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Recessions, recoveries and regional resilience: Evidence on Italy

Paolo Di Caro*

Abstract

This paper analyses regional resilience and local economic growth patterns in Italy over the past four decades. Place-specific transient and permanent effects of aggregate employment shocks are studied. Geographical asymmetries in engineering and ecological resilience are found, providing auxiliary insights on the rooted Italian regional inequalities. The territorial impact of different crises is investigated and a direct comparison with the UK case is offered. The importance of manufacturing activities for explaining economic resilience is assessed, finding out a positive relation between the resilience of the industrial sector and the overall local economic development. Some policy implications are conclusively discussed.

Keywords: recessions, recoveries, regional resilience, local economic growth.

JEL classification: E32, R11, R15.

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Introduction

Recessionary shocks and recovery periods have long been studied in order to identify origins, analyse consequences and provide policy recommendations. One important question does not seem to have been investigated enough in the economic literature: how booms and busts are geographically distributed within a country. Although some recent contributions have studied the geography of crisis and upturns on a sub-national level (Wilkerson, 2009; Groot *et al.*, 2011; Hamilton and Owyang, 2012; Fingleton *et al.*, 2014), most of the research in this area still remains spatially-blind.

The spatial unevenness of economic downturns has been evident and clearly observable within nations over the centuries and the same has been true for post-recessionary stages. While some places show a strong attitude toward shock-absorption, re-orientation of activities and ability to recover; others are less responsive to slumps and deeply affected, struggling for years. The recently conceptualized regional resilience framework (Martin, 2012) bridges this gap, providing a place-aware synthesis for the study of shocks at territorial level. It allows for the consideration of both the temporary impact of exogenous disturbances on a given equilibrium level (engineering resilience) and the persistence of out-of-equilibrium regional evolutions *à la* Kaldor-Myrdal (ecological resilience).

Yet, as recently highlighted by Martin and Sunley (2014), the regional resilience perspective encompasses both the engineering and ecological meanings, being referred to a more general complex set of economic, social and institutional traits characterizing the ability of a regional or local economy to recover from shocks *lato* sensu, adapt to structural changes, move to new development paths, maintain or modify its long-term growth pattern. In this sense, both the short-term impact of shocks and the occurrence of disequilibrium forces are part of a broader evolutionary process of the changing and multifaceted regional or local environment, where the social and economic consequences of the adverse events shall be integrated with the place-specific historical trajectories, geographical connections, knowledge networks and institutional patterns.

This paper aims to study the local effects of country-wide employment shocks on 20 Italian regions (NUTS II) and their recovery capability over the past four decades. In the following pages, a particular emphasis will be put on the link between the overall effects of aggregate shocks at disaggregate level and the long-run regional economic growth patterns. The detection of economic resilience for the Italian case is built upon the econometric

specification proposed by Fingleton, Garretsen and Martin (2012) for the UK case (thereafter FGM). Three are three main reasons why the Italian case can be considered a proper candidate for testing and verifying regional resilience and comparing our results with those regarding the UK.

Firstly, Italian regions have historically showed significant differences regarding both GDP and employment growth, like British areas. Secondly, in the early 1990s both countries experienced a currency crisis with a strong depreciation of the *Lira* and the Pound Sterling starting in September 1992. Thirdly, at the beginning of Nineties, economic shocks in both countries were amplified at local level by the contemporaneous reduction of regional policy interventions: in Italy, the so-called *Intervento Straordinario* for Southern regions was progressively abolished, while in the UK the map of local assisted areas was substantially redefined (Gudgin, 1995).

Two main novel aspects, however, characterize this contribution with respect to that of FGM. The availability of data up to the end of 2013 allows us to analyse the impact of the recent Great Recession, by making a distinction between the effects of the financial crisis and those of the European sovereign debt crisis. As a consequence, we are able to investigate both the relevance of shocks of different nature and the jobless recovery featuring Italy and other European countries in recent times.

In addition, in line with the more recent literature (Doran and Fingleton, 2013), we move one step further by studying one possible reason behind regional resilience, namely the performance of the industrial sector at a local level. As it will be pointed out in the next pages, the evolution of manufacturing activities in different areas can be helpful for understanding the way local economies react to and recover from aggregate shocks. When a region or a city is able to adapt its manufacturing sector to the changing national and global environment, exploiting trade opportunities and experimenting continuous innovations, this area will probably be more resilient than others.

The rest of the paper is organized as follows. The next two sections discuss the regional resilience framework and its relations with local economic growth; and describe the data, illustrate some preliminary empirics and provide an overview on regional disparities in Italy. Then, the econometric analysis is developed. A final section summarizes and concludes, suggesting possible future areas of research.

Regional resilience

Economic resilience is a multifaceted concept that comes from other disciplines such as Ecology, Engineering and Sociology. Among others, regional scientists and economic geographers have been the merit to pioneer it during recent years so as to provide a different and stimulating look for analysing some of the unsettled consequences of the Great Recession like its uneven spatial effects and long-term damage (Ball, 2014). Although there is no univocally shared definition of regional economic resilience, three main interpretations have been mostly adopted. Engineering resilience, the ability of a given area to bounce back after a negative shock, and ecological resilience, multiple patterns of growth experienced by a place after a recession (Simmie and Martin, 2010; Martin, 2012).

More recently, the regional resilience perspective has undertaken an evolutionary turn (Christopherson *et al.*, 2010; Pike *et al.*, Martin and Sunley, 2014; Boschma, 2014), which points out the importance of looking at regions and local economies as complex systems, where time, space and agents are dynamically interdependent. According to this evolutionary or adaptive view, regional resilience represents a changing process which combines a set of featuring elements: the vulnerability or sensitivity of a given place to shocks; the general pattern of the shock itself; the initial resistance to shocks; the robustness or the ability to adjust and adapt to shocks; the extent and nature of the recovery. This latter definition is able to integrate both the engineering and ecological view into the broader analysis of regional development, by providing a causal relationship between resilience and long-run economic growth and considering historical, institutional and agency issues.[1]

The relation between the local impact of crises and the long-run regional growth has a long tradition in economic geography and regional studies. Recently, it has been revitalized by the occurrence of the Great Recession and its possible uneven implications at a local level. Fingleton and Palombi (2013), for instance, have explored the resilience of British towns during the Victorian Era noting the importance of industrial diversification for explaining various local trajectories. Owyang *et al.* (2008) and Wall (2013) have analysed the determinants behind asymmetric growth levels showed by metropolitan areas in the US during booms and busts.

Although the regional resilience framework is *in fieri* both in theory and in practice, it allows for the investigation of the reasons behind the geographical unevenness of recessions and recoveries within and across countries. Regions may become more

synchronized in reacting to shocks *ex post* the institution of a common market (Barrios and Lucio, 2003), depending on the distribution of human capital (De Haan *et al.*, 2008) or according to a particular product fragmentation across territories (Ng, 2010). More resilient places, furthermore, can be located within economic districts *à la* Marshall-Becattini where the triad territory, community and enterprises create positive social and economic externalities.

