

Resilience, resistance and recoverability, regional economic structure and human capital in Italy.

Are they related?

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Abstract

The 2007 economic shock has affected Italian regions strongly, nevertheless with remarkable differences among them. The aim of the paper is not to analyse the economic impact of the crisis on regions but to investigate the determinant of regional resilience using a holistic approach and by exploring regional specialization, economic structure and human capital. Our results suggest that, the Italian regional de-specialization process it is not a consequence of the 2007 shock. Moreover, there is not a relationship between resilience and regional specialization. Nevertheless, the economic structure, especially the regional effects influence regional resistance and recoverability. Finally, human capital can contribute to increase regional resilience.

Key words: Resilience, Regions, Human Capital, Italy.

JEL Classification R10; R11; R12

1. Introduction

The concept of resilient has been evolved considerably since Holling's (1973) seminal paper and it has attracted the attention from regional analyst and economic geographers only recently. In one of the pioneering study Reggiani et al., (2001) argued that the notion of 'resilience' could be a key aspect of the dynamics of spatial economic systems, especially concerning how such systems respond to shocks, disturbances, and perturbations. As consequence the notion of resilience not only can be adopted by scientific context but it can also be used in a socio-economic system where resilience can be seen as a conceptual framework and regions can be represented in a dynamic and holistic way in which social and economic components are interrelated (Swanstrom 2008). The growing interest for the notion of resilience and the socio-economic system has been stimulated by several factors. The first one regards natural disaster and terroristic attack, the NY city twin towers attack in 2001, the Katrina Hurricane in 2005, the earthquake in Tahiti in 2010, and the second one concerning the 2007 economic shock. After the 2007 economic shock resilience received a growing interest as response to a generalized sense of uncertainty and insecurity from the perception that processes associated with

globalization have made places and regions more permeable to the effects of what were once thought to be external processes and it has been seen as an answer to the search for formulas for adaptation and survival (Christopherson et al., 2010). Resilience, the ability of a system to deal with a shock, can be interpreted using three different approaches: engineering – the ability of a system to return to its state of equilibrium after the shock- ecological –the scale of shock that a system is able to absorb before moves to a different state, and, finally, and adaptive approach- ability of the system to reorganize its form or functions- (Martin 2012).

Resilience literature is wide and it can be ideally divided in two lines. The first one, prior 2008, focalized the attention on *dynamics of complex, adaptive, social-ecological systems* (SES) - the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change (Holling 1973, 1996, 2001; Gunderson 2000; Adger 2000; Walker et al., 2004; Carpenter et al., 2005). Following this approach resilience is a process (Pendall et al., 2007) and it includes those inherent conditions that allow the system to absorb impacts and disturbance and cope with an event, as well as post-event. Moreover, it is an adaptive process that facilitate the ability of the social system to re-organize, change, and learn in response to a threat (Cutter et al., 2008) and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (Walker and Mayers 2004). These contributions take into consideration not only the economic components of a system but also the social ecological ones. A second wave of contribution -started with a special issue on Cambridge Journal of Regions, Economy and Society (2010)- it is mainly focalized on the economic resilience after the 2007 economic shock and it can be ideally split in two different lines. The first one, focused on the spatial asymmetry in the reaction to the 2007 economic shock (Cellini & Torrisi 2012; Crescenzi et al., 2016; Fingelton 2012; Martin 2012) and a second one, regarding the determinant of regional resilience (Lee 2014, Martin et al., 2016; Fratesi and Perrucca 2017). These contributions consider the resilience as a process including, as part of the analysis, not only the consequences of the shock but also the previous regional situation. At this point a definition of resilience it is necessary. Unfortunately, there is not a theory of regional economic resilience (Martin and Sunley 2015). Following Martin (2012) resilience can be defined as the ability of a system to withstand, cope with or recover after a shock. In accordance with this definition resilience is a multifaceted process made by four interrelated dimensions: resistance- the degree of sensitivity or depth reaction to the shock-, recovery – the speed and the degree of recovery after the shock-, re-orientation – adaptability of regional economy in response to the shock-, renewal- the extent to which regional economy renews its pre shock growth path or hysteretic shift to new growth path- (Martin 2012). The way whereby these dimensions are interrelated is still unexplored in literature. In order to focus not only on the reaction to the shock but also on the consequence of it we will define resilience as the ability of a region to reconfigure their socio-economic and institutional structure to develop new growth path (Bosham 2015). This definition is wide enough and it has the advantage to underlying the importance of the social components in regional resilience. In accordance with the definition of resilience, our starting point is represented by the idea the resilience is a process (Pendall 2007) and the ability to reconfigure the social economic structure will depend also from the choices made during the past (Gardiner et al., 2013 for UK, and Lagravinese 2015 for Italy, Cuadraro and Maroto 2016 for Spain). The shock definition is important to identify. Shocks can be different for severity and length and they can impact in different ways across different regions. Moreover, different shocks generate different reactions and, as consequence, different levels of resilience (Martin et al., 2016). Therefore, resilience cannot be considered as a fixed attribute of a region (Martin e Sunley 2015). The shock is the 2007 economic shock, considered

