Recent Trends of Industrial Production in the Euro Area Major Countries*

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Abstract

This paper evaluates the dynamics of industrial production in Italy since the start of the financial crisis in 2008, both at the aggregate and sector level, focusing on the main differences observed with respect to France and Germany. We find that the severe decline experienced by the Italian industrial output, in particular since the sovereign debt crisis, has been almost completely driven by a deep compression in internal demand. Furthermore, the mild recovery in activity that was starting to materialize in the summer of 2013 came to a halt a year later in all the three major Euro area economies, again on the backdrop of continuous weakness in internal demand. We estimate a FAVAR model to quantify the reaction of production in specific sectors to the different structural shocks that hit the Euro area during the double dip crisis. We show that sovereign risk shocks have been (*i*) a non-negligible source of economic fluctuations in the euro area, exerting a strong impact on loans to non-financial corporations, and (*ii*) the main driver for the deeper decline of manufacturing production in Italy compared to Germany and France.

JEL classification: C32, E32, F34.

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1 Introduction

In the last six years industrial production in Italy has registered a strong contraction, unprecedented for intensity and length since the Second World War. This work analyzes the evolution of industrial activity in Italy by sector, focusing on different sub-periods, in particular the Global Financial Crisis (GFC) and the Sovereign Debt Crisis (SDC). In doing so the dynamics of Italian production is compared with that of France and Germany. In a first step, we provide descriptive evidence on the stylized facts that characterized the two temporal horizons mentioned above. We then provide formal evidence of the reaction of industrial sectors to the shocks that hit the Euro area (EA), comparing their behavior across countries. The main results of the first part are the following. While the GFC, that spurred a collapse in international trade, had a similar impact on the industrial output of the three considered countries, the SDC that erupted in the summer of 2011 weighted mainly on Italy, through a severe drop in internal demand caused by both credit and fiscal restrictions as a reaction by banks and the Government to the increase in sovereign risk. The more traditional "Made in Italy" sectors, which became progressively more dependent on internal demand, registered considerable losses of production, while high value-added sectors like chemicals and pharmaceuticals suffered relatively less. Transport equipment goods, that sustained Germany's activity to a great extent, declined dramatically in Italy and currently represent one of the weakest sectors of Italian production in comparison with its main European partners.

In order to establish econometric evidence and some causal linkages, in the second part of the paper we evaluate the dynamic response of industrial sectors to the most important shocks responsible for the two crises by estimating a Factor Augmented VAR model (FAVAR; Bernanke et al. (2005); Forni et al. (2009)) including monthly macroeconomic variables and factors estimated on the set of industry–specific sectors. The FAVAR approach looks suitable for our research aims because industrial activity in Italy, Germany and France displays a reasonable degree of comovement (see Figure 1a), while still allowing for idiosyncratic developments within countries, i.e. across sectors (Figure 1b). Indeed, while the pairwise correlation between the three indices on the sample 1995:1 – 2014:1 is roughly equal to 0.75, the same statistics computed across sectors and across countries falls in a range between 0.15 and 0.90.

On the basis of standard identification techniques, our results show that the Global Financial Crisis produced transitory effects on the EA economy and overall similar effects across the three major countries. By contrast, the SDC displayed a larger impact on the dynamics of the Eurozone, by severely and persistently reducing loans to non-financial corporations. Furthermore, it induced a divergent dynamics between Italy, that suffered a deep ad prolonged downturn, and France and Germany, that were relatively untouched by the crisis.

The remainder of the paper is organized as follows. In Section 2 we highlight some stylized facts on the evolution of industrial activity in France, Germany and Italy over the last six years. Section 3 briefly sketches the econometric approach adopted to evaluate the dynamic reaction to the crises, while Section 4 presents the main results of our analysis. Section 5 concludes.

