium to
49 reduce by half the shock. Another interesting observation is therefore that the speed of
50 convergence is not of similar magnitude across all macro areas.
51
52
53
54
55
56

57 It is interesting to note that the estimated speed of convergence is actually
58 slower for the South than for the other areas. This result may be explained by the
59
60

1
2
3 economic conditions of this area which, as we mentioned in section 4, play a crucial
4
5 role in determining the convergence process.
6
7

8 The nature and efficiency of the financial sectors have been found to be the
9
10 major reasons behind differences in speed of convergence across different countries
11
12 and across different areas inside one country. In economies with weak financial
13
14 sectors, the intermediation costs are much larger. These costs have been found to be
15
16 responsible for high spreads and longer speeds of adjustment. In particular, for the
17
18 case of the South of Italy we can mention high intermediation costs, the lack of
19
20 adequate competition, the diseconomies of scale due to the small size of markets, high
21
22 fixed and operating costs, the existence of regulatory controls, and maybe even more
23
24 important, perceived market risks.
25
26
27
28
29
30
31

32 6. Policy Implications 33 34 35

36 Our evidence of persistent regional differentials implies that any asymmetric shock
37
38 will not be absorbed by capital flows within Italy, but will rather be reflected in
39
40 persistent regional differences in credit conditions. The further implication is that any
41
42 change in monetary policy, as one such shock, does not have the same impact across
43
44 Italy. This is consistent with evidence for Spain and the UK (e.g. Rodriguez-Fuentes,
45
46 2005; Dow and Montagnoli, 2007).
47
48
49

50 One policy implication of our research is therefore that, for regional economic
51
52 convergence in Italy, measures are required to ease credit conditions in the lower-
53
54 growth regions if greater regional convergence is to be achieved. The convergence
55
56 within the macro regions that we have identified reflects greater homogeneity of
57
58 credit conditions within these regions. Further consideration of how this has been
59
60

1
2
3 achieved would serve to illuminate how such an outcome might be obtained for the
4 nation as a whole. But the suggestion that there is homogeneity within regions is
5
6 consistent with the view that regional economies do have distinctive identities, and are
7
8 therefore amenable to regional policies.
9
10
11

12
13 Distinctive regional identities allow us to identify regional characteristics in
14 credit markets. In particular, in line with the Post Keynesian theory of regional
15 finance developed by Dow (1982) and Rodriguez Fuentes (2005), we would expect to
16 find homogeneity within the macro regions with respect both to supply of credit and
17 demand, but heterogeneity between them. Thus poorer regions facing adverse shocks
18 would be characterised by unfavourable risk assessment on the part of banks in other
19 regions, which reflected lower levels of knowledge about borrowers (particularly
20 SMEs) as much as the assessment of risk itself. If poorer regions tend to fare worse
21 under adverse shocks, credit conditions will in any case reflect this. Further,
22 borrowers would be less willing to accept the consequences of vulnerability
23 associated with high debt levels, would attempt to maintain relatively liquid portfolios
24 more generally, and would satisfy this by buying financial assets issued outside the
25 region (partly because the financial centre is elsewhere), further weakening the market
26 in local assets. While local banks would have better knowledge of borrowers, high
27 local liquidity preference leading to capital outflows to other regions would weaken
28 their capacity to lend. Conversely the more prosperous regions (which also tend to
29 house the larger financial institutions) would experience more favourable risk
30 assessment based on more robust knowledge, credit conditions would reflect the
31 normal more favourable response to adverse shocks, and lower liquidity preference
32 would encourage more borrowing, and more investment in illiquid assets. The ability
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 to respond better to adverse shocks would be further reinforced by the capital inflows
4
5 from the poorer regions.
6
7

