Regional resilience during the Great Recession: the role of the European Union cohesion policy*

by

ROBERTA ARBOLINO [a], *PAOLO DI CARO* [bc], *UGO MARANI* [a]

[a]University of Napoli l'Orientale, Department of Human and Social Sciences; Napoli, Italy.
[b]University of Catania, Department of Economics and Business; Catania, Italy.
[c]Centre for Applied Macro-Finance, DERS, University of York; York, United Kingdom.

Abstract

This paper analyses regional resilience in Italy during the years of the Great Recession, by investigating the extent of and the reasons behind geographical differences regarding the impact of the recent crisis on local labour markets. Differences in regional resilience are explained by the place-specific ability of regional policymakers to manage the financial tools of the European Union cohesion policy. The role of the EU cohesion policy for shaping the short-term cyclical behaviour of regional economies is evaluated. Results are robust to the introduction of spatial interactions across areas and alternative econometric specifications. Some policy implications are conclusively discussed.

Keywords: regional resilience, Great Recession, EU structural funds, EU cohesion policy.

JEL classification: C33, R11, R12.

Roberta Arbolino – University of Napoli l'Orientale, Department of Human and Social Sciences.
Largo S. Giovanni Maggiore 30 - 80134 Napoli – Italy;
E-mail rarbolino@unior.it

Paolo Di Caro - University of Catania, Department of Economics and Business.
Corso Italia 55 – 95129 Catania – Italy;
tel.: +39-095-7537738; e-mail pdiaro@unict.it
(CORRESPONDING AUTHOR)

Ugo Marani - University of Napoli l'Orientale, Department of Human and Social Sciences.
Largo S. Giovanni Maggiore 30 - 80134 Napoli - Italy
E-mail marani@unina.it

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1. Introduction

About nine years after the start of the Great Recession, that is, the deep and prolonged financial and economic crisis hitting the Western economies since 2007, recovery expectations are spreading in many countries. Significant spatial differences regarding the speed of adjustment in the aftermath of the shock and the ability to restore pre-crisis levels of employment and economic activities have been observed (OECD, 2015). In Italy, where the Great Recession had negative consequences among the worst in the European Union (EU), starting from 2014 household consumption expenditures, exports, and private investments have registered encouraging signals; in the first two quarters of 2015, employment increased by about 0.8% with the respect to the previous year (Bank of Italy, 2015a). The still fragile recovery of the Italian economy, however, is not evenly distributed across geographical areas (IMF, 2015): most of Central and Northern regions are catching up with the national growth dynamics; while a missing recovery is underway in almost all the Southern regions.

Drawing from the recent advancements in the regional resilience framework (Martin, 2012; Boschma, 2015), this paper aims to investigate the extent of and the reasons behind the asymmetric patterns of economic resilience shown by the Italian regions during the Great Recession. Our objective is twofold. First, this paper provides an up-to-date assessment of regional economic resilience across the Italian regional labour markets, by combining data on employment and job insurance mechanisms. Second, the role of the European Union cohesion policy – the set of EU funding schemes that are direct to promote growth and reduce spatial inequalities across European regions – as a possible determinant of regional resilience is studied empirically.[1] In particular, we aim at analysing if the ability of regional policymakers to manage the EU funds can contribute to explain the uneven distribution of regional resilience during the Great Recession.

This research brings timely and novel contributions to the regional science literature along different dimensions. The explicit focus on regional resilience in Italy during the Great Recession integrates previous studies investigating economic resilience in this country over different periods (Cellini and Torrisi, 2014). By analysing the role of regional policies for explaining economic resilience, we participate to the alive debate on the

[1] The European Union cohesion policy is a set of three policy instruments: the European Regional Development Fund (ERDF), the European Social Fund (ESF), and the Cohesion Fund. In this paper, the focus is on the ERDF and the ESF that represent the two most important funding schemes of regional policy in Italy: from 2007 to 2013, about 100 billion of Euros have been addressed to Italian regions within the EU cohesion framework.

determinants of resilience, and in particular, on the effects of policy and governance arrangements, which have received limited attention to date (Christopherson *et al.*, 2010; Eraydin, 2015). The assessment of the impact of the EU funds on regional economies in times of crisis throws further light on the potential contribution of the EU cohesion policy as a countercyclical mechanism (Camagni and Capello, 2015). In addition, we provide further empirical evidence on the regional administrations' ability to use the existing EU funds, by contributing to the discussion on the effectiveness of the EU cohesion policy and its design in the next programming period 2014-2020 (see the special issue 'Place-based Economic Development and the New EU Cohesion Policy' in *Regional Studies*, 2015).

The remainder of the paper is organised as follows. Section 2 provides a discussion of the related literature. Section 3 describes the data and presents preliminary evidence. The empirical analysis is developed in section 4. Section 5 summarizes and concludes.

2. Related literature

2.1 Regional resilience: definition, measurement and determinants

In the recent years, the concept of economic resilience has attracted increasing interest among academics and policymakers, by posing novel theoretical and empirical questions that are currently under scrutiny (White and O'Hare, 2014). Economic resilience has been defined as the ability of a given geographical area to resist to and recover from shocks *lato sensu* in order to maintain a specific developmental path and/or move towards alternative growth trajectories (Martin and Sunley, 2015).[2] In this sense, resilience can be interpreted as the combination of different place-specific attributes such as vulnerability and resistance to a particular shock, robustness, and recoverability in terms of post-shock growth path. On empirical grounds, some of the crucial aspects that need to be addressed are: the exact identification of shocks; the correct measurement of resilience across places; the explaining factors justifying differences in regional resilience (Sensier *et al.*, 2016).