as the deepest crises since 1930s, and it has severely hit Italian regions. Nevertheless, some of them showed a resilience capacity to overcome the negative effect whereas some others were not able to be resilient. Our intent is not only to analyse the impact of economic crises on Italian regions but also to contribute in understanding what determines the regional resilience and what makes it more or less resilient.

The aim of the paper is to explore some possible factors determining the different regional reaction to the shock. In doing so, we have chosen the regional specialization, and the human capital as explaining factors. This article innovatively contributes to the existing literature in two ways. First, according to Martin et al., (2016), resistance and recovery are part of an evolving dynamic and changes occur slowly. Choices made in the past affect the resilience ability today. In exploring Italian regional resistance and recoverability, we highlight not only the post-shock impacts but also the situation before the shock. In doing so we will investigate the Italian regional structure and the regional specialization. Moreover, we will use the Multi-Factor Partitioning (MFP) (Ray et al., 2012, Gardiner et al., 2013) to decompose the regional employment change and to investigate how the different components influence the resilience. Second, using literature regarding the social resilience, we will investigate the relationship between human capital and resilience looking at the determinant of resilience in a holistic way.

The remainder of the paper is structured as follows. Section 2 describes the effect of 2007 economic shock in Italy. Section 3 briefly recalls the methods to measuring resistance and recoverability. Section 4 describes the Italian regional structure and the regional specialization and explores the relationship between regional specialization and resilience. Section 5 calculates a human capital index for Italian regions and investigates the relationship with resilience. Section 6 offers conclusions.

2. The effect of 2007 economic shock in Italy: some descriptive features

Our analysis will be focused on the 2007 economic shock taking into consideration not only the economic situation after the shock but also the previous one. Employment and output are the most common indicators for quantifying growth and downturn of economic activities. In order to carry out the analysis we will use ISTAT employment data (Cellini Torrisi 2012, Fingleton et al., 2012, Lagravinese 2015, Martin et al. 2016) from 2000 to 2016. The employment trend at national level during the period under consideration is depicted in *Figure 1*.

Insert figure 1 about here

According to Martin et al., (2016) we will define recession as the national downsizing from peak to trough, and recovery as the national upswing from trough to peak. Consistently with this definition the period from 2000 to 2016 can be divided in three subperiods. The first one, between 2000 and 2008, named first recovery period, it is a growing period and it has been started in 1995, after the 1992 economic crisis. The 2007 economic shock, an external shock originated by the Lehman Brothers default in US and expanded to Europe, hit Italian regions in 2008. After the shock Italy has had one year of recovery -2010- not uniformly distributed across regions and mainly based on an increase of lay-off (Cassa Integrazione Guadagni). The recovery in 2010 has been stopped by

new crisis, the sovereign debt crisis, that has affected the peripheral areas of Euro. Using these argumentations, the recovery in 2010 will be not treated as a recovery period and the period from 2008 to 2013 will be considered as resistance period. Finally, the period 2013-2016 will be named second recovery period. The 2007 economic shock impact on Italian regions in different way. The employment data at regional level for the period from 2000 to 2016 are depicted in *Figure 2*

Insert figure 2 about here

During the first recovery period regions experimented an increase in terms of employment. Nevertheless, some of them such as: Basilicata and Campania have already experienced a decrease in terms of employment before the 2007. These regions, before the crisis, were unable to catch up with the leading regions and, at the beginning of the crisis, they show a disadvantage in terms of employment. After the crisis the employment decreases in all regions except Lazio and Trentino Alto Adige. At the end of the resistance period, in 2013, the level of employment is lower than in 2008 with the exception of Lazio and Trentino Alto Adige. Moreover, several regions exhibit a level of employment lower than in 2000 (Valle d'Aosta, Liguria, Basilicata, Campania, Calabria, Molise, Puglia, Sicilia, and Sardegna) and it remained lower than in 2000 also during the recovery period.