8 If this is indeed the case for the different macro regions in Italy, then policy
9
10 measures at least to improve information flows on borrowers in the poorer regions
11
12 would provide a foundation for more informed risk assessment, which would reduce
13
14 the differential on interest charges and supply of credit. Support for regional financial
15
16 institutions would be one way of addressing the difficulty of accessing credit from
17
18 large remote financial institutions. But the absence of convergence between regions is
19
20 self-reinforcing, in that the divergent response to adverse shocks causes credit
21
22 conditions (both demand and supply) to diverge, which reinforces the divergent
23
24 response. The only substantial way of breaking out of this vicious cycle is public
25
26 sector financial institutions specifically designed to improve credit conditions in
27
28 poorer regions, or regional policy based on fiscal measures. If this could achieve
29
30 economic convergence, then that would in itself bring about convergence of credit
31
32 conditions to a significant extent. Indeed, since monetary policy is likely to have
33
34 divergent effects on different regions, regional policy is required, even if only to
35
36 offset the effects of national macroeconomic policy.
37
38
39
40
41
42

43 Finally, if there are interest rate differentials within nations, we should expect
44
45 differentials also within larger economic areas. Yet EMU was expected to bring about
46
47 interest rate convergence. Indeed, as de Grauwe (2003: 136) puts it: '[T]he interest
48
49 rate convergence criterion [for EMU entry] is redundant. As soon as countries are
50
51 expected to satisfy the other criteria, market forces make sure that the interest rates
52
53 quickly converge'. But to the extent that national interest rate data suggest
54
55 convergence at the national level, our evidence suggests that this masks divergence
56
57 within each national economy.
58
59
60

7. Conclusion

Our study has used a novel set of measures of regional financial credit conditions to assess the argument that financial markets within currency areas promote regional convergence. Using a series of panel unit root tests on panel interest rate data, we have shown that Italy is characterized by four macro-areas which follow different dynamics. Since the Italian regions operate under a single currency area, theory suggests that there are enough conditions for the convergence of interest rates towards an average national level (net of single region risk). However, the widespread perception, confirmed by our results, is that interest rate convergence did not occur in Italy, either before or after membership of EMU.

In particular, our empirical results suggest that the twenty regions do not move together. Convergence is found within, but not across, the four macro regions: North-East, North-West, Central and South. Despite the theoretical consensus about the factors that can contribute to regional differences in spreads and premia, there is a lack of literature analysing the convergence towards macro regions. This, together with the large interest rate spreads and premia which are evident between the Italian macro regions, in our opinion, warrant further investigation. Indeed our study lends support to the idea that similar investigations could be revealing for other countries where such data are available.

The evidence we have found of homogeneity within macro regions allows an analysis of characteristics particular to different regions, and thus consideration of policy addressed to the absence of regional convergence which we have identified. This runs counter to a recent trend to downplay regional economic identity, relative to

1
2
3 the role of cities for example, and thus to downplay also the potential role for regional
4
5 policy.
6
7

8 With a historical pattern of divergence between macro regions we can expect
9
10 persistence of regional differences in credit conditions, both on the supply and
11
12 demand side. If indeed we cannot rely on capital flows within national markets to
13
14 promote convergence, and indeed if instead they promote divergence, then some
15
16 policy response is called for. Addressing these differences requires attention to the
17
18 institutional structure of banking from the point of view of the regions. Otherwise the
19
20 vicious cycle of absence of convergence requires a fiscal response to promote the
21
22 economic convergence which would go a long way to promoting convergence of
23
24 credit conditions.
25
26
27
28

29 In order to reduce differences between the credit conditions in the different
30
31 macro regions, we have suggested improved information flows on the weaker regions.
32
33 But even more effective would be active state involvement in regional credit markets
34
35 through dedicated state-run financial institutions. These institutions would be
36
37 designed to improve credit conditions in weaker regions in general, but also aim to
38
39 assist adjustment to particular shocks, including the regional component of monetary
40
41 policy shocks. The origins of regional divergence lie predominantly in structural
42
43 factors relating to location, industrial and sectoral composition, and the regional
44
45 labour market. But our evidence suggests that the evolution of financial structure and
46
47 financial behaviour have also become part of the structural problem. Efforts to make
48
49 financial conditions more homogeneous across regions could, instead, help to
50
51 ameliorate the other structural problems and promote regional convergence.
52
53
54
55
56
57
58
59
60