2 Stylized Facts

The Italian industrial production index has decreased by 24% in the period between January 2008 and August 2014, against a fall of 15% in France and 6% in Germany. The overall period can be divided into four main phases. The first one coincided with the GFC and was characterized by a substantial drop in industrial output (2008m1-2009m4); it was followed by a temporary recovery (2009m4-2011m8) which ended abruptly into the SDC (2011m8-2013m7). Economic activity has since stagnated in all the three major Euro area economies around levels comparable to those of one year ago and it is still threatened by a number of downside risks. In order to analyze the dynamics of the domestic and foreign components of activity, we have looked at the industrial turnover index deflated by the producers price's index. During the GFC, Italy's and Germany's turnovers have been almost identically affected, both in the overall change and across components (see Figures 2, 3 and 4)): in particular, the fall in foreign revenue reached almost 30% in both countries, while the domestic component declined by less (20%). France recorded a 20% reduction in its foreign turnover against just 7 for the domestic component; French foreign turnover, in particular, benefited from a smaller exposure to extra-EU trade compared to the other two countries. Since the middle of 2011, the dynamics of turnover suggests that the fundamental difference between Italy and its two main European partners rested on the different evolution of domestic revenue, which was negative for our country and flat for the other two, signaling more broadly that the lack of a clear recovery in production has been associated to the continuous weakness in internal demand at the Euro area level. Indeed, between August 2011 and July 2014, real domestic revenue suffered a drop of 10% in Italy against a much smaller decline in France (-2%) and a stability in Germany. By comparison, over the same period Italian foreign turnover was stable, against a small increase in Germany (3%) and a mild reduction in France (-2%). France's turnover component, in the period between 2008 and July 2014, shows a dynamic which inversely mirrors that of Italy, with domestic revenue that has recovered its pre-crisis level while foreign revenue is still 10% below its 2008's level. On the contrary, Italian domestic revenue is still 25% below its beginning-of-2008's level whereas its foreign turnover has almost completely recovered its losses. Its interesting to notice that the relative performance of the Italian foreign turnover is broadly comparable to that of Germany's, whose foreign revenues are currently just 5% above their pre-crisis level.

The descriptive evidence we provided on the decomposition of industrial revenue in its domestic and foreign components suggests that, in Italy, the latter component does not seem to have suffered relative to its main European partners, while the former - over the entire 2008-2014 period - has been the main driver of the dramatic loss of industrial output that has occurred since the beginning of 2008 (see Figures 2, 3 and 4).

2.1 The Heritage of the Crisis

The legacy of the double-dip crisis in terms of industrial production has been quite heterogeneous among the three countries considered, both at the aggregate and sectoral level, yet none of the three countries has still recovered its pre-crisis production levels, see Figure 5. In particular, while Germany's industrial output is relatively close to recovering its pre-crisis level (-6% in August 2014 compared to the level at the beginning of 2008), France's activity is still 15% below, and Italian production has lost a quarter of its pre-crisis level (see Table 1). From a sectoral point of view, between January 2008 and August 2014, Italian production losses have been widespread (see Table 1): of the 17 sectors considered, 15 suffered reductions close to or in excess of 15%; only the "chemicals and pharmaceuticals"' and the "food" sectors recorded less intense contractions (-8 and -7%, respectively). An important sector which was severely affected in Italy and much less so in France and Germany is the "transport equipment" one. Transport equipments represent 6.8% of the Italian index, against 10% in France and nearly 15% in Germany; this sector experimented a particularly severe contraction in Italy (-36%), which contrasts with the mild reductions recorded both France and Germany (see Table 1 and Accetturo et al. (2013)).

The difference bewteen Italy and the other two countries were not confined exclusively to the transport equipment sector. Between 2008 and 2013 France managed to contain, contrary to Italy, the negative effects of the crisis on its industrial output by recording limited losses on some of the sectors that matter most in its general index, especially the "food", "electricity" and "chemicals" ones, which overall account for almost 40% of its total production, against 28 in Italy. Germany registered a steep contraction in just two sectors, the "textile" and the "mining" ones (-26 and -36%, respectively), which however have a combined weight of only roughly 2% in its general production index. The cumulated changes of industrial activity registered over the last six years hides the heterogeneity, both within and between countries, that can be found in the aforementioned four sub-periods.