In the regional resilience literature, economic shocks have been identified either endogenously through the adoption of business cycles' time-series methodologies (Sensier and Artis, 2014) or exogenously by using data driven approaches (Fingleton *et al.*, 2014). In this paper, we follow the latter perspective, namely the shock under investigation (i.e. the Great Recession) is defined starting from the observation of the data and the official timing

[2] The definition and the theoretical underpinnings of regional resilience are the focus of a vivid debate in the regional science and economic geography literature, given that several open issues remain to be deal with (Pike *et al.*, 2010).

of the Italian recessions provided by the Bank of Italy and the Italian Institute of Statistics (ISTAT). As for the measurement of resilience, different variables and indicators have been proposed with data on employment and GDP being the leading ones (Modica and Reggiani, 2014). In the empirical section, we combine data on employment and job insurance mechanisms in order to analyse the resilience of Italian regions by looking at the complex set of consequences on local labour markets (Blanchard and Katz, 1992).

An increasing number of contributions is studying the factors explaining differences in resilience across time and space (Fingleton and Palombi, 2013; Diodato and Weterings, 2014). Martin and Sunley (2015) identified five possible set of determinants of regional resilience: industrial and business structure, labour market conditions, financial arrangements, agency and decision-making, governance arrangements. Although different studies are now addressing the question regarding what explains resilience, governance aspects received limited attention to date (Duval *et al.*, 2007; Davies, 2011). The way national and regional policymakers operate in times of crises, however, is likely to play a relevant role both during and after a given recession occurs: activist and effective policy authorities can contribute to foster the resistance of a particular economic context from unexpected shocks, and support its recoverability and long-run developmental path (Martin and Sunley, 2015).

In Italy, the adoption of the regional resilience framework resulted helpful for refreshing the debate on the extent of and the reasons behind the social and economic divide between the North and the South of the country. Using data on regional employment over the past forty years relevant spatial and time differences were found when looking at the impact of the main Italian economic recessions (Lagravinese, 2015). Italian regions, moreover, registered asymmetric patterns with respect to both the temporary and permanent consequences of economic downturns (Di Caro, 2015a). Such differences have been explained by using specific factors such as human and civic capital, industrial structure, export propensity (Di Caro, 2015b). Recently, Faggian *et al.* (2016) studied the resilience of Italian local labour systems during the years 2009-2010, by pointing out the presence of more detailed differences across geographical areas and the importance of specific factors like specialization and diversification for explaining local employment growth paths.

2.2 The EU cohesion policy: institutional framework and economic impact

Since the second half of 1980s, the EU cohesion policy has promoted economic and social integration and the reduction of disparities across European regions (Rodríguez-Pose and Fratesi, 2004; EU Commission, 2014). Within this regional policy framework, an increasing amount of funds has been addressed to finance investments in different fields such as infrastructures, education, energy, environment, labour market programs and firms' incentives: in the programming period 2007-2013, the two most relevant structural funds (ERDF and ESF) counted for about 30% of the total EU budget. Most of the EU funds are targeted to promoting the growth of lagging regions (i.e. 'Objective Convergence'), which represent those areas registering Gross Domestic Product (GDP) per capita less than 75% of the EU average: in Italy, Campania, Puglia, Basilicata, Calabria, and Sicilia. The remaining regions benefit from the EU cohesion policy being part of the 'Objective Competitiveness and Occupation'. Regional authorities manage a large fraction of the EU funds by setting up priorities, targeting financial resources, and defining policy tools mostly through the 'Regional Operational Programmes (ROP)'. A more detailed discussion on the structure and the governance of the EU cohesion policy 2007-2013 is provided, among others, by Barca (2009).

In the last two decades, the evaluation of the impact of the EU funds for regional economies has been widely studied by adopting different perspectives (Armstrong and Wells, 2006; Dall'Erba and Fang, 2015). Yet, no clear cut results have been achieved given the occurrence of several empirical shortcomings; results depend on different aspects such as econometric specifications, the dataset used, and the particular fund scheme under observation (Becker *et al.*, 2010). Two main contrasting views have emerged. Some authors have emphasised the positive effects of the EU funds in terms of employment or GDP growth and economic convergence (Ederveen *et al.*, 2006); more recently, a positive impact on regional economies was detected by Becker *et al.* (2012) and Pellegrini *et al.* (2013). At the other end of the spectrum, scholars have highlighted how the EU cohesion policy had not statistically significant or even produced negative effects (Dall'Erba and Le Gallo, 2008).

As for the Italian case, most of the findings observed at the European level found confirmation. Milio (2007) pointed out the connections between quality of local governments and EU funds expenditures. Using firm-specific data for the European programming periods before 2007, Bondonio and Greenbaum (2007; 2012) detected a

positive impact of the EU funds on employment growth in Central and Northern regions. Esposti and Bussoletti (2008) and Aiello and Pupo (2012) provided evidence on the presence of regional convergence in Italy conditional to the allocation and expenditure of the EU funds. Looking at the period 2000-2006, Florio and Moretti (2014) highlighted that business support programs financed by the EU cohesion policy were positively associated with higher employment growth in specific industries. Conversely, Barbieri and Pellegrini (1999) and Percoco (2005) observed limited or highly volatile impact of the EU funds on Italian regional economies.

The study of the place-specific effects associated to the management of the EU funds during recessionary times has recently attracted the interest of researchers. Healy and Bristow (2015), for instance, provided qualitative evidence on the link between regional responses to the Great Recession and the way the EU structural funds were organised in particular areas. Looking at local labour markets located in Southern Italy, Ciani and De Blasio (2015) suggested that the EU funds had no or limited impact on employment during the years from 2007 to 2013. We provide two main advancements to this recent literature. A quantitative assessment of the consequences of the management of the EU cohesion policy on regional resilience is performed. In addition, our investigation is conducted for all the Italian regions, differently from the contribution of Ciani and De Blasio (2015), where the focus was on local labour markets located in Southern regions.