1
2
3 Acknowledgements
4
5
6
7

8 We are particularly grateful to two anonymous referees for widespread comments that
9 considerably improved the paper. We would also like to thank the participants at the
10 DIW Macroeconometric Workshop in Berlin 2009 for comments and suggestions.
11
12
13
14
15 Any remaining errors are the sole responsibility of the authors.
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

References

- AMADO, A (1997) *Disparate Regional Development in Brazil: A Monetary Production Approach*, Aldershot: Ashgate.
- ANGELONI I., KASHUAP, A. and MOJON, B. (2003) *Monetary Policy Transmission in the Euro Area*, Cambridge: Cambridge University Press.
- ARICÓ F. (2003) Growth and unemployment: Towards a theoretical integration, *Journal of Economic Surveys* 17(3): 419-55.
- ARTIS, M.J. (2003) Is there a European business cycle?, CES-ifo Working Papers, No 1053.
- BARRO, R.J. and SALA-I-MARTIN, X. (1991) Convergence across states and regions, *Brookings Paper on Economic Activity* 1: 107–58.
- BAYER, B. and JÜBEN, F. (2007) Convergence in West German Regional Unemployment Rates, *German Economic Review*, 8 (Nov.): 510-35.
- BAYOUMI T. and ROSE, A. (1993) Domestic savings and intra-national capital flows, *European Economic Review*, 37 (6): 1197-1202.
- BODO, G. and SESTITO, P. (1989) Disoccupazione e Dualismo Territoriale, Temi di Discussione del Servizio Studi Banca d'Italia, 123 (August).
- BREITUNG, J. (2000) The Local Power of Some Unit Root Tests for Panel Data, in B. BALTAGI (ed.), *Advances in Econometrics, Vol. 15: Nonstationary Panels, Panel Cointegration, and Dynamic Panels*, Amsterdam: JAI Press: 161–78.
- BRUNO, G. S. F. (2005a) Approximating the Bias of the LSDV Estimator for Dynamic Unbalanced Panel Data Models, *Economics Letters*, vol.87: 361-66.
- BRUNO, G. S. F. (2005b) Estimation and Inference in Dynamic Unbalanced Panel Data Models with a Small Number of Individuals, CESPRI WP n.165.

1
2
3 CARMECI, G. and MAURO, L. (2002) The convergence of the Italian regions and
4 unemployment: Theory and evidence, *Journal of Regional Science* 42(3): 509-32.
5
6

7
8 CHICK, V. and DOW, S. C. (1988) A Post Keynesian Perspective on Banking and
9 Regional Development, Thames Papers, Spring: 1-22.
10
11

12
13 COCCORESE P. (2008) Bank competition and regional differences, *Economics*
14 *Letters*, 101:13-16.
15
16

17
18 CULVER, S. E., and PAPELL, D. H. (1997) Is there a unit root in the inflation rate?
19 Evidence from sequential break and panel data models, *Journal of Applied*
20 *Econometrics*, 12: 436-44.
21
22
23

24
25 DE GRAUWE, P. and MONGELLI, F. (2005) Endogeneities of Optimum Currency
26 Areas. What Brings Countries Sharing a Single Currency Closer Together?, ECB
27 Working Paper No. 468.
28
29
30

31
32 DOBADO, R. and MARRERO, G. A. (2005) Corn Market Integration in Porfirian
33 Mexico, *Journal of Economic History*, 65(1): 103-28.
34
35

36
37 DOW, S. C. (1982) The Regional Composition of the Money Multiplier Process,
38 *Scottish Journal of Political Economy*, 29(1): 22-44.
39
40