2.2 The Global Financial Crisis and the Temporary Recovery

The GFC, originated in the US with the subprime crisis, was followed by a generalized collapse in world trade, that recorded an exceptional drop, by 18% from January 2008 to June 2009 according to the CPB trade volume index. Consequently, in the three countries the downturn impacted mainly on the production of those goods whose demand is more dependent on foreign

components, namely intermediate and capital goods. Between January 2008 and April 2009, the index of industrial production decreased by almost 25% both in Italy and Germany and by 19% in France (see Tables 2, 3 and 4). As world trade resumed (2009m4-2011m8), at the national level the recovery in economic activity was mainly driven by intermediate and capital goods, i.e. the same items that had declined most in the previous year and a half. By summer 2011, the Italian industrial production index was 15% below its pre-crisis level, against -11 in France and -2% in Germany.

2.3 The Sovereign Debt Crisis

The SDC (2011m8-2013m7) had a severe impact on the Italian industrial production, leaving France and Germany relatively unaffected, see Table 5. The fall in industrial output was around three times bigger in our country than in the other two (-11% against -4 and -2% in France and Germany, respectively). The divergent dynamics of the domestic and foreign components of the Italian industrial turnover for the main industrial groupings (see Figures 7,8 and 9) strongly points to the domestic component as the main driver of the observed contractions in consumption, intermediate and capital goods.

2.4 The Current Stagnation

In the summer of 2013 there were signals, both qualitative and quantitative, that a moderate recovery in activity was materializing; yet those early positive signals came to a halt, on the backdrop of continuous weakness in internal demand at the Euro area level. By August 2014, industrial activity was substantially flat with respect to a year earlier in all the three major European economies. Between 2013m7 and 2014m8, Italian industrial production benefited from small increases in capital and consumption goods (see Table 2) whereas intermediate goods' production and, above all, energy declined further. Among sectors, "chemicals and pharmaceuticals", "metals", "rubber and plastic" and "transport equipment" increased the most in our country (by 7% the first three sectors and 12 the latter, respectively; see Table 6), while the "textiles and wearing apparels" output has declined further, against a stabilization in France and a moderate growth in Germany.

The recovery in activity has been hampered by a decline in the production of consumption goods in France (see Table 3) and capital goods in Germany (see Table 4), again suggesting that the weakness in internal demand, which has caused so much damage to the Italian manufacturing system over the last few years, has been holding back the recovery of industrial production in both France and Germany.

In order to capture to what extent, over the last few years, periods of growth in industrial production have been widespread throughout the production system, we have calculated a "diffusion index" as follows. First, we take the three-terms moving average variations of each sector's monthly industrial production (working days and seasonally adjusted). Second, a

specific sector is defined in "expansion" if it has recorded positive growth, as defined above, both in the current month as well as in the three months before. Finally, we compute the share of sectors in expansion according to the definition outlined above, multiplied by their 2010-weight in the respective general production index. Figure 6 shows that by January 2014 Germany had the highest share of sectors in expansion (around 60% of its index of industrial), Italy was coming in second with roughly 40% of its general index in expansion followed by France with only 10% of its total production which was growing at that time

By the summer of 2014 those signs of recovery progressively faded away. The reversal in growth prospects has been particularly acute for Germany which, as of August 2014, does not have anymore a significant share of sectors in expansion. In comparison, France and Italy still have about 15-to-20% of industrial sectors in expansion, a share that is however comparable to previous periods of stagnation.

The evidence provided so far hinges on stylized facts that are *per se* informative, yet incomplete under at least two aspects. First, they lack a proper statistical validation and are taken in isolation, in that we cannot be sure, for example, that the business cycle shock which originated the first crisis was the sole responsible for the observed dynamic of industrial activity, nor that the same shock can give rise to responses in other sectors of the economy which are in line with observed data. Second, the descriptive evidence provided above is mute about future developments, and can only give rise to informed guesses about the direction and strength of the current recovery.