3. Data and preliminary evidence

Likewise in most of European countries, in Italy, the Great Recession occurred during the years 2008-2013, and it was the combination of the financial crisis initially originating in the United States and the United Kingdom, and the Euro sovereign debt crisis starting from 2011. The Italian labour market experienced deep negative consequences: at the end of 2013, the national unemployment rate was about 12.6%, and the long-term unemployment rate reached the peak of about 7.3%. Employment losses varied substantially across the four Italian macro-areas, where at the end of the crisis employment was quite different than that registered in 2008: -0.047 (North-West), -0.021 (North-East), -0.025 (Centre) and -0.088 (South).[3] In 2014-15, when the Italian recovery

[3] The four macro areas are defined by ISTAT as follows: i) North-West: Valle d'Aosta, Piemonte, Lombardia, Liguria; ii) North-East: Trentino A.A., Friuli V.G., Veneto, Emilia Romagna; iii) Centre: Toscana, Marche, Umbria, Lazio; iv) South: Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sardegna, Sicilia. The Centre-North is made up of macro-areas i-iii.

officially started, such differences continued to hold; in the first half of 2015, regions in the North-West and in the North-East contributed for more than 4% to the positive growth of national exports, while most of the regions in the South registered negative export growths (Bank of Italy, 2015b).

To describe the resilience of Italian regional labour markets data on regional employment (obtained from ISTAT) have been combined with observations regarding the amount of time allocated to the main Italian employment insurance mechanism - hours of *'Cassa Integrazione Guadagni'* (CIG) – that are collected by the Italian Institute of Social Security (INPS). CIG data result helpful for understanding the dynamics of regional labour markets more in depth given that workers benefiting from the job insurance are excluded from employment figures. This mechanism is made up of three different instruments (*ordinaria, straordinaria, in deroga*); in this paper, we use data on the CIG '*ordinaria*' because of they capture the short-term adjustments of labour markets during crises more directly (Tronti, 1991). Variations in CIG's hours provide information on the behaviour of local labour markets during particular shocks: an increase (a decrease) of the CIG's hours can be interpreted like the occurrence of worse (better) economic conditions following a reduction (a rise) of labour demand (Padoa Schioppa, 1988). In addition, positive (negative) changes in CIG's hours can be read as more (less) income support to workers in times of crises. In what follows, we adopt the former interpretation that reflects our interest for the analysis of local labour markets.

Insert about here.
Table 1. Italian regional labour markets.

Table 1 reports the growth of employment and CIG hours registered across Italian regions during the Great Recession and the first year of recovery. Significant spatial variations can be observed, with employment losses mostly localized in Southern regions. At the end of 2013, the hours of CIG were about 6% higher than that registered at the beginning of the crisis, with the four Italian macro-areas registering different patterns: 0.046 (North-West), 0.073 (North-East), 0.101 (Centre) and 0.049 (South). Table 2 reports the two indexes of resilience proposed by Martin (2012). The sensitivity index is defined as the regional percentage growth in employment/CIG hours relative to the national percentage growth in the same variables for the years 2008-2013; the recovery index has been calculated in a similar way for the first year of recovery. As for employment, the

sensitivity index measures the degree of synchronization of a given region with respect to the national aggregate in terms of positive/negative growth of jobs in times of crisis, with the national economy being the benchmark against which to measure the relative resistance or resilience of regions. Observe that, when the Italian employment growth rate is negative, which was the case during the years 2008-2013, a value of the sensitivity index higher (lower) than one denotes the situation of a region showing lower (higher) resilience in relative terms (Fingleton *et al.*, 2012). When the CIG growth rate is positive, which was the case during the recession, a value of the sensitivity index higher (lower) than one denotes the situation of a region showing lower (higher) resilience in relative terms.

Insert about here.
Table 2. Italian regional resilience.

Some aspects are worth discussing. Italian regions registered asymmetric patterns in terms of sensitivity to the recent crisis: regions located in the Centre and in the North-East shown higher relative resilience in employment than other regions, though with some differences within each macro area. This is in line with the findings of previous contributions analysing the resilience of Italian regional labour markets for the initial years of the Great Recession (Di Caro, 2015a). The situation becomes more puzzling if we consider the sensitivity index derived from CIG data. In the Centre and in the North, where the industrial sector is more spread and the firm size is bigger than in the South – two aspects of particular importance for the spatial allocation of CIG's hours (Tronti, 1991) - the CIG has been extensively used in order to smooth the negative consequences of the crisis, probably due to a sort of labour hoarding effect. The two sides of resilience (i.e. sensitivity and recovery) show some featuring connections: the Pearson correlation coefficient between the sensitivity and the recovery index is about -0.36 and -0.04 for employment and CIG data, respectively. Stronger correlation patterns emerge if we group the regions for macro-areas, namely -0.73 (employment) and -0.76 (CIG). In other words, those regions registering higher (lower) employment and CIG sensitivity than the national aggregate also present lower (higher) recoverability.

It is interesting to note that differently from previous studies conducted by using time-series methodologies over longer time spans, our analysis is focused on the short-term resilience of Italian regions during the Great Recession. This means looking at one of the

featuring aspects of regional resilience, that is, the shock-specific effects on regional economies (Martin and Sunley, 2015). Yet, these temporary dynamics have to be read in combination with the structural patterns of local labour markets. Indeed, regions registering better (worse) economic conditions before the crisis can result more (less) resilient during and after the shock. This is true for Italy, where in the years before the crisis, labour market indicators presented similar spatial asymmetries than those observed during the downturn. From 2001 to 2007, the growth rate of employment and CIG's hours varied across the four Italian macro-areas as follows: North-West (0.036 and 0.296), North-East (0.062 and 0.928), Centre (0.082 and 0.145), South (0.029 and 0.862). Figures 1(a) and 1(b) report the (log of) employment and CIG's hours for the four Italian macro-areas during the last decade. Table 3 reports the ranking of Italian regions for employment and CIG before (2001-2007), during and after the Great Recession. Notably, short-term resilience patterns reflect the long-term developmental process of Italian regions.