Italian regional evolution: stylised facts and preliminary empirics

Regional disparities characterize the Italian economy like other European countries such as Germany, Spain and the United Kingdom, but what makes Italian regional inequalities somewhat unique is the very long-lasting nature of the social and economic divide between the North and the South (A'Hearn and Venables, 2013). While less developed regions in other European countries have moved towards better economic conditions, at least on average, in Italy the regional divide, with the exclusion of the period 1950-1970, has not registered a significant reduction since the early 1890s (Daniele and Malanima, 2007). In 2012, the GDP per-capita of Southern regions was about 57% of that of Northern counterparts. Regions located in the so-called *Mezzogiorno* represent one-third of the Italian population and one-fourth of the aggregate GDP, they register more than 40% of Italian unemployed and about two-thirds of Italian citizens experiencing relative poverty (Bank of Italy, 2010).

Several causes have been suggested for explaining the North-South divide and a proper review is outside the boundaries of the present paper. Differences in the industrial structure, accessibility to markets and export propensity have long been studied (Del Monte and Giannola, 1997). The presence of dissimilar institutional frameworks has been claimed as a significant cause even before Putnam's contribution on social capital. To our knowledge, very few contributions have linked regional disparities to the local impact of recessions and recoveries. Cellini and Torrisi (2014) provide a recent exception by studying the relation between local economic growth and resilience across Italian regions over the period 1890-2009. Although they contribute to the growing debate on regional resilience in Italy, these authors limit their analysis to annual GDP data and do not investigate the causes behind asymmetric regional patterns.

Our empirical analysis is based on regional data for total employment and manufacturing employment (excluding building) over the period 1977-2013.[2] Annual series

are available for the whole period, while quarterly data range from 1992(IV) to 2013(IV). Employment series have been preferred to GDP or other economic measures for two main reasons: they are more articulated on a regional level and do not need to be deflated; they provide interesting insights into the evolution of a regional context, though they can be affected by issues related to place-specific frictions in labour markets.

Insert about here:
Figure 1.a,b. – Italian employment, 1977-2013.

Figure 1 illustrates Italian employment figures both in level and growth rate for annual data. The sample period contains three major national shocks: the early 1980s, the *Lira* crisis in the early 1990s and the more recent Great Recession. The first crisis was part of an extended slowdown in the economic activity registered in Italy and in other European countries over all the Seventies (Bassanetti *et al.*, 2010). It caused a substantial reduction in output, exports and internal consumption, while employment was less affected, perhaps due to the massive use of generous temporary work subsidies and the increased public labour demand related to the process of regional decentralization starting in the second half of the Seventies.

The announcement of the devaluation of the Italian *Lira* operated by the government in September 1992 is generally recognized as the starting point of the Italian currency crisis, which officially ended after eleven quarters in 1995(II). It caused almost one third of cumulative loss in terms of external value and sudden depreciation in the real exchange rate: a fall of 10.25% was registered only over the last quarter of 1992. From late 1992 to the beginning of 1995, relevant employment losses were registered and economic conditions worsened: Miniaci and Weber (1999) have estimated a decline in GDP of around 1.2% and household disposable income fell by 5% for the only year 1993. Also, it contributed to temporarily pushing Italy out of the European Monetary System.

The recent Great Recession is the combination of two recessionary events: the financial crisis originated in overleveraged banks and financial institutions in the US and UK, which affected Europe since the second-half of 2008; the European sovereign debt crisis registered in some Eurozone's countries in 2011-2012, which created public debt sustainability issues and negative spillovers across Southern European nations. In Italy, the worrisome results of these two adverse shocks have been a cumulative employment loss of about 6% and a jobless recovery registered up to the end of 2013.

Looking at the regional distribution of recessions, table 1 shows the sensitivity of the 20 Italian regions to the three shocks experienced in the past twenty years, calculated as the regional percentage decline in employment relative to the national decline during each adverse event (Martin, 2012). The dating of these crises has been exogenously detected (Harding and Pagan, 2002) on the basis of our dataset and according to the official analyses elaborated by the Bank of Italy and the Italian Institute for Studies and Economic Analyses (ISAE).

Insert about here:
Table 1. – Italian sensitivity index.

The impact of the *Lira* crisis followed a well-defined North-South polarization, with regions in the Centre-South suffering higher cumulative employment losses than their Northern counterparts. This effect can be explained by two main reasons. The specific nature of the crisis, a currency one, that initially increased trade opportunities for more export prone areas and industrial districts, mostly located in the Centre-North, where employment was less affected. The contemporaneous abolition of the specific regional policies devoted to the *Mezzogiorno* amplified the local effects of this aggregate shock. Interestingly, comparing the Italian case with the UK one we can note that during both the shock of early 1990s and the financial crisis the sensitivity of Italian regions has been more spread (i.e. higher standard deviation) than that of the British areas. This can partly imply a lower synchronization between regional business cycles in Italy than in the UK.

From a diachronic perspective, the rise of regional asymmetries within Italy is a worthwhile aspect. The standard deviation of the sensitivity index doubled over the period here analysed: from 0.81 registered during the recession of early 1990s to 1.63 of the last shock. Moreover, the initial North-South shock-absorption distribution appears less clear. This pattern can be due to the different nature of the more recent crisis: financial recessions imply credit constraints and less investments at a country-wide level; and some local areas can suffer more than others given their weaker economic structure or, as recently highlighted by Fingleton *et al.* (2014), because the effects of a common currency (i.e. the Eurozone) during recessions can be uneven within a member State.

Insert about here:
Table 2. – Italian recovery index.

Table 2 contains the recovery index registered during the years after the *Lira* crisis and between the financial and the sovereign debt crisis, defined as the post-recession percentage growth in employment in a region relative to the percentage growth in national employment over the whole time period (Martin, 2012). In the aftermath of the *Lira* crisis the relative employment growth followed the rooted North-South divide, with higher reactions registered in the Central and Northern regions and most of the Southern areas remaining below the Italian average. Similar trends have been found in a study focused on the identification of co-movements in regional business cycles in Italy (Mastromarco and Woitek, 2007).

This pattern can be explained by the different economic structure of local economies, with old industrial areas like Liguria in the North and Campania in the South being less able to react to aggregate shocks than more dynamic contexts along the Adriatic Sea coast-line such as Emilia Romagna, Marche and Abruzzo. The period 2010(IV)-2012(I) is officially classified as a recovery, nonetheless it has been followed by a new deep recession. Not surprisingly, after the financial crisis regional reactions were more volatile and dispersed than before and employment growth has registered a puzzling evolution at a local level.

Insert about here:
Figure 2 a,b. – Italian sensitivity and recovery.

Figures 2 map the average sensitivity of Italian regions to the three recessionary events occurring in the last twenty years (left), and their recovery after the *Lira* crisis and before the more recent financial crisis (right). In general, low resilient regions show high sensitivity and low recovery (dark colour), while high resilient areas seem to suffer less from shocks and bounce back better in the aftermath (white colour).