41
42 DOW, S. C. (1992) The Regional Financial Sector: A Scottish Case Study, *Regional*
43 *Studies*, 26 (7): 619-31.
44
45

46
47 DOW, S.C. (1999) Stages of Banking Development and the Spatial Development of
48 Financial Systems, in R. MARTIN (ed.), *Money and the Space Economy*, Wiley: 31-48.
49
50

51
52 DOW, S.C. and MONTAGNOLI, A. (2007) The Regional Transmission of UK
53 Monetary Policy, *Regional Studies* 41(6): 797-808.
54
55

56
57 EVANGELISTA R., IAMMARINO S., MASTROSTEFANO V. and SILVANI A.,
58 (2002) Looking for regional systems of innovation. Evidence from the Italian
59 innovation survey, *Regional Studies* 36(2): 173-86.
60

1
2
3 FERRI, G. and MESSORI M. (2000) Bank-firm relationships and allocative efficiency
4 in Northeastern and Central Italy and in the South, *Journal of Banking and Finance*,
5
6 24: 1067-95.
7
8

9
10 GRAZIANI A. (1969) *Lo sviluppo di un'economia aperta*, Napoli, Edizioni
11
12 Scientifiche Italiane.
13

14
15 GRAZIANI A. (2000) *Lo sviluppo dell'economia Italiana. Dalla ricostruzione alla*
16
17 *moneta unica*, Torino, Bollati Boringhieri.
18

19
20 GUERRIERI P. and IAMMARINO, S. (2003) The Dynamics of Export Specialisation
21
22 in the Regions of the Italian Mezzogiorno: Persistence and Change, SPRU Electronic
23
24 Working Paper Series, no. 105.
25

26
27 GUIO L., SAPIENZA P. and ZINGALES, L. (2004) Does Local Financial
28
29 Development Matter?, *Quarterly Journal of Economics* 119: 929-69.
30

31
32 GUIO L., SAPIENZA P. and ZINGALES L. (2006) The Cost of Banking
33
34 Regulation, NBER Working Papers No.12501.
35

36
37 IAMMARINO S., JONA-LASINIO, C. and MANTEGAZZA, S. (2004) Labour
38
39 productivity, ICT and regions. The revival of Italian "dualism"?, SPRU Electronic
40
41 Working Paper Series, no. 127.
42

43
44 IM, K. S., PESARAN, M. H. and SHIN, Y. (2003) Testing for Unit Roots in
45
46 Heterogeneous Panels, *Journal of Econometrics*, 115: 53-74.
47

48
49 KIVIET, J. F. (1995) On Bias, Inconsistency, and Efficiency of Various Estimators in
50
51 Dynamic Panel Data Models, *Journal of Econometrics*, 68: 53-78.
52

53
54 KIVIET, J. F. (1999) Expectation of Expansions for Estimators in a Dynamic Panel
55
56 Data Model; Some Results for Weakly Exogenous Regressors, in HSIAO, C.,
57
58 LAHIRI, K., LEE, L.F. AND M. HASHEM PESARAN, (ed.). *Analysis of panels and*
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

limited dependent variable models. In honour of G.S. Maddala, Cambridge University Press.

LEVIN, A., LIN, C. F. and CHU, C. (2002) 'Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties, *Journal of Econometrics* 108: 1–24.

LUCCHETTI, R., PAPI, L. and ZAZZARO, A. (2001) Banks' inefficiency and economic growth: a micro-macro approach, *Scottish Journal of Political Economy* 48: 400–24.

LUTZ V. (1958) Il processo di sviluppo di un sistema economico dualistico, *Moneta e Credito*, n. 4.

LUTZ V. (1962) *Italy. A Study in Economic Development*, Oxford University Press, Oxford.

MACKAY, R. R. and MOLYNEUX, P. (1996) Bank Credit and the regions: A comparison within Europe, *Regional Studies*, 30(8): 757-63.