3. Measuring resistance and recoverability.

Literature concerning resilience has proposed many methodologies to identify a resilient region. Martin (2012) highlighted how the effect of an economic downtown on the regional economy is composed of two different phases: the first one concerns the ability to resist during the shock and the second one regards the recovery from the shock. In measuring resilience we will adopt the approach developed by Martin et., (2016) that calculates it by comparing the movement of national employment (in contraction and expansion phases) in relation to expected falls and increases in the region concerned. The expectation is that each region's employment would contract (in recession) and expand (in recovery) as the same rate as nationally. The expected change in employment in region r during recession or recovery of duration k periods would be given as:

$$(\Delta E_r^{t+k})^e = \sum_i g_N^{t+k} E_{ir}^t \quad [1]$$

where g_N^{t+k} is the rate of contraction (in recession) or expansion (in recovery) of national employment; and E_{ir}^t is the employment in industry i in region r in starting time t . The starting time t represents the turning point into recession or into recovery. The measure of regional resistance can be expressed as:

$$Resistance_r = \frac{(\Delta E_r^{Contraction}) - (\Delta E_r^{Contraction})^{expected}}{|(\Delta E_r^{Contraction})^{expected}|} \quad [2]$$

And the recoverability is given by:

$$Recovery_r = \frac{(\Delta E_r^{Recovery}) - (\Delta E_r^{Recovery})^{expected}}{|(\Delta E_r^{Recovery})^{expected}|} \quad [3]$$

The two measures of resistance and recovery are concentrated around zero. Thus an R greater than zero indicates that a region is more resistant to recession or abler to recover more than the national economy. The relationship between resistance index and recovery index (average of two recovery periods) calculated using equation (2) and (3) are depicted in *Figure 3*:

Insert figure 3 about here

Partitioning the relationship into quadrants it is possible to distinguish two large regional groups, although there are some internal differences. The first group, resilient regions, includes regions that exhibit high level of resistance during the shock and high level of recoverability after the shock. Belong to this group Lombardia, Emilia Romagna, Veneto, Lazio and Trentino Alto Adige. The second group, non resilient regions, it is represented by the remaining regions. Within the second group differences can also be observed. Basilicata and Molise display a high level of recoverability associated with a low level of resistance. Toscana, by contrast, shows a low level of recoverability and an high level of resistance. Calabria, Sicilia, Sardegna, Liguria, Puglia and Campania are characterized by low level of resistance and low level of recoverability. Finally, Piemonte, Marche and Umbria are concentrated around the zero. There is a positive relationship between resistance and recoverability: regions with higher resistance exhibit also higher recoverability. In order to explore the determinants of regional resilience we will analyze the regional specialization and the human capital endowment before and after the 2007 economic shock. Resilience is a process and the regional ability to resist and recover will depend also from choices made during the past. In accordance with this approach in the next two paragraphs productive structure, regional specialization and human capital endowment will be investigated.

4. Productive structure, regional specialization and resilience

Our aim is to contribute in understanding why some regions have had a positive reaction to the 2007 economic shock and some others don't. Resilience is a multifaceted process and regional economic structure and the skills of its workforces will shape the resistance and the recovery from a shock. In order to explore the productive specialization, we will use the Local Quotient (LQ). A region j is considered specialized in a specific industry i if this industry has a big weight among the employment in the branch of industry of the region j . The Local Quotient is defined as:

$$LQ = \frac{e_i}{e} / \frac{E_i}{E}$$

where e_i is the employment at regional level of industry i , e is the total regional employment, E_i is the employment of industry i at national level and E is the total employment at national level. A LQ greater than 1 indicates that the share of regional employment in industry i is greater than the share of national employment in the same industry. Using a Nace2 classification the data availability allow us to split the economy in only five sectors: Agriculture (A), Industry (I) (including mining and quarrying manufacturing electricity, gas, steam and air conditioning supply water supply; sewerage, waste management and remediation activities), Construction (C), Wholesale (W) (including wholesale and retail trade; repair of motor vehicles and motorcycles transportation and storage) and Services (S). Moreover, we are going to illustrate only three sectors: Industry, Construction and Services. *Figure 4* depict LQ in industry construction and services sectors.