Econometric analysis

Engineering resilience

In this section, engineering resilience is analysed by estimating a Seemingly Unrelated Regression (SUR) model for testing the possible heterogeneity of recession and recoveries across regions. The choice of this model has deliberately been made in order to be able to compare our results with those presented in FGM. However, the significance of our model and all test results discussed in this section have also been checked by means of alternative

panel specifications. Observe that, SUR results do not consider permanent effects of shocks and, therefore, they need to be integrated with the results presented in the next section in order to explain why Italian regions show differences in trend employment growth rate.

The following general SUR model has been estimated for both annual and quarterly series:

$$\Delta emp_{it} = \alpha_{0i} + \beta_{1i} Rec_{1t} + \beta_{2i} Rec_{2t} + \beta_{3i} Rec_{3t} + \beta_{4i} Post_{1t} + \beta_{5i} Post_{2t} + \varepsilon_{it} \qquad (1)$$

with: Δemp_{it} = employment growth in region i at time t; α_{0i} = region-specific (autonomous) growth rate; $\beta_{1i} = \beta_{2i} = \beta_{3i}$ = change in employment growth rate as recession dummies; $\beta_{4i} = \beta_{5i}$ = change in the employment growth rate during post-recession periods; ε_{it} = error terms with $E[\varepsilon_{it}\, \varepsilon_{it}] = \sigma^2_{ii}$ and $E[\varepsilon_{it}\, \varepsilon_{jt}] = \sigma^2_{ij}$.

The (unrestricted) SUR model in (1) represents a starting point for testing various hypotheses able to identify the spatial patterns of engineering resilience. The following restrictions have been tested:

a) $\beta_{1i} = \beta_{2i} = \beta_{3i}$: for each region the impact of recessions is constant over time;

b) $\beta_{r1} = \beta_{r2} = \beta_{r3} = \beta_{r4} = \beta_{r5} = ...$: the impact of each recession (r = 1,2,3) is the same for all regions;

c) $\beta_{4i} = \beta_{5i}$: for each region the impact of the recoveries is constant across time;

d) $\beta_{s1} = \beta_{s2} = \beta_{s3} = \beta_{s4} = \beta_{s5} = ...$: the impact of each post-recession (s = 1,2) is the same for all regions.

Whereas restrictions (a) and (c) capture the differentiated effects of both recessions and recoveries introduced in the estimation, testing (b) and (d) means investigating the presence of geographical asymmetry in the shock-absorption and in the recovery phase. A rejection of the null hypothesis presented in (a) and (c) means that every recession (and recovery) in the sample has the same effect; while a rejection of the null in (b) and (d) allows us to confirm the presence of regional heterogeneity when a shock (or a recovery) occurs.

For annual data, it has been estimated the model in (1) with the following recession dummies: Rec_{1t} (1982-1984), Rec_{2t} (1992-1995), Rec_{3t} (2009-2013); and post-recession periods, $Post_{1t}$ (1985-1991), $Post_{2t}$ (1996-2008). The null hypothesis of geographical evenness (i.e. the

same impact for all regions) can be rejected for every recession and the second recovery period. For the first recovery period, we are unable to reject the null hypothesis in (d), namely the absence of a common national pattern experienced by all the Italian regions, and we impose the restriction $\beta_{4i} = \beta_4$. Our results have been obtained by estimating a restricted version of the model in (1), which takes into account this common component. Estimation results and graphs are given in the *Appendix*.

The Appendix also contains comparisons among some Italian regions, which follow a deliberate purpose. Two old industrial regions in the North, Piemonte and Liguria, are compared with two regions having small and medium firms and being part of the so-called Third-Italy, Veneto and Marche, respectively. The selection of the other two couples of regions has been made with the aim of showing the differences in employment evolution between two areas in the Centre-North (Emilia Romagna and Toscana) and two in the South (Campania and Puglia) having similar total populations and sharing the relevance of local industrial districts.

The first aspect to comment is the significant regional heterogeneity registered in Italy, with each pair of regions showing different local employment growth patterns during every crisis and in the aftermath. Looking at the first two comparisons, estimation results reflect what it has happened in the past forty years in these regions, where the image of cities like Turin (Piemonte) and Genova (Liguria) has been related to the declining experience of old industries at least up to the end of 1990s; while Veneto and Marche have been influenced by the innovative traits of their industrial districts like the production of glasses around the city of Belluno (Veneto) and the footwear districts between Fermo and Macerata (Marche). As for the two North-South comparisons, observe that Southern regions were more resistant to the negative shock of the Eighties. This variation could be ascribed to the relative reduction of the share of public employment experienced in the South in the early 1990s and the contemporaneous introduction of more flexible contracts in the public sector which had a major impact on those regions with a large number of public workers.

The second aspect pertains to the specific effects of each crisis. The industrial crisis had lower employment losses and narrower regional differences than the *Lira* crisis and the Great Recession. The concomitant presence of a currency shock and other internal structural changes can explain the impact of the former, while the consequences of the Great Recession shall be read as the effects of a prolonged slump deriving from the

combination of exogenous (e.g. liquidity trap and decreasing expectations) and endogenous (credit shortages and weak internal public and private demand) factors.

For quarterly data, the same model as in (1) has been estimated with the following recession dummies: Rec_{1t} (1993(I)-1995(II)), Rec_{2t} (2008(III)-2010(III)), Rec_{3t} (2012(II)-2013(IV)); and post-recession periods, $Post_{1t}$ (1995(III)-1996(IV)), $Post_{2t}$ (2010(IV)-2012(I)). The specific recovery dummy here adopted, namely six quarters after a given recession, provides a more reliable assessment of recoveries and it represents the maximum length of the recovery phase experienced between the financial crisis and the last recession.[3] We have preferred to make a more homogenous comparison between the different recoveries, by looking at the same time horizon; an approach which differs from that of FGM where post-recessions are defined as the whole time period between two shocks, and which seems more realistic.

After testing the unrestricted model as before (restrictions a-d), a restricted version has been estimated by taking into account a common national shock for the financial crisis $\beta_{2i} = \beta_2$, and similar regional responses during the first recovery period $\beta_{4i} = \beta_4$. The former restriction implies that during the financial crisis Italian regions seem affected by a country-wide, rather than several region-specific ones. This appears quite realistic given the nature of this shock and that at the beginning of the Great Recession the main consequences were somewhat homogenous and limited to building and financial activities. Also, note the similarity with the UK case, where the financial crisis has commonly been imposed.

The restriction on the first recovery means that we are not able to reject the hypothesis of homogeneity when looking at six quarters after the *Lira* crisis. This result can be related to the structural economic, social and political changes which occurred at a national level in the first half of 1990s: transformations like public employment and pension reforms are more likely to have affected Italian employment in a quite even way across territories. Estimation results, graphs and selected regional comparisons are given in the Appendix.