MADDALA, G. S. and WU, S. (1999) A Comparative Study of Unit Root Tests with Panel Data and A New Simple Test, *Oxford Bulletin of Economics and Statistics* 61: 631–52.

MARTIN, R. (1989) The Growth and Geographical Autonomy of Venture capitalism in The United Kingdom, *Regional Studies*, 23: 389-403.

MARTIN, R., and MINNS, R. (1995) Undermining the Financial Basis of Regions: The Spatial Structure and Implications of the UK Pension Fund System, *Regional Studies*, 29(2): 125-44.

MAURO, L. and PODRECCA, E. (1994) The case of Italian regions: Convergence or dualism, *Economics Notes* 3: 447–68.

MAURO, L. (2004) The macroeconomics of Italy: a regional perspective, *Journal of Policy Modelling* 26 (8-9): 927-44.

1
2
3 MUNDELL, R. (1961) A Theory of Optimum Currency Areas, *The American*
4
5
6 *Economic Review* 51(4): 509-17.

7
8 MUNDELL, R. (1973) Uncommon Arguments for Common Currencies, in H.G.
9
10 JOHNSON and A. SWOBODA (ed.), *The Economics of Common Currencies*,
11
12 London: George Allen & Unwin Ltd.

13
14
15 PACI, R. and PIGLIARU, F. (1995) Differenziali di Crescita tra le Regioni Italiane:
16
17 un'analisi cross-section, *Rivista di Politica Economica*, 85: 3–34.

18
19
20 PORTEOUS, D. J. (1995) *The Geography of Finance*. Aldershot: Avebury.

21
22 RODRIGUEZ FUENTES, C. (2005) *Regional Monetary Policy*. London: Routledge.

23
24
25 SINGER H. W. (1970) Dualism revisited. A new approach to the problems of dual
26
27 society in developing countries, *Journal of Development Studies*, 7.

28
29
30 TOPEL, R. (1999) Labor Markets and Economic Growth, in O. ASHENFELTER and
31
32 D. CARD (ed.), *Handbook of Labor Economics*, Amsterdam: Elsevier, pp. 2943-3029.

33
34
35 USAI S and VANNINI, M (2005) Banking Structure and Regional Economic
36
37 Growth: Lessons from Italy, *Annals of Regional Science*, 39: 691–714.

38
39
40 VAONA, A. (2008) Regional evidence on financial development, finance term
41
42 structure and growth, *Empirical Economics*, 34(1): 185-201.

43
44
45 VINCI S. (1967) Dualismo e sviluppo economico in G. BRACHIESI, A. GRAZIANI,
46
47 G. MARENGO, M. TERRASI and S. VINCI (ed.), *Lo sviluppo di un'economia*
48
49 *aperta. Aspetti teorici e strutturali*, Università di Napoli, Centro di Specializzazione e
50
51 Ricerche Economico-Agraria per il Mezzogiorno.

52
53
54 VINCI S. (1967) Modelli di sviluppo “export-led” (chap. 4) in G. BRACHIESI, A.
55
56 GRAZIANI, G. MARENGO, M. TERRASI and S. VINCI (ed.), *Lo sviluppo di*
57
58 *un'economia aperta. Aspetti teorici e strutturali*, Università di Napoli, Centro di
59
60 Specializzazione e Ricerche Economico-Agraria per il Mezzogiorno.