3 Empirical analysis

In this Section, we move to an econometric approach to evaluate the dynamics of industrial production in France, Germany and Italy with the aim of investigating three main issues:

(i) how the GFC of 2008-09 propagated among different sectors (ii) how the SDC affected the three major countries and (iii) to what extent, if any, the recessionary effects produced by the double dip crisis changed the dynamics of industrial production in the EA major countries. We estimate a Factor Augmented VAR model (FAVAR) on some key macroeconomic series and industry-specific indicators. This empirical approach follows the one implemented by Peersman and Smets (2005) and Dedola and Lippi (2005) in investigating the industry effects of macroeconomic shocks, but develops further these contributions. The first paper adopts a univariate approach, while the second one uses a VAR model. However, the authors are forced to evaluate one sector at a time because of the curse of dimensionality, which is precisely what we address by resorting to factor models. Furthermore, they do not provide a structural analysis in terms of dynamic reaction to the shocks that hit the EA in the last two crises. More recently, Billio et al. (2013) use a Bayesian Panel VAR model on industrial production to evaluate the interaction between US and EA business cycle, covering all EA countries.

Indeed, we model simultaneously all the sectors of the industrial production index and, above all, investigate the effects of two different shocks other than monetary policy. In particular, we model the GFC as a business cycle shock which hit the EA and then propagated to the single member states economies, whereas the SDC of 2011-12 will be simulated by means of an increase in sovereign risk.

3.1 Structural Factor Models framework

The econometric framework here adopted is the FAVAR methodology introduced by Bernanke et al. (2005). The FAVAR model is also related to the Structural Dynamic Factor Model proposed by Giannone et al. (2005), Stock and Watson (2005) and Forni et al. (2009) being a particular case of the latter, in which the number of static factors coincides with the number of dynamic factors. The factor approach is receiving a growing attention in macroeconomic analysis and is increasingly used in structural analysis as an alternative tool to VAR models (see, among others, Boivin et al., 2009; Forni and Gambetti, 2010; Barigozzi et al., 2014; Neri and Ropele, 2014) because of some crucial appealing features. First, it allows for handling a large number of time series without suffering from the curse of dimensionality. In particular, this means that we are able to properly characterize the response of all the series of interest to a certain exogenous innovation, i.e. the macroeconomic shock of interest such as a business cycle or a sovereign risk shock. Moreover, it has an edge in the identification of structural shocks with respect to SVAR models by explicitly recognizing the large amount of data exploited by policymakers in the implementation of their decisions. Second, it provides a very realistic representation of macroeconomic dynamics by assuming that the business cycle is driven by a few common shocks, while labeling the others as sector or country-specific shocks. In this sense, the FAVAR approach is particularly suitable to the joint modeling of comovement and heterogeneity across the series of interest, a feature closely related to our research question. In what follows, we sketch our empirical framework, referring to Bernanke et al. (2005), Boivin et al. (2009) and Buch et al. (2014). We assume that there exist two different sources of economic fluctuations: (i) a few structural shocks common to all the variables entering the dataset and (ii) many idiosyncratic shocks, capturing, for example sector / industry specific shocks. In terms of time series, this means that each individual time series can be decomposed in the sum of a common and an idiosyncratic component. Formally, we have