Insert about here.
Figure 1. Employment and CIG levels, Italian macro-areas.

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Table 3. Ranking of Italian regions.

To investigate the effects of the management of the EU cohesion policy, for each regional operational program it has been calculated the financial realization indicator (payments/total available funds) on annual basis. This indicator - that is commonly adopted for monitoring the progress of EU structural funds (MEF-RGS, 2015) - provides information on the capacity of regional policymakers to manage the financial process of the EU cohesion policy by transferring committed EU funds by means of payments to the beneficiaries (Mohl and Hagen, 2010). It takes values from 0 to 1, with values close to 1 indicating higher financial realization and that regional institutions worked better in particular areas (McCann and Varga, 2015). Data are referred to the EU programming period 2007-2013 and have been obtained from the new Italian databank *Opencoesione*, which contains detailed geo-referenced information on the progress, the location, the year and the subject for more than 780,000 projects. In the empirical analysis, the financial realization indicator is specified for all the subjects (*temi*) covering the EU-funded projects

in the databank.[4] In addition, the financial realization indicator has been constructed for three specific subjects (Education, Employment, Research & Innovation – R&I), given their importance in terms of total funds and data availability, and that they represent relevant policy tools for activating endogenous mechanisms of growth (Helpman, 2009).

Insert about here.
Table 4. EU Structural Funds, Italian regions.

Table 4 reports information on the EU regional operational programmes for the twenty Italian regions. Observations are referred to projects started during the years 2007-2013 in order to cover the time span under investigation and limit the influence of retrospective projects. For each region, total funds and payments denote cumulative values and are related to ROP managed by the same region, without taking into consideration the projects localized in a given region but financed through ROPs of other regions or national programmes. The number of projects varied substantially across geographical areas depending on several factors like the total availability of resources, the type of projects, the beneficiaries, and the subjects' covered. The total allocation of funds is on average higher in the South, which represent about 60% of total funds, are localized. The financial realization indicator registered spatial asymmetries both across and within regional macro areas: Emilia Romagna and Friuli V.G. (Centre-North), Abruzzo and Sardegna (South) ranked among the top regions.[5] As for the gap between issued and allocated funds, unspent funds were mostly located in the South (about 32% of total) than in the Centre-North (25%).

4. Empirical analysis

4.1 Methodology

To estimate the relationships between the regional governments' capacity to manage the EU cohesion policy and regional resilience some empirical issues need to be

[4] The databank '*Opencoesione*' - available at http://www.opencoesione.gov.it/ – contains information on 13 subjects: 1) Research & Innovation; 2) Firm competitiveness; 3) Energy; 4) Transports; 5) Employment; 6) Education; 7) PA capacity building; 8) Digital Agenda; 9) Environment; 10) Culture & Tourism; 11) Social Inclusion; 12) Childhood and Elderly people; 13) Cities and rural areas. In the empirical analysis, observations on subjects 1-7 (about 60% of total funds) have been used in order to reduce the presence of missing data.

[5] Differences in the financial progress of ROPs can be also due to the different timing of execution of the EU cohesion policy across areas. Some regions – mostly in the South – registered time delays in the approval and implementation of ROPs: in these areas, a large amount of funds is allocated to projects starting in 2014-15 after the official end of the EU programming period. The analysis of this additional source of regional management of the EU funds is beyond the scope of this paper, however.

preliminarily addressed. Regional fixed effects have been introduced in order to take into account time-invariant differences across geographical areas; time-dummy have been added for capturing the impact of shocks common to all regions (Bondonio, 2000). Moreover, the error structure has to be correctly specified: tests results show the presence of heteroskedasticity, autocorrelation and contemporaneous cross-sectional dependence.[6] In the econometric specification, cross-sectional dependence has been modelled through the errors structure by considering the spatial relationships across geographical areas like an unobserved common factor (Arbia and Baltagi, 2008). Therefore, the following relation has been estimated by applying the fixed-effects estimator with Driscoll-Kraay errors (Driscoll and Kraay, 1998):

$$Y_{it} = \alpha_i + \lambda_t + \beta EUFu_{it} + \gamma X_{it} + \varepsilon_{it},$$

where the dependent variable represents the labour market indicator (employment or CIG growth rate) in region i $(i = 1, \dots, 20)$ during the Great Recession $(t = 2008, \dots, 2013)$. Variations in employment across geographical areas during recessionary periods have been commonly adopted as dependent variable in the resilience literature (Eriksson and Hane Weijman, 2015). The variable $EUFund_{it}$ captures the role of the regional management of the EU cohesion policy: a positive (negative) coefficient is expected when the dependent variable is employment (CIG). X_{it} is a set of covariates used as control factors, α_i and λ_t are regional fixed-effects and time-dummy respectively; β and γ are coefficients to be estimated, ε_{it} is the error term.

The set of controls includes the following variables. The growth of employment/CIG registered in the previous period (2001-2007) has been added in order to account for past economic conditions. Two dummy variables are used for grouping the different regions that are part of the 'Objective Convergence' and the 'Objective Competitiveness'. The total EU funds allocated in each region at the beginning of the programming period (divided by regional population) has been added to check for additional regional heterogeneity. The share of employment in specific sectors (agriculture, manufacturing, building, financial services, public administration) has been included for taking into account both differences in regional economic structures and the occurrence of sector-specific shocks (Rodriguez-Posè and Fratesi, 2004). The (log) of the annual value of

[6] The null hypotheses of homoscedasticity, no autocorrelation and cross-sectional independence have been rejected at 1% level of statistical significance (p-value = 0.000). Test results are available from the authors upon request.

regional international exports has been used for isolating the effects of the external demand, which were relevant during the recent crisis. Additional control variables are discussed in the sub-section 4.3, where the robustness analysis is presented. The data source, the description and summary statistics of all the variables are reported in the Appendix.