Observe that, since 2008 more resilient regions like Veneto and Marche have suffered higher employment losses than during the *Lira* crisis. This can be explained by the combination of two main forces: a sharp reduction of internal and external (mostly European) demand in the past five years which has reduced exports, and the sudden credit shortage particularly relevant for small and medium enterprises. In addition, the Great Recession has contributed to increase the dispersion of employment growth not only

across regions but also within regions: since 2008 the standard deviation of sub-regional (provincial) employment growth has increased.

Employment growth in Campania has been quite different from that in Emilia Romagna over the whole sample period, while the performance of Puglia has been somewhat in line with that registered in Toscana, at least up to the end of 2012 when Puglia seemed to experience a structural break. This pattern shall be related to the progressive export propensity and innovative ability of productive activities in Puglia, where a key element may have been played by investments in entrepreneurs' human capital so as to counterbalance the negative effect of dynastic management (Caselli and Gennaioli, 2013) in family-owned firms, typical of Italian industrial organizations.

Explaining transient resilience: the role of manufacturing

One possible explanation of engineering resilience can be the performance of the industrial sector and particular industrial activities during and after a recessionary event. The importance of the manufacturing sector for explaining local economic growth and convergence across areas is related to its ability of sustaining higher investments, capital accumulation, and producing tradable goods (Porter, 2003; Rodrik, 2013). The business cycle literature has long studied the close relationship between shocks affecting industrial employment and aggregate employment fluctuations, and the importance of industrial activities for analysing national and local economic growth during booms and busts (Garcia-Mila and McGuire, 1993).

Our main interest is to verify if the uneven engineering resilience previously detected can be related to the different evolution of the regional industrial structures. To this end, we use observations for industrial employment and we follow two routes. Firstly, the same SUR specification as in (1) has been estimated for annual and quarterly data respectively, in order to analyse the sector-specific effects of country-wide recessions. In this way, we can look at how manufacturing activities have reacted to the Italian major shocks and whether or not recessions and recoveries are linked to the manufacturing-specific patterns. Secondly, the behaviour of regional industrial employment has been investigated by estimating a SUR model with industry-specific recessions and recoveries, obtained by looking at the turning points of national employment series for the industrial sector. As a result, it is possible to analyse the reaction of manufacturing activities at a local level during and after shocks registered in the same sector on aggregate.

Proceeding with order, the same model as in (1) has been re-estimated for annual industrial employment observations. After testing the unrestricted model as before, all recessions and recoveries denote regional differences, rejecting the hypothesis of common national patterns. Comparing these estimation results with the aggregate case above some interesting insights can be advanced. There is a negative correlation (about -0.60) between the average impact of the three major recessions on total employment and the average performance of the manufacturing sector during recoveries. Put differently, the lower is the shock-absorption ability of a local economy, the lower the reaction of its industrial activities. In addition, it is interesting to note the impact of the recession in terms of total employment and the employment growth of manufacturing experienced in the aftermath of a given event. For the crisis of early-80s this relation was about -0.54, which reflects the nature of this supply-side event; for the *Lira* crisis the same relation was about -0.27 denoting a weaker effect on manufacturing. Table 3 illustrates these relations on a regional level.

Insert about here:
Table 3. – Sensitivity of total employment and recovery manufacturing sector.

Next, we have specified a SUR model with the following sector-specific recession dummies, Rec_{1t} (1981-1987), Rec_{2t} (1994-1997), Rec_{3t} (2008-2013), and recoveries, $Post_{1t}$ (1988-1993) and $Post_{2t}$ (1998-2007). Again, the unrestricted model seems to perform quite well, rejecting the hypothesis of common national recessions and recoveries. Selected regional comparisons are reported in the Appendix. Observe that, high sensitivity and low recovery ability is observable for the industrial sector in Piemonte and to less extend in Liguria. Campania was somewhat more prone to recovery up to the end of 1980s, when private and public industrial investments still remained relevant, while it has progressively loosened this ability in the past twenty years. Despite its higher sensitivity during the *Lira* crisis and the Great Recession, manufacturing in Puglia did quite better than in Toscana over the past forty years.

The same strategy has been followed for quarterly industrial employment observations. After testing the unrestricted model in (1) as before, common effects of the *Lira* crisis and the post-financial crisis have been imposed. The former can be explained by the homogenous effect of terms of trade variations during a currency crisis and the consequences of labour market reforms launched at the end of 1980s for manufacturing at

country-wide level. The latter can derive from the common initial impact of the Great Recession on manufacturing activities across Italy as yet discussed.

Note that the higher is the impact of country-wide recessions on local economies, the lower is the ability of a particular region to bounce back six quarters after the shock: this is true when comparing the average impact of recessions with the average performance of recoveries for both industrial and overall employment, about -0.15 and -0.30, respectively. More importantly, there is a positive relation between the average recovery registered in terms of total employment and that showed by the manufacturing sector (+0.25). Although causal interpretations would necessarily require additional evidence, the latter result sustains the view that the dynamic of manufacturing activities after a shock is able to play a role for explaining the way economic resilience takes place across regions.

This relation can rely upon two main factors. Firstly, the positive growth of manufacturing activities in the aftermath of a shock may sustain the demand for traded and non-traded private services and agricultural products. Secondly, variations in industrial occupation are less volatile than those experienced in sectors like agriculture, building and private services and, as a consequence, when labour demand in manufacturing starts to rise after a shock, it is likely to be a more structural change than if the same pattern occurs in agriculture or private services.

In addition, a SUR model for quarterly industrial employment has been specified with the following sector-specific recession dummies, Rec_{1t} (1993(I)-1995(I)), Rec_{2t} (2008(III)-2010(II)), Rec_{3t} (2012(I)-2013(II)), and recoveries, $Post_{1t}$ (1995(II)-1996(III)) and $Post_{2t}$ (2013(III)-2011(IV)). Final estimations have been obtained by imposing the restrictions of a common effect related to the *Lira* crisis and the post-financial crisis recovery. Selected regional comparisons are reported in the Appendix. As for the two Southern regions, we can observe that manufacturing in Campania was more resilient than in Puglia during the recession of early-1990s, but the opposite has occurred when considering the Great Recession. This changing pattern may depend on the increased relevance and diversification of manufacturing activities, some of them specialized in traded products, in Puglia: at the beginning of the time period here considered (1992), the share of manufacturing employment on total employment was higher in Campania (about 0.18) than in Puglia (about 0.13), since the second-half of 1990s this relation was reversed registering at the end of the period (2013) about 0.12 and 0.15.

The importance of manufacturing activities for explaining local economic resilience emerges more directly when comparing the evolution of two quite similar economic contexts such as Emilia Romagna and Toscana. In the past twenty years the recovery ability of the former after a negative aggregate shock has progressively outperformed that of the latter. Both regions recovered from the *Lira* crisis at the same time, two quarters before Italy as a whole, while in recent times they show some differences: Emilia Romagna registered positive employment growth starting the second quarter of 2013, whereas Toscana still continues to have negative employment growth.