1
2
3
4
5
6 WOLSZCZAK-DERLACZ, J. (2008) Price convergence in the EU: an aggregate and
7
8 disaggregate approach, *International Economics and Economic, International*
9
10 *Economics and Economic Policy*, vol. 5(1), pages 25-47, July.
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Peer Review Only

Table 1. Descriptive statistics

	Interest rate spread			Interest rate premium		
	Mean	Std Deviation	Correl (r _i ,r _N)	Mean	Std Deviation	Correl (r _p ,r _N)
<i>Political Region</i>						
Abruzzi	-2.23	0.77	0.25	6.01	0.47	0.44
Basilicata	-2.68	0.89	-0.37	6.73	0.75	-0.16
Calabria	-3.46	1.06	0.04	7.82	0.84	0.00
Campania	-2.81	0.82	0.13	6.83	0.34	0.07
Emilia Romagna	-1.53	0.51	0.02	4.55	0.44	0.15
Friuli Ven.Giu	-2.03	0.68	-0.48	5.07	0.57	-0.47
Lazio	-1.97	0.85	-0.15	4.80	0.68	-0.38
Liguria	-2.35	0.82	0.15	5.95	0.53	-0.10
Lombardia	-1.18	0.66	0.04	4.16	0.57	-0.18
Marche	-1.59	0.55	0.02	4.69	0.59	-0.15
Molise	-3.37	0.65	-0.21	7.15	0.50	-0.11
Piemonte	-1.90	0.89	0.23	5.06	0.64	-0.09
Puglia	-2.82	0.79	0.07	6.71	0.56	-0.16
Sardegna	-2.49	0.91	-0.48	6.29	0.78	-0.03
Sicilia	-3.02	0.65	-0.27	6.85	0.78	-0.13
Toscana	-1.78	0.57	-0.08	4.95	0.43	0.07
Trentino Alto Adige	-1.19	0.40	-0.19	4.37	0.79	0.07
Umbria	-2.37	0.61	-0.16	5.88	0.51	0.03
Val d'Aosta	-2.51	0.87	-0.20	6.01	0.71	-0.19
Veneto	-1.76	0.50	0.30	5.16	0.36	0.18
<i>Economic Region</i>						
North-West	-2.03	0.74	-0.006	5.21	0.52	0.77
North-East	-1.61	0.40	-0.11	4.87	0.42	0.90
Centre	-1.92	0.57	-0.05	5.34	0.51	-0.05
South	-2.95	0.65	-0.01	6.92	0.54	0.94
National	-3.19	1.21	--	6.70	1.28	--

Table 2a. Premium (all regions – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-0.56	0.32
Breitung t-stat		-0.50
Im, Pesaran and Shin W-stat	-0.26	0.95
ADF - Fisher Chi-square	30.09	36.62

Notes: Null: Unit root; Newey-West bandwidth selection using Bartlett kernel; Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 2b. Premium (North-East – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-0.14	1.36
Breitung t-stat		-1.07
Im, Pesaran and Shin W-stat	-0.16	-0.74
ADF - Fisher Chi-square	4.60	11.19 *

Notes: See Table 2a

Table 2c. Premium (North-West – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	0.58	0.09
Breitung t-stat		0.38
Im, Pesaran and Shin W-stat	0.66	1.59
ADF - Fisher Chi-square	3.47	1.77

Notes: See Table 2a

Table 2d. Premium (Central – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-0.45	-0.24
Breitung t-stat		-0.02
Im, Pesaran and Shin W-stat	-0.26	1.59
ADF - Fisher Chi-square	10.90	4.55

Notes: See Table 2a

Table 2e. Premium (South – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-0.86	-0.32
Breitung t-stat		-0.71
Im, Pesaran and Shin W-stat	-0.61	-0.63
ADF - Fisher Chi-square	11.12	19.11 *

Notes: See Table 2a

Table 3a. Premium North-East

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-1.22	-0.06
Breitung t-stat		-0.85
Im, Pesaran and Shin W-stat	-0.98	0.26
ADF - Fisher Chi-square	7.88	4.01

Notes: See Table 2a

Table 3b. Premium North-West

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-2.85 ***	-3.23 ***
Breitung t-stat		-2.59 ***
Im, Pesaran and Shin W-stat	-3.30 ***	-2.55 ***
ADF - Fisher Chi-square	25.65 ***	19.56 ***