4.2 Estimation results

Table 5 reports baseline estimation results for employment data with the inclusion of regional fixed effects, time-dummy variables, and a constant term. The impact of the EU cohesion policy is captured by introducing different variants of the financial realization indicator. In model (1), the financial realization indicator is related to all the subjects covering the EU-funded projects (*EUFUND*); in models (2-4), it is referred to the subjects Education (*EUFUND_ED*), Employment (*EUFUND_EM*), and Research & Innovation (*EUFUND_RI*), respectively. In general, a positive and significant relation between the financial realization of the EU-funded projects, but those in R&I,[7] and regional employment growth can be observed. In resilience terms, the higher the ability of regional governments to address the EU structural funds to beneficiaries through payments, the higher the ability of regional economies to resist to the crisis by showing reduced employment losses during the recessionary period. From 2008 to 2013, regions in the Centre-North registered lower cumulative employment losses (-0.018) and higher financial realization of EU-funded projects (0.81) than the regions located in the South registering (-0.090) and (0.75), respectively. Liguria (Centre-North) and Sicily (South), two regions having the lowest financial realization within each macro-area, experienced low resilience in terms of sensitivity and recovery.

Insert about here.
Table 5. Estimation results, employment data.

In 2011, the Italian government introduced new policy tools to enhance the effectiveness and the efficiency of the EU cohesion policy in line with the new strategy pursued by the European Commission for smoothing the negative consequences of the crisis. In Italy, the reformed framework ('*Piano di Azione e Coesione - PAC*') aimed at

[7] The lack of statistical significance of the financial realization indicator for the R&I's projects can be justified by the relevant role of national actors (e.g. universities and research centers) in this subject area.

speeding up financial commitments and payments by means of the recalibration of national and regional targets and priorities connected to the expenditure of the EU structural funds, and the introduction of more flexible procedures. To control for the consequences of this policy innovation, in model (5) the variable *EUFUND_PAC* – that is defined as the interaction of the financial realization indicator and the three years (2011-2013) when the new framework was operative - has been added. The positive (negative) impact of the *PAC* on regional employment growth (resilience) can be observed, which partially confirms the counter-cyclical capacity of this new policy framework (DPS, 2013).

Table 6 reports baseline estimation results for CIG data. In this case, the financial realization indicator covers all the subjects in the *Opencoesione*'s databank with the exclusion of those subjects funded by the European Social Fund. This choice is due to the fact that during the Great Recession Italian regions had the opportunity of using the ESF for financing additional job insurance mechanisms (e.g. CIG *staordinaria* and *in deroga*), which in some circumstances were activated in connection with the CIG *ordinaria* (Italialavoro, 2010). Therefore, this exclusion limits the occurrence of potential reverse causality bias in the estimates. For the same reasons, the financial realization indicator for the subjects Education and Employment has not been taken into consideration. To control for the possible influence of other job insurance mechanisms, estimation results have been obtained also with an additional control variable (*CIG_STRA*) that is defined as the regional growth rate in the hours of the CIG *straordinaria*. No significant modifications are registered when using the (log) of CIG *straordinaria* instead of the growth rate.

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Table 6. Estimation results, CIG data.

The negative and significant relation between the financial realization indicator and the CIG *ordinaria* growth rate (models 1-4) indicates that on a regional level the higher the progress of the EU Funds, the less pronounced the shortage of financial resources available to firms, the lower the request of job insurance mechanisms during the recent crisis. In other words, in those regions where firms and people (timely) benefit from the additional resources provided by the EU cohesion policy, the activation of the CIG short-term earnings compensation mechanism, which can be due to either temporary events not attributable to the employer/employees or the economic situation (Tronti, 1997), can be reduced. In resilience terms, the high performance of the EU structural funds' management

contributes to enhancing the resistance and robustness of local labour markets. In models (5) and (6), the variable *EUFUND_PAC* has been introduced for taking into account the impact of the reformed policy framework as discussed beforehand; the sign of the coefficient is confirmed, but it does not result statistically significant. Baseline estimation results for CIG (and employment) data are confirmed after introducing the set of control variables presented in the sub-section 4.1.

Our results suggest that the way regions manage the EU structural funds becomes relevant in times of crisis, when regional policies can counterbalance the negative consequences of recessions through the provision and the recalibration of financial resources (Camagni and Capello, 2015). As a consequence, regional policymakers are able to partially reduce the vulnerability of particular sectors and areas and bolster the resistance of regional economies and labour markets. The role of the EU cohesion policy can be helpful for explaining the asymmetric patterns registered across Italy in the first years of recovery. Indeed, those regions showing the highest financial realization of EU-funded projects during the period 2008-2013 (Lombardia, Emilia Romagna, Marche), which are located in the Centre-North, since 2014 have reported the best performance in terms of employment (positive sign) and CIG (negative sign) growth rates. This is also true for the South, where Puglia and Basilicata registered good financial realization indexes regarding the EU cohesion policy and favourable recoverability paths.

4.3 Robustness analysis

The robustness of the results has been checked by adopting several alternative specifications. The growth rate of the regional real GDP per-capita has been used as dependent variable. The measurement of resilience using GDP data results helpful for integrating the analysis of regional labour markets, given the existing complementarity between employment and output in terms of resilience behaviour (Cellini *et al.*, 2016). Table 7 reports baseline estimation results for GDP data. Previous findings are confirmed, that is, during the Great Recession the capacity of regional policymakers to manage the EU funds influenced positively the GDP growth rate making regions more resilient to the downturn. The more the efficiency in making EU-funded payments available to beneficiaries, the higher the GDP growth rate in the recovery phase: in 2014, GDP increased by about 0.008 and 0.007 in the Centre-North and the South.

Insert about here.
Table 7. Estimation results, GDP data.