These regions are located in the Centre-North and they share many structural economic and social aspects. Since the first half of 1990s, however, manufacturing activities in Toscana have reduced their relative importance within the economy of this region and they have become less diversified: in 1992, the share of industrial employment on total employment and the share of industrial added value on total added value were about 0.27 and 0.28 respectively, while in 2013 they were 0.19 and 0.17. In Emilia Romagna, these figures were about 0.26 and 0.27 both in 1992 and 2013. Having maintained its industrial structure and manufacturing diversification more than Toscana, Emilia Romagna has probably benefited from the lower volatility of manufacturing activities in comparison with private services, and their higher resistance during recessionary events. Similar arguments can be extended to other high resilient regions like Veneto, Marche, Abruzzo and partly Puglia, where the combination of innovative productions, traded goods and knowledge-based networks has influenced the shock-absorption phase and the recovery pattern.

Ecological resilience

The idea of linear cointegration – that is, the identification of long-run relations in the presence of nonstationary series I(1) and cointegrated variables - allows us to distinguish between temporary and permanent effects of a given shock. Specifically, the cointegrating relationships represent the steady-state of long-run relations characterized by an error-correcting mechanism, which is able to level off all shocks in order to allow the system to return to a balanced growth path (Beyer and Farmer, 2007). In principle, this modelling procedure is capable to analyse the short-term as well as the long-term adjustments of local economies to aggregate shocks, by allowing for the joint consideration of transient and permanent effects. As a consequence, when cointegration results are found to be significant and the main objective of the empirical analysis is to look at the transient

and permanent effects of shocks, this model can be more appropriate to study engineering and ecological resilience in combination. In our case, however, we prefer to maintain the original distinction adopted by FGM, given that one of the purposes of our study is a comparative one and, more importantly, we are interested in exploring the two meanings of resilience in a different framework so as to end up with a more complete picture.

For quarterly data, a Vector Error Correction Model (VECM) with 1 lag and 7 cointegrating relationships has been estimated for a sub-sample of 18 Italian regions, excluding Valle d'Aosta and Trentino A.A., for which we are unable to detect the presence of non-stationarity.[4] The eigenvalue stability condition supports the number of cointegrating relationships adopted after applying the Johansen trace test. In contrast with the UK case where the presence of a dominant region (i.e. South East) can be justified for explaining the way shocks propagate across areas, the propagation of shocks across Italian regions follows a more varied pattern and a more general perspective needs to be applied. This implies that the ecological resilience of Italian regions needs to be described by using orthogonalized mean responses (OIRFs) to impulses emanating from all the regions in our sample, which can be understood as an Italian overall effect. The system has been identified by imposing the following order of the variance-covariance matrix in order to introduce a spatial interpretation of the Cholesky structure: from North to South, responses tend to weaken with distance, being strongest within regions and in neighbouring regions. Figures 3 (a-f) illustrate the mean responses over time of Italian regions to one-unit negative national shock.

Insert about here:
Figure 3 (a-e). – Mean responses to shocks from all regions, total employment.

Aggregate employment shocks, regardless of origin, affect each area in a peculiar way, confirming the presence of regional heterogeneity also when considering ecological resilience. Regions located in the Centre-North are on average more resilient in the long-run than regions located in the Centre-South. This means that country-wide long-lasting shocks will have a deep impact in Southern local economies, which are weaker and less resistant. Local economies in the North are either temporarily affected by aggregate shocks or they limit employment losses. Italian regions, furthermore, confirm their higher dispersion than British areas: in Italy, the standard deviation of OIRFs is 0.006 and in the UK 0.001.

Although their higher ecological resilience, some regions in the North will be negatively influenced by the permanent employment losses experienced in the rest of the country and particularly in the South given the reduction of internal demand. This effect will be more relevant in those regions highly integrated with other national areas and where internal trade exchanges of intermediate and final goods are consistent. Not surprisingly, high engineering resilient regions like Veneto and Emilia Romagna perform worse than Piemonte and Toscana when dealing with ecological resilience: the former two areas rely upon internal trade linkages more than the latter two ones (SRM-Prometeia, 2014). The important implication is that when a national shock has severe permanent effects on employment in weak local economies, it will also influence strong regions through the demand channel.

Explaining permanent resilience: the role of manufacturing

We can expect that some local economies can become more ecological resilient, by focussing on diversified manufactures and re-defining their industrial activities in a productive and innovative way. In the UK, for instance, the creation of important interdependencies among enterprises, universities and research centres in the main cities of Scotland, the North-East and the Yorkshire (Charles *et al.*, 2014) has probably contributed to make these regions more resilient to country-wide shocks than in the past.

For these purposes, we have applied the VECM specification to industrial employment data in order to look at the possible presence of asymmetric responses of regional manufacturing activities to sector-specific aggregate shocks. We want to address the ecological resilience of the industrial sector and, more importantly, if there are some commonalities between the geographic distribution of total economic resilience and manufacturing resilience. As before, the resulting VECM has been selected after testing for the presence of non-stationarity in the series, checking the optimal lag length and establishing the number of cointegrating relations. The same Cholesky decomposition as in the aggregate case has been applied with the spatial implications discussed above. Figures 4 (a-f) illustrate the mean responses of regional industrial employment to national shocks.[5]

Insert about here:
Figure 4 (a-f). – Mean responses to shocks from all regions, industrial employment.

Insert about here:
Table 4. – Mean responses to shocks from all regions, total and industrial employment.

Table 4 compares the mean OIRFs (total and industrial employment) over period 1-20 for each region. The geographical unevenness of regional resilience in Italy is confirmed in both cases, with less ecological resilient regions located in the South and more resilient ones in the North. Observe that there is a quite strong correlation (about 0.65) between regional responses registered in total employment and manufacturing-specific responses. This evidence can support the idea that the long-run evolution of a particular local economy after a country-wide shock can partially be determined by the long-run performance of its manufacturing activities. Other things being equal, regions having an industrial sector more resilient to aggregate shocks show stronger resistance to shocks than others having weaker manufacturing activities.

Conclusion

Some years ago, Barry Eichengreen stated the importance 'to think harder than we traditionally have' when applying a particular economic analysis to a given local area. The idea of regional resilience goes in this direction providing a spatially-aware perspective for studying economic evolution. This paper has tried to throw some light on regional resilience in Italy, by showing that the rooted regional disparities registered in this country over the decades can be explained through the lengths of the regional resilience perspective. Our empirical analysis has confirmed the recent view that engineering and ecological resilience are both part of the more general concept of evolutionary or adaptive regional resilience. Historical knowledge and institutional arguments have reinforced this point. Italian regions, furthermore, show higher dispersion in economic resilience than UK areas.

We have found that regions in the Centre-North and, particularly, those in the Adriatic belt are more resilient than regions in the South in terms of both engineering and ecological resilience. In the presence of aggregate shocks, like economic recessions and financial crises, regions showing high resilience are able to resist to shocks in the short-run, be more robust to the permanent impact of such shocks, and recover faster. More resilient areas register a high level of long-run economic growth and they represent adaptive and changing environments. By integrating the econometric analysis with a discussion on historical and institutional aspects, we have documented that high resilient regions are places where the combination of social and economic factors, knowledge sharing, local

leadership and human skills have interacted all together for making these places less vulnerable and more robust in a dynamic sense.