Notes: See Table 2a

Table 3c. Premium Central

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-2.16 ***	-3.64 ***
Breitung t-stat		-1.99 ***
Im, Pesaran and Shin W-stat	-2.58 ***	-2.97 ***
ADF - Fisher Chi-square	23.09 ***	33.19 ***

Notes: See Table 2a

Table 3d. Premium South

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-3.44 ***	-3.54 ***
Breitung t-stat		-3.21 ***
Im, Pesaran and Shin W-stat	-3.62 ***	-3.24 ***
ADF - Fisher Chi-square	33.83 ***	29.26 ***

Notes: See Table 2a

Table 4a. Spread (all regions – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-0.89	-0.06
Breitung t-stat		-1.65 **
Im, Pesaran and Shin W-stat	-1.33 *	1.39
ADF - Fisher Chi-square	35.76	25.72

Notes: See Table 2a

Table 4b. Spread (North-East – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-0.35	0.65
Breitung t-stat		-0.61
Im, Pesaran and Shin W-stat	-0.37	1.34
ADF - Fisher Chi-square	5.26	1.39

Notes: See Table 2a

Table 4c. Spread (North-West – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-0.26	-0.37
Breitung t-stat		-0.39
Im, Pesaran and Shin W-stat	-0.29	0.89
ADF - Fisher Chi-square	6.53	3.11

Notes: See Table 2a

Table 4d. Spread (Central – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-0.01	0.11
Breitung t-stat		-0.44
Im, Pesaran and Shin W-stat	-0.76	1.52
ADF - Fisher Chi-square	13.28	5.00

Notes: See Table 2a

Table 4e. Spread (South – National)

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-1.33 *	-0.48
Breitung t-stat		-2.05 **
Im, Pesaran and Shin W-stat	-1.14	-0.70
ADF - Fisher Chi-square	14.08	16.23

Notes: See Table 2a

Table 5a. Spread North-East

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-2.98 ***	-2.42 ***
Breitung t-stat		-3.75 ***
Im, Pesaran and Shin W-stat	-3.83 ***	-3.17 ***
ADF - Fisher Chi-square	25.84 ***	20.34 ***

Notes: See Table 2a

Table 5b. Spread North-West

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-6.51 ***	-5.74 ***
Breitung t-stat		-3.67 ***
Im, Pesaran and Shin W-stat	-6.35 ***	-5.08 ***
ADF - Fisher Chi-square	54.02 ***	39.04 ***

Notes: See Table 2a

Table 5c. Spread Central

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-5.49 ***	-4.57 ***
Breitung t-stat		-4.79 ***
Im, Pesaran and Shin W-stat	-6.19 ***	-4.83 ***
ADF - Fisher Chi-square	64.21 ***	46.54 ***

Notes: See Table 2a

Table 5d. Spread South

	Individual effects	Individual effects and individual linear trends
Levin, Lin & Chu t*	-6.03 ***	-6.10 ***
Breitung t-stat		-5.34 ***
Im, Pesaran and Shin W-stat	-5.38 ***	-4.98 ***
ADF - Fisher Chi-square	50.55 ***	44.29 ***

Notes: See Table 2a

Table 6. Maddala and Wu intermediate results (p-value)

	Regions	Premium		Spread	
		Individual Intercept	Individual intercept and trend	Individual Intercept	Individual intercept and trend
North-East	Friuli Ven.Giu	0.519	0.592	0.073	0.188
	Trentino A. A.	0.950	0.759	0.005	0.008
	Veneto	0.937	0.996	0.028	0.152
North-West	Lombardia	0.000	0.005	0.000	0.001
	Piemonte	0.230	0.056	0.001	0.010
	Liguria	0.061	0.091	0.224	0.731
	Val d'Aosta	0.115	0.241	0.000	0.000
Centre	Abruzzi	0.077	0.268	0.015	0.081
	Emilia Romagna	0.008	0.058	0.037	0.040
	Lazio	0.425	0.741	0.048	0.000
	Marche	0.024	0.022	0.010	0.020
	Molise	0.371	0.197	0.042	0.090
	Toscana	0.037	0.198	0.057	0.110
South	Umbria	0.789	0.002	0.226	0.219
	Campania	0.194	0.309	0.044	0.173
	Calabria	0.071	0.222	0.018	0.075
	Basilicata	0.419	0.102	0.016	0.014
	Puglia	0.522	0.867	0.049	0.290
	Sicilia	0.440	0.108	0.061	0.016
	Sardegna	0.452	0.115	0.031	0.009