Without going into the details of each regions specialization LQ changes have occurred previously, during and after the economic shock and they left the regions in similar position to the ones they were at the beginning of the period. Moreover, there is not direct relationship between regional specialization and resilience. Among resilient regions, three of them are specialized in industry and the remaining in construction or services. The same result holds for the non resilient ones. Crisis do

not hit all sectors uniformly, some of them were hit strongly than others. *Figure 5* displays the employment path in industry, construction and services sectors.

Insert figure 5 about here

Data show that the de-industrialization process was already begun before the 2007 economic crises and it has been sharpened by the crisis. The employment data for industrial sector show a generalized decrease between 2000-2008 with the exception of Valle d'Aosta, Marche, Abruzzo and Sardegna. The decreases continued in all the regions (except Friuli Venezia Giulia) also during the resistance period. Finally, during the second recovery period the industry level of employment starts to increase in several regions (Piemonte, Valle d'Aosta, Veneto, Emilia Romagna, Umbria, Toscana, Abruzzo, Molise, Calabria, Basilicata). Nevertheless, employment in industrial sector at regional level in 2000 is higher than in 2016 (data show an increase only for Abruzzo). Construction sector was the most hit by crisis. Nevertheless, the percentage of employment, especially in some regions (Piemonte, Friuli Venezia Giulia, Abruzzo, Campania, Calabria), was already declining before the 2007. During the resistance period the percentage of employment in construction sector decrease in all regions except Abruzzo¹. The process went on also during the second recovery period when the employment increased only in Liguria. Finally, taking into consideration the period 2000-2016 the percentage of employment in construction sector increased only in Liguria, Umbria and Marche. Services sector is characterized by an increase of percentage of employment. Nevertheless, some regions as Liguria, Abruzzo, Calabria, Sicilia are de-specialization in service sector. In order to explore deeply the de-specialization process we will use Krugman structural specialization (dissimilarity) indices (Krugman 1993). This index compares the employment share for each industry in a region with the corresponding share nationally:

$$D_R = \sum_i \left| \left(\frac{E_{ij}}{E_j} \right) - \left(\frac{E_i}{E} \right) \right|$$

where E_{ij} is the employment of sector i from the region j , E_i is total employment in the sector i in all regions, E_j is total employment of the region j and E is total employment from all the regions. The index range from 0 (no dissimilarity) to 2 (maximum dissimilarity). The higher is the index the dissimilar (or more specialized) is the region respect to nation economy as whole. The indices for Italian regions over the period 2000-2016 are shown in *Figure 6*.

Insert figure 6 about here

Krugman index confirm the results previously discussed and highlight that regional structure is converging and regions are progressively becoming similar specialized. Moreover, the result it is not the consequence of the 2007 economic shock but it as a process already in progress in 2000.

In order to explore the change in employment it is important to correctly measure the different components of employment change. For this purpose, Ray-Srinanth (Ray et al., 2012) multifactor partitioning (MFP) model is proposed. This approach was first introduced by Ray (1990) and Lamarche et al., (2003) and it is an extension of shift share analysis. Gardiner et al., (2013) propose a dynamic version of MFP to take into account changes of a region's industrial structure over the

¹ The result is due to the rebuilding process after the 2009 earthquake

time. We are going to use the dynamic version of MFP using the approach developed by Bianchi and Biffignandi (2014). The components of the MFP are identified in according to the following equation:

$$r_{.j} = \underbrace{r_{..}}_{\text{National Effect } N_j} + \underbrace{(\hat{r}_{..} - r_{..})}_{\text{Allocation Effect } A_j} + \underbrace{\frac{\sum_i E_{ij}^t (\hat{r}_{i.} - \hat{r}_{..})}{E_{.j}^t}}_{\text{Industry-mix effect } MN_j} + \underbrace{\frac{\sum_i E_{ij}^t (\hat{r}_{.j} - \hat{r}_{..})}{E_{.j}^t}}_{\text{Region-mix effect } R_j} + \underbrace{\frac{\sum_i E_{ij}^t [(r_{ij} - \hat{r}_{.j}) - (\hat{r}_{i.} - \hat{r}_{..})]}{E_{.j}^t}}_{\text{Interaction mix effect } MR_j}$$

where $r_{.j}$ and $\hat{r}_{.j}$ are the crude and the standardized rates of region j , $r_{..}$ and $\hat{r}_{..}$ are the national crude and standardized growth rates, $\hat{r}_{i.}$ is the standardized rate if industry i , E_{ij}^t is the number of employees in industry i and region j at time t , $E_{.j}^t$ is the number of employees in region j at time t .