An additional and important implication of our analysis is the relation between differences in regional resilience *lato* sensu and economic convergence and development. In the past twenty years, the adaptive resilience of Southern regions has progressively decreased mostly due to the effect of the reduced national commitment for regional policies, the occurrence of new challenges like the increased international competition and the one-way migration of people, skills and ideas. Such reduced resilience has been observed when looking at both the short- and the long-term place-specific impact of country-wide recessions. Over the same time period, the social and economic divide between the North and the South of Italy has widened again, reaching dismissed levels. Although further evidence is required for drawing more robust conclusions, the resurgence of regional disparities in Italy can be partially explained by the increased inability of Southern regions to cope with unexpected events: the lower the robustness, the less likely the bounce forward, the less favourable the long-term development path.

This contribution also revitalises an old idea on the causes behind divergent local economic growth in Italy (Graziani, 1978; Giannola, 1982; Paci and Pigliaru, 1998), namely the importance of industrialisation and manufacturing activities for promoting convergence and development across areas. We have showed that the presence of manufacturing activities can contribute to explain the high resilience of some regions during recessions and recoveries. Agreeing with the idea that Italian manufacturing activities show spatial patterns (Brugnoli and Fachin, 2001; Pellegrini, 2005), we can provide a first answer why economic resilience presents territorial differences across Italian regions. The long-term effects of manufacturing activities for regional evolution and resilience can be related to the relevant increasing returns to scale for manufactures, such as dynamic learning effects, self-reinforcing expectations and the quasi-irreversibility of investments (Martin and Sunley, 2006).

Finally, two policy implications derive from our discussion. In the presence of asymmetric local reactions to country-wide shocks, as we have documented in this paper, the scrutiny of place-tailored counter-cyclical policies assumes relevance both in theory and in practice (Garretsen *et al.*, 2013). For example, observe that during the Great Recession the Italian credit market has become more differentiated at a regional level, registering a cumulative rise in the standard deviation of the average interest rate paid by firms of about

+0.39 from 2008 to 2012. To reduce this kind of disparities, which have consequences on both the uneven distribution of economic resilience and the long-term local economic growth, place-specific information are required together with place-tailored policies. In addition, policy discussions on the importance of the industrial sector shall be taken seriously in Europe, and especially in Italy where the manufacturing sector has registered negative dynamics in the past twenty years, in order to make places less vulnerable to crises and more prone to recover. These and other questions are left for future research.

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[1] In particular, Martin and Sunley (2014, p.8) have pointed out that 'while these three main definitions/interpretations of resilience are in some senses quite distinct, they are not mutually exclusive. Indeed, the idea of adaptive resilience (or robustness) subsumes aspects of, but is more expansive than, the other two definitions, since it allows a system - such as a regional economy - to absorb and rebound from a shock.'

[2] The main data source is the Italian National Institute of Statistic (ISTAT). Quarterly data have been seasonally adjusted by adopting the procedure X-13 ARIMA SEATS (U.S. Census Bureau, 2013). To our knowledge, this is the first work using seasonally adjusted time series data for employment at regional level in Italy.

[3] The higher frequency of quarterly observations compared to annual data has favoured the adoption of different time selection criteria to describe recoveries, such as one/two year/s after a given recession or the number of quarters between a major recession and the subsequent first technical recession. These additional model results are available upon request.

[4] The stationarity of employment series has been verified using the traditional Augmented Dickey Fuller (ADF) test; the optimal lag length of the model has been chosen by comparing different selection criteria (AIC, SBIC and LR test). All test results not reported here are available upon request.

[5] For quarterly industrial data, a VECM with 1 lag and 7 cointegrating relations has been estimated for the same sub-sample of 18 Italian regions as in the aggregate case.

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Tables and Figures

Figure 1. Italian Employment, 1977 – 2013

(a) Level (Millions) **(b) Growth rate**

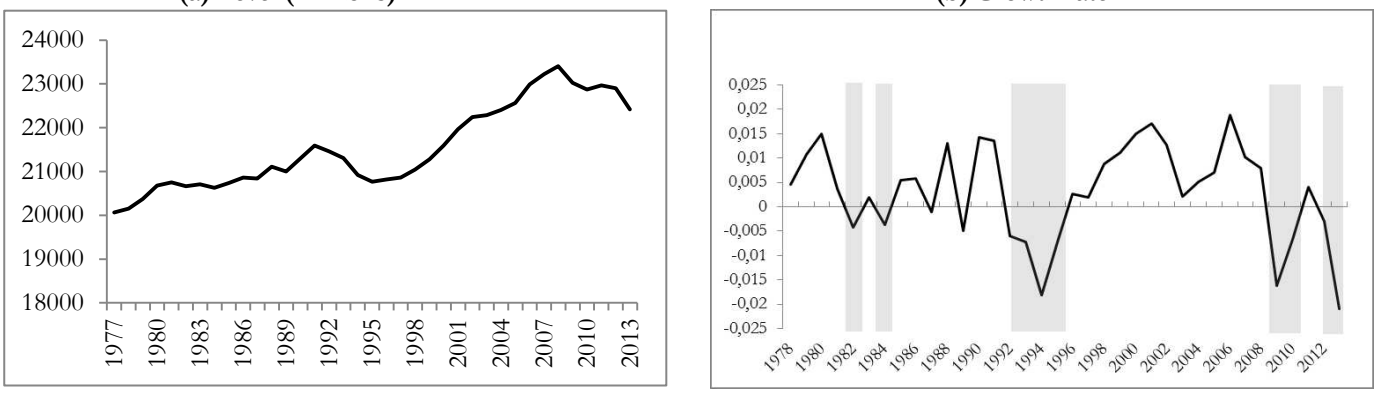


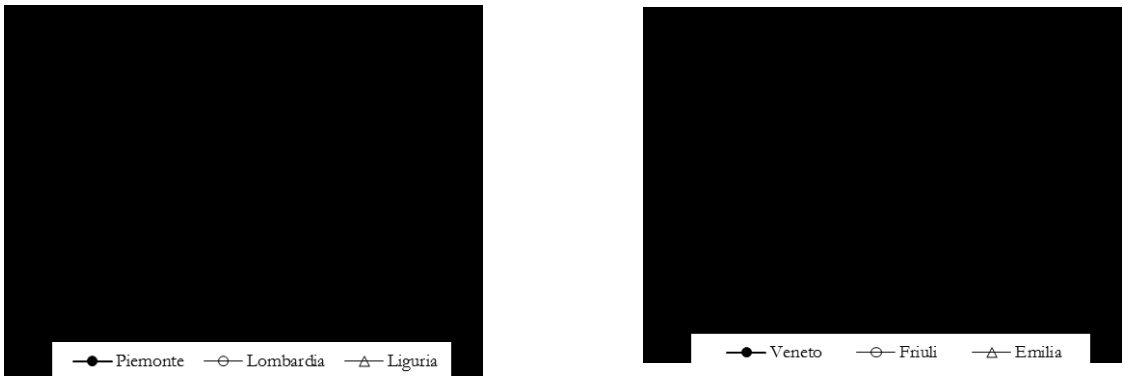
Figure 2. Italian sensitivity and recovery