Alternative indicators for describing the impact of the EU cohesion policy have been adopted. The financial realization indicator has been modified by excluding the projects relating to infrastructures, which are mostly located in Southern regions and are partially influenced by the inefficient procedures derived from the Italian regulatory framework (Bank of Italy, 2015a). The one period lag of the financial realization indicator has been introduced in order to check for the dynamic impact of this variable on employment and CIG growth rates, given that the management of the EU funds in terms of payments can produce its effects with some delays. The interaction term used for identifying the *PAC* has been related to the years 2012 and 2013, when the new policy framework had probably produced more relevant economic consequences (Bank of Italy, 2015b). A different variable, namely the commitment capacity indicator (financial commitments/total available funds) has been used for capturing the ability of regional governments to implement regional policies co-funded by the EU through concrete policy instruments. The place-specific financial progress of EU-funded projects has been further investigated by constructing a realization index based upon the financial performance indicator obtained from the *Opencoesione* databank. This indicator distinguishes projects in: high financial progress (payments/total available funds > 95%); ongoing progress (0% < payments/total available funds < 95%); no progress (payments/total available funds = 0%). From these additional estimates, which are available from the authors upon request, no significant modifications of the results have been registered.

The empirical strategy has been applied to the period 2007-2013 in order to take into consideration the longer duration of the Great Recession. In addition, baseline estimations have been enriched with additional control variables. The (log of) regional GDP per-capita has been added in order to control for differences in structural economic conditions. To isolate the effects of regional policies funded by the EU cohesion policy from other public interventions operating in the same areas (Del Bo and Sirtori, 2015), a set of variables capturing current and capital public per-capita expenditures financed by both the national and local governments (data obtained from the databank *DPS – Conti Pubblici Territoriali*) has been used. No significant modifications of the results have been registered.

V. Conclusions

This paper has tried to shed light on the spatial patterns of regional resilience in Italy during the Great Recession, by providing novel empirical evidence on the place-specific consequences of the recent economic crisis on Italian local labour markets. Three main results are achieved. First, Italian regions registered asymmetric dynamics both in the shock-absorption phase and during the recovery path. Linking these findings with local labour dynamics observed before the crisis, the view that regional resilience can be interpreted as the changing ability of regional economies to adapt over time, minimize the vulnerability to and recover successfully from shocks (Martin, 2016) found confirmation. Moreover, the low recoverability of Southern regions in the aftermath of the crisis, which counterbalances the ability of Central and Northern regions to recover from the shock in line with some European regions, can explain the weak recovery of the Italian economy on aggregate. Second, empirical support has been provided on the idea that one of the factors explaining the presence of differences in resilience across geographical areas is the way regional policymakers manage public funds and, in particular, the ability of using the financial tools provided by the EU cohesion policy. Simply put, the higher the capacity of regional policymakers to make regional policies effectively work, the more robust the economic landscape in resisting to and rebuilding from unexpected events like economic shocks. Third, it has been documented that the financial progress of the EU structural funds can play a relevant role for shaping the short-term (cyclical) adjustments of regional economies, though the primary long-run purposes of such policy interventions.

Our results suggest that policymakers should be aware of the important role of regional cohesion policies for determining economic resilience and the overall ability of regional economies to resist to and recover from shocks. The European Economic Recovery Plan promoted on a European level and the Italian *Piano di Azione e Coesione* moved in this direction, by designing new policy tools for smoothing the negative economic and social consequences of the crisis. Yet, further aspects need to be addressed and investigated in order to understand the relationships between regional resilience and the EU cohesion policy. Cross-regional comparisons across Europe (Brakman *et al.*, 2015; Crescenzi *et al.*, 2016) can be helpful for providing more robust results. The adoption of more detailed micro data can contribute to understand the complex set of consequences of regional cohesion policies more in depth (Bondonio *et al.*, 2015). The analysis of the short-term impact of the EU cohesion policy on regional resilience has to be integrated with

analyses covering longer time periods. In the presence of hysteretic processes of positive (negative) growth, the role of the EU funds can be bolstered (weakened). For the Italian case, this implies questioning the connections among the long-term developmental path of specific areas, the rooted North-South divide, and the regional policymakers' performance in administering regional growth policies. These and other questions are left for future research.

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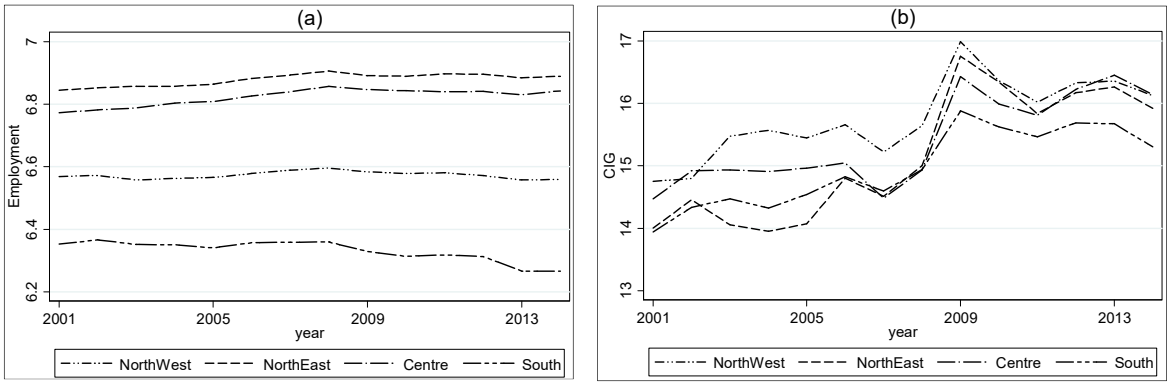
TABLES AND FIGURES

Figure 1. Employment and CIG levels, Italian macro-areas



Note: Graphs above report the log of employment (a) and CIG's hours (b) for the four Italian macro-areas over the period 2001-2014.