Notes: p-values of a null of unit root; the number of lagged difference terms was selected using the Schwarz (SIC) information criterion.

Table 7: Pooled AR (1) estimation with fixed effect

	Constant	AR(1) coeff.	<i>F-test</i>
Premium NE	-0.022	0.776 ***	F(2, 125) = 5.54 ***
Premium NW	0.038 **	0.782 ***	F(3, 167) = 4.36 ***
Premium Central	0.042 ***	0.763 ***	F(6, 293) = 5.12 ***
Premium South	0.042 **	0.686 ***	F(5, 251) = 6.01 ***
Spread NE	-0.018	0.519 ***	F(2,125) = 8.67 ***
Spread NW	-0.020	0.354 ***	F(3, 167) = 16.36 ***
Spread Central	-0.121 ***	0.371 ***	F(6, 293) = 15.37 ***
Spread South	-0.031	0.561 ***	F(5, 251) = 3.72 ***

Notes: The *F-test* null-hypothesis is that the individual effects are zero

Table 8. Speed of adjustment

	Premium				Spread			
<i>Regions</i>	NE	NW	Centre	South	NE	NW	Centre	South
<i>Speed of Convergence</i>	--	0.369	0.281	--	0.447	1.165	0.683	0.468
<i>Half-life of Shocks</i>	--	1.879	2.463	--	1.552	0.595	1.016	1.482

¹ See for example Angeloni *et al.* (2003), Artis (2003), De Grauwe and Mongelli (2005).

² See for example Aricó (2003), Barro and Sala-i-Martin (1991), Mauro (2004) and Topel (1999).

³ Overoptimistic (but relatively uninformed) expectations in central financial institutions may at times encourage significant capital inflows to peripheral regions in response to some new development, but with a high risk of strong reversals when expectations change (see Chick and Dow 1988).

⁴ The short-term interest rate is the interest rate earned by a debt instrument that will mature within one year. The long-term interest rate is the interest rate earned by a note or bond that matures in one or more years (Bank of Italy definitions).

⁵ Italy has 20 administrative regions; the economic regions reflect the different economic structures across Italy. They are defined as: North-West (Liguria, Piemonte, Valle d'Aosta, Lombardia), North-East (Friuli Venezia Giulia, Trentino Alto Adige, Veneto), Centre (Abruzzo, Emilia Romagna, Lazio, Marche, Molise, Toscana, Umbria), South and Islands (Basilicata, Calabria, Campania, Puglia, Sardegna, Sicilia). In the remainder of the text, the terms 'economic regions' and 'macro regions/areas' are used interchangeably.

⁶ For the full specification, see Breitung (2000)

⁷ See Bodo and Sestito (1989), Mauro and Podrecca (1994), Paci and Pigliaru (1995), Carmeci and Mauro (2002).

⁸ Formally we can write that there is *unconditional* convergence between two time series if $\lim_{t \rightarrow \infty} (y_{t+k} - \alpha) = 0$. Where y_{t+k} denotes current and past observations of the

1
2
3
4
5 price differentials. If $\alpha \neq 0$ then convergence is said to be *conditional*. For a similar
6
7 exercise see Bayer and Juessen (2007).

8
9⁹ In other words this measure tells us how long it takes for the series to decrease by
10
11 half after it has been hit by a shock. (11)

12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Peer Review Only