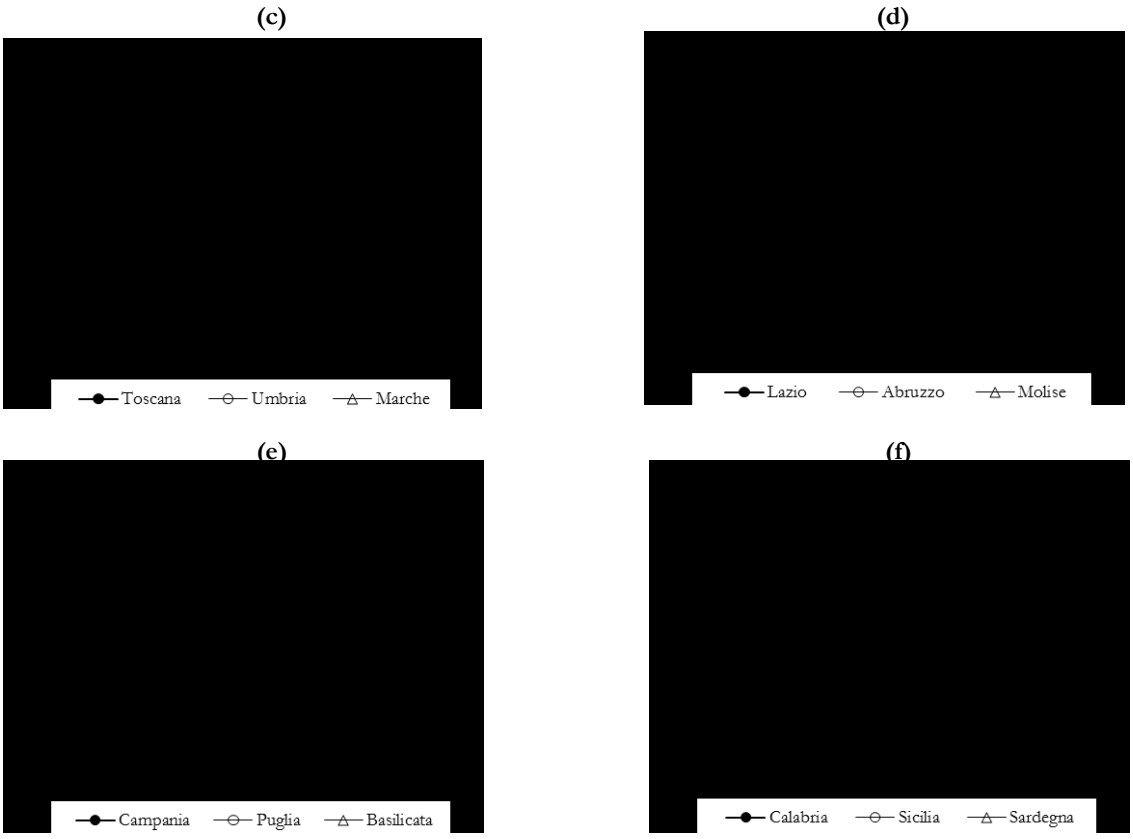
(a) sensitivity **(b) recovery**

Note: Figure 2a shows the average sensitivity of Italian regions to the three crises of the period 1992(IV)-2013(IV); Figure 2b shows the recovery of Italian regions over the period 1995(III)-2008(II).