The *national effect* N_j is the change in a region that would have occurred if the region had grown at the national rate. The *allocation effect* A_j measures the extent to which the location of economic activity enhances national rates. The *industry-mix effect* MN_j measures the proportion of change attributable to the industrial composition within each region. A region with a concentration of fast-growth industries will have a favourable industry-mix effect. The *region effect* R_j captures the proportion of change which can be ascribed to regional characteristics. Finally, each region has specific resources and local attributes that have a differential value for each industry according to its needs. The *industry-region interaction* MR_j is an aggregate measure of such specific factors (Bianchi and Biffignandi 2014). The result using the five sector disaggregation, the most detailed possible given the data available, are given in *Figure 7* where the graph gives the contribution to cumulative growth attributable to industry mix effect, region effect and interaction mix effect over the three resistance and recovery periods.

Insert figure 7 about here

Region effect exceeds the industry mix effect and the interaction mix effect during all the phases. Regional advantages have played an important role in shaping how regions have reacted. Resilient regions are characterized by high level of regional effect during all the periods (Emilia Romagna, Lazio and Lombardia) or a positive region effect during the first recovery and the resistance periods (Trentino Alto Adige and Veneto). Among the non resilient regions we have individuate two of them, Basilicata and Molise, displaying a high level of recoverability associated with a low level of resistance. They both exhibit a negative regional effect during the first recovery and the resistance periods and a positive one during the second recovery period. Toscana have experimented low level of recoverability and an high level of resistance. It has a negative region effect during the first recovery period and a positive region effect during the remaining. Piemonte, Marche and Umbria are characterized by a level of resilience concentrated around zero and they display a positive regional effect during the first recovery period and a positive or negative regional effect during the remaining one. Finally, Calabria, Sicilia, Sardegna, Liguria, Puglia and Campania are characterized by low level of resistance and low level of recoverability. They display a negative regional effect during all the periods (Campania shows a positive regional effect during the second recovery period).

The result obtained analyzing the regional specialization can be summarized as follows. First, there is not direct relationship between regional specialization and resilience. Moreover, after the 2007 economic shock no changes in regional specialization occurred; regions remain in similar position to the ones they were at the beginning of the period. Second, Italian regions are involved in a de-specialization process, regarding industry and construction sectors, the services sectors, by contrast, it is increasing. Nevertheless, this process it is not directly related to the 2007 economic shock. Data showed that de-specialization was already in progress before the 2007. Differences in regional resilience

are not only imputable to the 2007 economic shock but also to other factors not directly linked with the crises. Finally, the regional effect, capturing the competitive advantages of a region, seems to be the highest source of regional resilience. In order to investigate better this result, in the following paragraph we will explore the relationship between human capital and regional resilience.

5. Human capital and resilience

In the previous paragraph we conclude that regional effect- the competitive advantages of a region- is the most important factor in determining regional resilience. Structural spatial disparities cannot be attribute to a less efficient use of production factors as labour and capital but there is a relationship between knowledge, local cognitive capital and growth (Capello et al., 2009). Using this argumentation as starting point it appears clear that the territorial capital (Camagni 2012) is an important component of resilience. Moreover, consistently with our approach, resistance and recoverability can be shaped by territorial capital. The aim of this paragraph is to explore the relationship between human capital and resilience. Resilience literature, before the 2007 economic shock, investigate the resilience determinants of a territory using a holistic approach. After the 2007 economic shock the attention regarding the relationship between social components and resilience it is impoverished. Nevertheless, resilience of a territory cannot be explained without taking into consideration local assets. Resilience determinants should be explored in a holistic way taking into consideration also the territorial capital defined as a system of territorial assets of an economic, cultural and social environmental nature, that determine the development potential of places (OECD 2001; Camagni 2009). A pioneering work regarding the relationship between territorial capital and resilience was recently done by Fratesi and Perrucca (2017). Due the data availability we will consider only one out of eight territorial capital dimensions focusing on the human capital i.e. skills, capabilities and knowledge embedded in individuals (Beker 1964). The human capital (HK) index has been built using four indicators: (i) early leavers from education and training, (ii) employment rates of young people not in education and training, (iii) tertiary education and (iv) university attractiveness, using the Eurostat and the ISTAT data as source, for the period 2000-2016. Each indicator has been standardized using the following formula:

$$X = \frac{X_R - X_{min}}{X_{max} - X_{min}}$$

where X is the variable and R is the region with $0 \leq X \leq 1$. The human capital index is the arithmetic average of standardized indicators. If the indicator's contribution to HK is negative one's complement has been considered. *Figure 8* plots the HK average during the three resistance/ recovery periods.

Insert figure 8 about here

The HK endowment is increased between the first and the second recovery period. Nevertheless, southern regions (Campania, Puglia, Basilicata, Calabria, Sardegna and Sicilia) are still characterized by low level of HK endowment. This result it is not surprising because HK is a mobile factor and it will move towards regions where there are more chances to be employed. In order to investigate the relationship between resilience and human capital we will take into consideration the two resistance periods (2008-2008; 2013-2016) and the recovery period (2008-2013) separately relating them with the HK average during the same periods. The results are depicted in *Figure 9*:

Insert figure 9 about here

During the first recovery period the relationship between HK and recoverability is positive: the higher is the level of HK the higher is the recoverability. Moreover, resilient regions exhibit high level of HK. Despite this, regions with high level of HK cannot have high level of recoverability (Molise, Liguria and Friuli Venezia Giulia). The relationship remains unchanged during the resistance period. Regions with low level of HK have also low level of resistance. Resilient regions display high level of HK nevertheless, high level of HK is necessary but not sufficient condition to exhibit high level of resistance. During the second recovery period the relationship between HK and recoverability changes. *Figure 9 (c)* highlight a negative relationship between HK and recoverability. This result has been already found in Fratesi Perrucca (2017). A more careful data exploration suggests that the relationship between resilience and HK still holds: resilient regions are characterized by high level of HK. This result is not surprising for two reasons. First, the HK is an important source of competitive advantages enhancing regional competitiveness. Moreover, it can be considered a positive component of region effect. Second, the HK is a mobile factor and the high skilled workers will move to a more dynamic and more competitive region. Furthermore, HK productivity depends on the sector in which is employed. Due the de-industrialization process, HK during the second recovery period, it is less employed in industry sector, the ones with higher productivity.

Conclusion

This paper investigates the relationship between resilience, economic structure, regional specialization, and human capital after the 2007 economic shock using a theoretical framework based on the hypothesis that resilience is a process and it depends also from the choices made during the past. Moreover, we have used a holistic approach taking into consideration not only the regional economic components but also the social ones and especially the human capital. Two out of four dimensions of resilience have been considered: resistance and recoverability and a “resilient region” is define as a region that exhibit a high level of resistance and high level of recoverability. Three key conclusions emerge from the analysis. First, there is not a direct relationship between regional specialization and resilience. A high level of resilience does not depend from specialization. Moreover, Italian regions are involved in a de-specialization process that have occurred previously, during and after the economic shock. De-specialization is not the consequence of the crisis. Second, the resilience depends strongly from the regional effect i.e. the competitive regional advantages in terms of natural resources, human capital, entrepreneurial abilities, appears to be prominent. Regions specific factors contribute to increase the resilience capacity of regional economies i.e. the highest is the regional effect the highest is the regional resilience. Third, there is not direct relationship between human capital and resilience nevertheless, resilient regions have a high level of human capital endowment.

Further studies on this fields are needed to explore better the relationship between social-economics components and resilience. Moreover, the resistance and the recovery ability depend non only from regional economic structure and human capital endowment when the shock hits but also from the previously situation. Resilience is a process and the ability to reconfigure the social economic structure depends also from the choices made during the past. Regional policies, should try to affect regional structure and improve social resilience before that a crisis occurs.