Table 1. Italian regional labour markets

Region	Employment		CIG	
	Great Recession	2014	Great Recession	2014
Piemonte	-0.035	0.004	1.726	-0.375
Valle d'Aosta	-0.038	0.001	0.236	-0.081
Lombardia	-0.003	0.008	2.086	-0.349
Liguria	-0.048	-0.007	1.363	-0.283
Trentino A.A.	0.049	0.004	0.496	-0.129
Veneto	-0.026	0.007	1.918	-0.356
Friuli V.G.	-0.046	0.011	1.885	-0.324
Emilia Romagna	-0.010	-0.001	1.829	-0.398
Toscana	0.003	0.004	1.404	-0.414
Umbria	-0.028	-0.001	2.202	-0.031
Marche	-0.052	0.016	2.495	-0.651
Lazio	0.042	0.034	1.765	-0.118
Abruzzo	-0.022	-0.020	1.703	-0.592
Molise	-0.119	-0.021	1.847	-0.203
Campania	-0.078	-0.012	0.812	-0.315
Puglia	-0.093	-0.013	1.075	-0.439
Basilicata	-0.077	0.021	1.214	-0.748
Calabria	-0.131	0.009	0.302	-0.182
Sicilia	-0.102	-0.010	0.649	-0.335
Sardegna	-0.100	0.003	1.005	-0.145
Min	-0.131	-0.021	0.236	-0.748
Max	0.049	0.034	2.495	-0.030
Average	-0.045	0.001	1.400	-0.323
St.dev	0.049	0.013	0.653	0.189

Note: Great Recession reports the cumulative growth of the variables over the years 2008-2013; 2014 reports the growth of the variables for this year.

Table 2. Italian regional resilience

Region	Employment		CIG	
	Sensitivity	Recovery	Sensitivity	Recovery
Piemonte	2.70	0.32	1.06	1.06
Valle d'Aosta	1.21	2.08	0.84	0.22
Lombardia	0.02	0.95	1.24	0.99
Liguria	2.88	-1.65	2.25	0.80
Trentino A.A.	-0.69	1.87	0.31	0.36
Veneto	1.44	2.70	0.66	1.01
Friuli V.G.	1.45	-0.31	0.92	0.91
Emilia Romagna	1.84	0.97	0.80	1.13
Toscana	0.68	0.09	1.15	1.17
Umbria	2.54	0.18	0.54	0.08
Marche	-0.97	3.92	3.23	1.85
Lazio	-0.74	8.64	1.00	0.33
Abruzzo	2.37	5.13	1.07	1.68
Molise	0.56	5.28	2.71	0.57
Campania	1.84	-3.09	0.44	0.89
Puglia	1.66	-3.18	0.84	1.24
Basilicata	3.58	5.33	-2.05	2.12
Calabria	3.65	2.13	-0.49	0.51
Sicilia	3.45	-2.44	0.46	0.95
Sardegna	1.79	0.81	0.21	0.41
Min	-0.97	-3.18	-2.05	0.08
Max	3.65	8.64	3.23	2.12
Average	1.56	1.46	0.86	0.91
St.dev	1.41	3.07	1.09	0.53

Note: the sensitivity index reports the average for the years 2008-2013; the recovery index has been calculated for the year 2014.

Table 3. Ranking of Italian regions

Employment			CIG		
Pre-shock	Shock	Post-shock	Pre-shock	Shock	Post-shock
LAZ	TRE	LAZ	UMB	VDA	BAS
MAR	LAZ	BAS	MAR	CAL	MAR
LOM	TOS	MAR	PIE	TRE	ABR
VEN	LOM	FRI	VDA	SIC	PUG
TRE	EMI	CAL	TOS	CAM	TOS
UMB	VEN	LOM	LOM	SAR	EMI
EMI	ABR	VEN	EMI	PUG	PIE
SIC	UMB	PIE	SAR	BAS	VEN
SAR	PIE	TRE	LAZ	LIG	LOM
ABR	VDA	TOS	VEN	TOS	FRI
FRI	FRI	SAR	PUG	ABR	SIC
TOS	LIG	VDA	ABR	PIE	CAM
PIE	MAR	EMI	LIG	LAZ	LIG
PUG	BAS	UMB	MOL	EMI	MOL
LIG	CAM	LIG	SIC	MOL	CAL
MOL	PUG	SIC	FRI	FRI	SAR
CAL	SAR	CAM	CAM	VEN	TRE
CAM	SIC	PUG	BAS	LOM	LAZ
VDA	MOL	MOL	CAL	UMB	VDA
BAS	CAL	ABR	TRE	MAR	UMB

Note: Regions are ranked on the basis of the following criteria. Employment: decreasing values (Pre-Shock and Post-Shock), increasing values (Shock). CIG: increasing values (Pre-Shock and Post-Shock), decreasing values (Shock).

Table 4. EU structural funds, Italian regions

Region	Num. of projects	Total Funds MEUR	Payments MEUR
Piemonte	28,304	1,715	1,412
Valle d'Aosta	4,017	125	92
Lombardia	308,130	1,020	920
Liguria	16,106	921	751
Trentino A.A.	6,362	517	416
Veneto	7,882	1,147	985
Friuli V.G.	48,927	519	487
Emilia Romagna	7,698	900	788
Toscana	58,145	1,547	1,289
Umbria	1,895	168	146
Marche	24,341	528	438
Lazio	10,131	1,635	1,116
Abruzzo	20,057	473	398
Molise	858	152	140
Campania	10,632	3,407	2,086
Puglia	34,855	5,558	4,401
Basilicata	5,272	680	561
Calabria	15,938	1,888	1,117
Sicilia	22,023	6,574	3,338
Sardegna	16,919	1,935	1,581
Min	858	125	92
Max	308,130	6,574	4,401
Average	32,424	1,570	1,123
St.dev	66,654	1,736	1,086

Note: Data refers to projects started during the period 2007-2013 and financed by regional operational programmes. Total funds and payments (millions of Euro) report cumulative values. Observations are obtained from the *Opencoesione* databank.