Figure 3. Mean responses to shocks from all regions, total employment

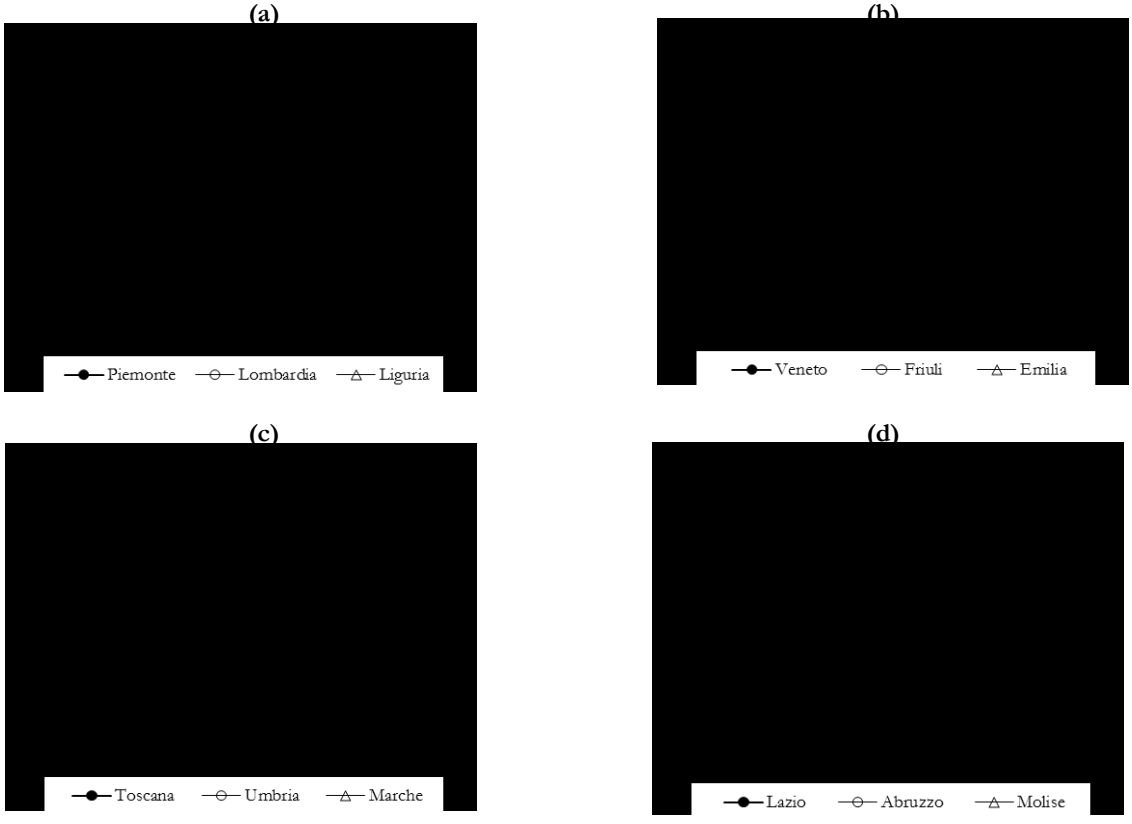
(a) **(b)**

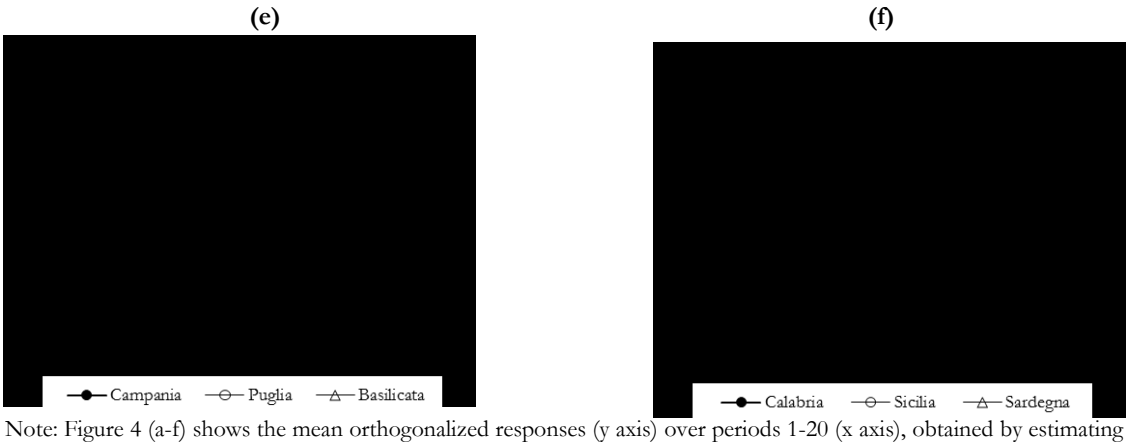




Note: Figure 3 (a-f) shows the mean orthogonalized responses (y axis) over periods 1-20 (x axis), obtained by estimating a VECM with 1 lag and 7 cointegrating relations for 18 Italian regional total employment series.

Figure 4. Mean responses to shocks from all regions, industrial employment





Note: Figure 4 (a-f) shows the mean orthogonalized responses (y axis) over periods 1-20 (x axis), obtained by estimating a VECM with 1 lag and 7 cointegrating relations for 18 Italian regional industrial employment series.

Tables

Table 1. Italian Sensitivity Index

Region	1993(I)-1995(II)	2008(III)-2010(III)	2012(II)-2013(IV)
Piemonte	0.94	0.76	1.51
Valle d'Aosta	0.05	0.01	-0.75
Lombardia	0.47	0.90	-0.23
Liguria	1.16	0.81	1.79
Veneto	0.11	0.84	1.02
Trentino A.A.	0.16	-0.40	-0.74
Friuli V.G.	0.84	1.60	-0.23
Emilia Romagna	0.41	0.65	0.89
Toscana	0.55	0.56	-0.54
Umbria	0.55	0.94	0.48
Marche	0.57	0.20	1.88
Lazio	1.36	-0.41	0.70
Abruzzo	0.68	1.64	0.68
Molise	3.21	2.79	3.73
Campania	2.18	2.56	0.22
Puglia	1.81	2.11	3.21
Basilicata	1.00	2.49	0.93
Calabria	1.30	3.35	4.55
Sicilia	2.18	1.09	3.15
Sardegna	1.58	1.47	3.97
Average	1.06	1.20	1.31
St.Dev.	0.81	1.05	1.63
Min	0.05	-0.40	-0.75
Max	3.21	3.35	4.55

Table 2. Italian Recovery Index

Region	1995(III)-2008(II)	2010(IV)-2012(I)
Piemonte	0.84	1.62
Valle d'Aosta	0.58	-5.22
Lombardia	1.15	1.18
Liguria	0.60	-1.32
Veneto	1.42	2.58
Trentino A.A.	1.47	2.38
Friuli V.G.	0.99	1.06
Emilia Romagna	1.20	2.69
Toscana	0.95	1.23
Umbria	1.58	-1.27
Marche	1.30	-1.44
Lazio	1.61	-0.30
Abruzzo	0.94	3.34
Molise	0.59	3.02
Campania	0.22	-0.01
Puglia	0.73	2.24
Basilicata	0.41	1.17
Calabria	0.11	3.34
Sicilia	0.86	-3.45
Sardegna	0.88	4.01
Average	0.92	0.84
St.Dev.	0.43	2.41
Min	0.11	-5.22
Max	1.61	4.01

Table 3. Recession of total employment and recovery manufacturing sector

Region	Recession 1 total	Recovery 1 manufacturing	Recession 2 total	Recovery 2 manufacturing
Piemonte	-0.0117	0.0097	-0.0178	0.0026
Valle d'Aosta	-0.0378	0.0062	-0.0113	0.0521
Lombardia	-0.0257	-0.0003	-0.0195	-0.0041
Liguria	-0.0496	0.0369	-0.0343	0.0478
Veneto	-0.0258	0.0095	-0.0221	-0.0030
Trentino A.A.	-0.0182	-0.0180	-0.0243	-0.0068
Friuli V.G.	-0.0212	0.0226	-0.0152	0.0211
Emilia Romagna	-0.0212	0.0012	-0.0181	0.0030
Toscana	-0.0166	-0.0117	-0.0186	0.0017
Umbria	-0.0175	0.0082	-0.0155	0.0235
Marche	-0.0134	-0.0319	-0.0203	-0.0027
Lazio	0.0135	0.0249	-0.0322	0.0082
Abruzzo	-0.0115	0.0111	-0.0201	-0.0005
Molise	-0.0328	0.0427	-0.0327	-0.0011
Campania	0.0523	-0.0571	-0.0298	-0.0429
Puglia	-0.0128	0.0132	-0.0290	-0.0096
Basilicata	-0.0167	0.0718	-0.0244	0.0485
Calabria	-0.0175	-0.0267	-0.0041	-0.0215
Sicilia	-0.0138	-0.0067	-0.0373	0.0127
Sardegna	-0.0437	0.0031	-0.0238	-0.0152

Note: coefficients obtained from the estimation of the restricted version of the SUR model in (1) for total employment annual data (Recession 1 and Recession 2); and from the estimation of the unrestricted version of the SUR model in (1) for industrial employment (Recovery 1 and Recovery 2).

Table 4. Mean responses to shocks from all regions, total and industrial employment

Region	OIRFs total	OIRFs manufacturing
Piemonte	-0.0037	-0.0211
Lombardia	-0.0014	-0.0206
Liguria	-0.0068	-0.0463
Veneto	-0.0111	-0.0137
Friuli V.G.	-0.0088	-0.0257
Emilia Romagna	-0.0040	-0.0104
Toscana	0.0005	-0.0341
Umbria	-0.0074	-0.0312
Marche	-0.0066	-0.0238
Lazio	-0.0058	-0.0101
Abruzzo	-0.0119	-0.0574
Molise	-0.0174	-0.0526
Campania	-0.0128	-0.0419
Puglia	-0.0185	-0.0400
Basilicata	-0.0122	-0.0600
Calabria	-0.0180	-0.0859
Sicilia	-0.0042	-0.0573
Sardegna	-0.0198	-0.0798

Note: OIRFs obtained as the average of regional responses to impulses from all the regions over the period 1- 20.