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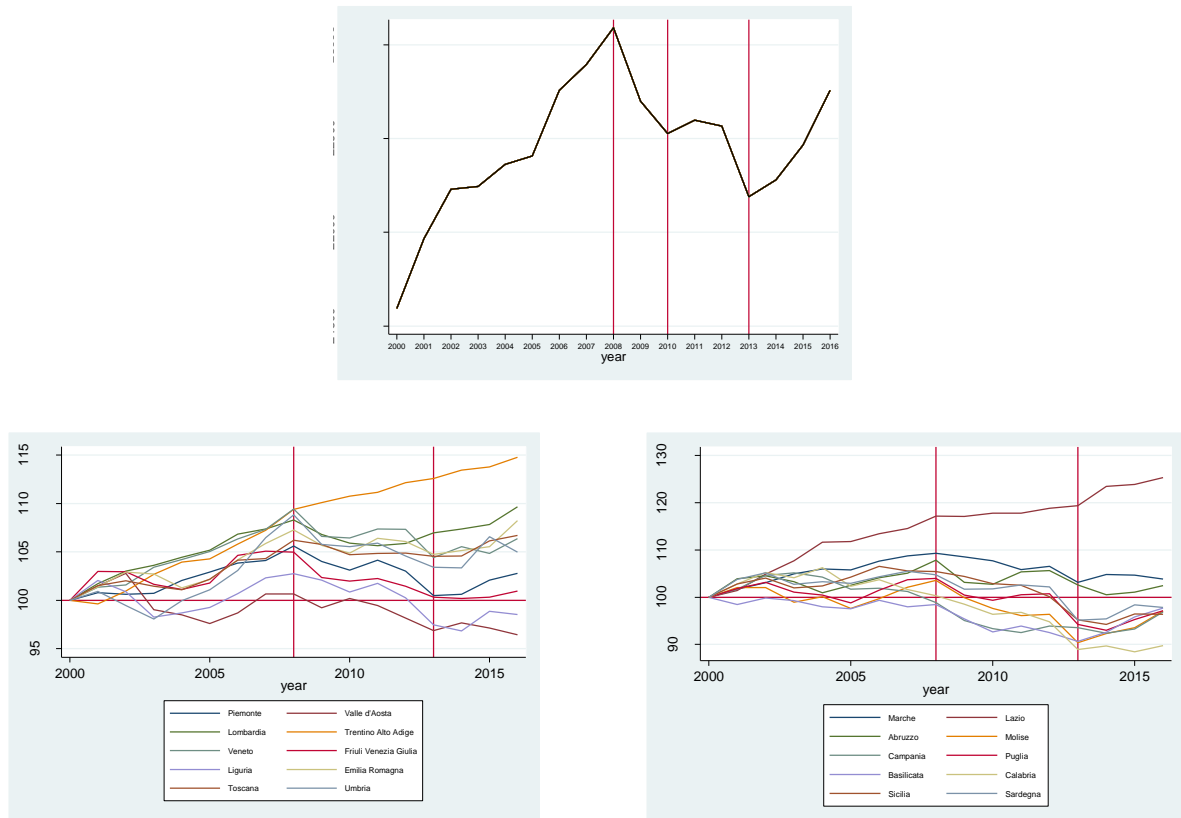


Figure 2: Employment in the Italian regions during the period 2000-2016
Source: Istat

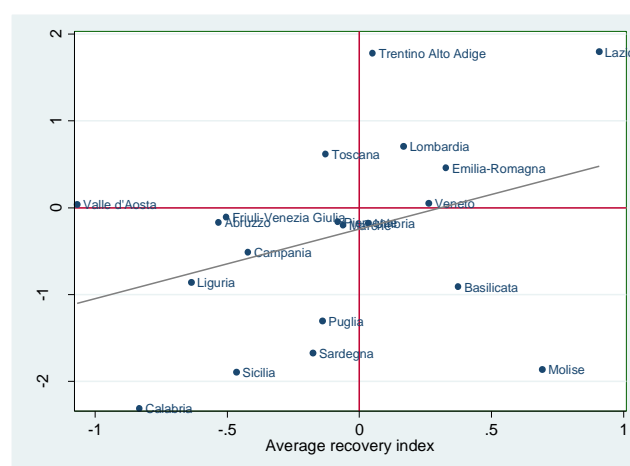


Figure 3: Regional resistance and recoverability
Note: recovery index computed during the two recovery period (2000-2008) (2013-2016)
Source: our elaboration on ISTAT data