Table 5. Estimation results, employment data

Dependent Variable: ***Employment***					
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
EUFUND	0.0296*	-	-	-	0.0139*
	(0.0136)				(0.0086)
EUFUND_ED	-	0.0265**	-	-	-
		(0.0098)			
EUFUND_EM	-	-	0.0184**	-	-
			(0.0060)		
EUFUND_RI	-	-	-	0.0027	-
				(0.0086)	
EUFUND_PAC	-	-	-	-	0.0250**
					(0.0071)
Constant	-0.0436***	-0.0300**	-0.0386***	-0.0272***	-0.0493**
	(0.0082)	(0.0107)	(0.0041)	(0.0046)	(0.0055)
Time effects	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES
Observations	120	120	120	120	120
R^2	0.51	0.23	0.50	0.49	0.52
F-statistics	4.76	3.62	9.41	0.10	10.37
	[0.054]	[0.092]	[0.0132]	[0.9924]	[0.0102]

Note: Errors are in parentheses ().* implies significance at 10%, ** implies significance at 5%, *** implies significance at 1%. Figures in brackets are p-values.

Table 6. Estimation results, CIG data

Dependent Variable: *CIG*						
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
EUFUND	-0.5960*** (0.1452)	-0.5836** (0.1607)	-	-	-0.5796*** (0.1228)	-0.5179*** (0.1054)
EUFUND_RI	-	-	-0.1050 (0.0543)	-0.1044* (0.0506)	-	-
EUFUND_PAC	-	-	-	-	-0.0364 (0.1259)	-0.1401 (0.1162)
Constant	0.2117 (0.1653)	0.2368 (0.1831)	-0.1344 (0.1270)	-0.0996 (0.1200)	0.2094 (0.1513)	0.2335 (0.1504)
CIG_STRA	NO	YES	NO	YES	NO	YES
Time effects	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	120	120	120	120	120	120
R^2	0.73	0.74	0.71	0.72	0.73	0.74
F-statistics	484.02 [0.000]	828.03 [0.000]	75.11 [0.000]	13.60 [0.006]	704.97 [0.000]	3383.21 [0.000]

Note: Errors are in parentheses ().* implies significance at 10%, ** implies significance at 5%, *** implies significance at 1%. Figures in brackets are p-values.

Table 7. Estimation results, GDP data

Dependent Variable: *GDP*					
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
EU FUND	0.0351*** (0.0074)	-	-	-	0.0338*** (0.0077)
EUFUND_ED	-	0.0174* (0.0075)	-	-	-
EUFUND_EM	-	-	0.0234*** (0.0037)	-	-
EUFUND_RI	-	-	-	0.0165* (0.0075)	-
EUFUND_PAC	-	-	-	-	0.0649*** (0.0077)
Constant	-0.0295*** (0.0050)	-0.0176*** (0.0040)	-0.0218*** (0.0057)	-0.0141 (0.0076)	-0.0286** (0.0052)
Time effects	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES
Observations	120	120	120	120	120
R^2	0.65	0.64	0.64	0.64	0.66
F-statistics	39.88 [0.000]	126.51 [0.000]	173.29 [0.000]	21.31 [0.002]	157.80 [0.000]

Note: Errors are in parentheses ().* implies significance at 10%, ** implies significance at 5%, *** implies significance at 1%. Figures in brackets are p-values.

APPENDIX

Table A1. Definition and source of the variables

Main Variables		
Variable	**Definition**	**Data Source**
EMPLOYMENT	employment growth rate	ISTAT
CIG	CIG *ordinaria* hours growth rate	INPS
EU FUND	Payments/tot. EU funds	OPENCOESIONE
CIG_STRA	CIG *straordinaria* hours growth rate	INPS
Additional Variables		
GDP	Real GDP per-capita	ISTAT
TOT. EU FUND	Tot. EU funds/regional pop	OPENCOESIONE
AGRI	% of agricultural employment	ISTAT
BUILD	% of building employment	ISTAT
FINANCE	% of finance employment	ISTAT
PUBLIC	% of public sector employment	ISTAT
MANUF	% of manufacturing employment	ISTAT
EXPORT	Regional exports (values)	COEWEB-ISTAT
EU FUND_2	Financial commitments/tot. EU funds	OPENCOESIONE
EU FUND_3	Financial realization indicator	OPENCOESIONE
PAEXPNAT_CURR	National current public exp.	CPT - ISTAT
PAEXPNAT_CAP	National capital public exp.	CPT - ISTAT
PAEXPLOC_CURR	Regional current public exp.	CPT - ISTAT
PAEXPLOC_CAP	Regional capital public exp.	CPT - ISTAT

Table A2. Descriptive statistics – Main variables

Variable		Mean	Stand. Dev.	Min	Max
EMPLOYMENT	overall	-0.0078	0.0187	-0.0718	0.0259
	between		0.0083	-0.0222	0.0081
	within		0.0168	-0.0623	0.0262
CIG	overall	0.2334	0.6461	-0.8713	2.2186
	between		0.1089	0.0394	0.4158
	within		0.6373	-0.9427	2.1473
EU FUND	overall	0.7881	0.1525	0.0000	1.1684
	between		0.0739	0.6349	0.8941
	within		0.1342	0.0999	1.1255
EU FUND_ED	overall	0.8341	0.2032	0.0000	1.9315
	between		0.0944	0.6607	1.0270
	within		0.1809	0.0268	1.7386
EU FUND_EM	overall	0.8223	0.1697	0.0000	1.2308
	between		0.1057	0.5718	0.9341
	within		0.1345	0.1597	1.2265
EU FUND_RI	overall	0.6710	0.2598	0.0000	1.0064
	between		0.1502	0.2562	0.8656
	within		0.2142	0.1233	1.2344
CIG_STRA	overall	0.2827	0.5052	-0.7788	1.7941
	between		0.1210	-0.0976	0.4575
	within		0.4911	-0.8756	1.6973