$$\mathbf{X}_t = \boldsymbol{\chi}_t + \boldsymbol{\xi}_t \tag{1}$$

$$\boldsymbol{\chi}_t = \boldsymbol{\Lambda}\mathbf{C}_t \tag{2}$$

$$\mathbf{C}_t = \mathbf{B}(L)\mathbf{C}_{t-1} + \mathbf{u}_t, \tag{3}$$

where $\mathbf{X}_t$ is a $n \times 1$ vector of observables, $\boldsymbol{\chi}_t$ is a $n \times 1$ vector of common components and $\boldsymbol{\xi}_t$ is a $n \times 1$ vector of idiosyncratic components uncorrelated with the factors but allowed to be serially correlated and mildly cross-correlated, while $\mathbf{C}_t$ is a $r \times 1$ vector of common factors, $\boldsymbol{\Lambda}$ is a matrix of loadings linking the factors to the observables, $\mathbf{B}(L)$ is a $r \times r$ polynomial matrix in the lag operator, $\mathbf{u}_t \sim iid(\mathbf{0}, \mathbf{I})$ is a $n \times 1$ vector of common structural shocks. Equation (3) is a VAR on the common components. However, the latter are a mix of observed and unobservable factors, respectively $\mathbf{Y}_t$ and $\mathbf{F}_t$, i.e. $\mathbf{C}_t = [\mathbf{Y}_t, \mathbf{F}_t]$. In particular, we are going to use a set of key EA macroeconomic indicators as observable factors and augment them by means of estimated sector-specific factors.

Estimation of the model takes place in four steps, similarly to Buch, Eickmeier and Prieto (2014). First, we extract principal components from the industrial production dataset to achieve consistent estimates of the unobservable factors (see Stock and Watson, 2002 and 2005). In a second step, we regress on the observable macroeconomic factors to purge the former from the correlation with the latter. Third, we collect together and the purged and we run a VAR model on them. Fourth, we identify the structural shocks of interest and we display the impulse responses. Since our sample is constrained to start in 2003m01, in order to avoid breaks in definitions of data on loans, we are going to use Bayesian methods for better estimation of the VAR, in particular when facing the sovereign shock. Indeed, as shown by Neri and Ropele (2014), Bayesian estimation may help in correctly identifying tensions on sovereign risk on a very short sample, taking into account the peculiar dynamics of the series: the sovereign risk spread is almost flat until 2008m9, before displaying an abrupt rise (see Figure 10). Once terminated the procedure, we are able to discuss the results of the structural analysis.

3.2 Identification strategy

We adopt a simple identification strategy. We model the whole set of country-specific sectors as latent factors, whereas Euro Area aggregate variables are employed as observed factors to capture the economic fluctuations (for a similar approach see, among others, Buch et al., 2014). In particular, the vector of observable factors is given by

$$\mathbf{Y}_t = [y_t, p_t, l_t, sov_t, s_t, q_t] \tag{4}$$

where y_t is the real GDP, p_t denotes the harmonized index of consumer prices (HICP), l_t stands for the loans to non-financial corporations, sov_t is the sovereign spread between the 10 years Greek bond and the German Bund, s_t is the ECB policy rate here proxied by the euribor at 3 months, q_t is the nominal US dollar / euro exchange rate. This specification allows for a good description of the stance of the business cycle in the euro area and for conducting a number of dynamic simulations in response to the identified structural shocks. Beyond

the standard three variables representing economic activity, prices and monetary policy, we include the exchange rate in order to have a measure of foreign demand, while we add credit and sovereign spread since they are two of the most important variables in order to describe recent developments in the EA. We augment the $\mathbf{Y}_t$ vector by using the first two principal components extracted by the panel of sector-specific industrial production indices: hence, our baseline vector of common factors is given by

$$\mathbf{C}_t = [y_t, p_t, l_t, sf_{1t}, sf_{2t}, sov_t, s_t, q_t] \tag{5}$$

The identification of the structural shocks is recursive. We simply assume that economic activity, prices, loans and country-specific factors do not respond contemporaneously to the sovereign risk shocks, while we allow for a policy reaction to all exogenous disturbances but exchange rate ones. By doing so, we provide a simple and intuitive interpretation of the sources of economic fluctuations: (i) a (common) business cycle shock is defined as a (negative) innovation to the EA wide industrial production and (ii) a sovereign risk shock is modeled in terms of a rise in the spread between Greek and German yields on 10 years bonds. Our identification scheme, especially concerning the distinction between a non-monetary and a monetary downturn, is broadly consistent with the one adopted by den Haan et al. (2007) for US economy and Giannone et al. (2012) for the EA.

4 Results

In Figures 11–16 we present some results of our empirical analysis, starting from the macroeconomic variables, i.e. the observable factors. The evolution of the identified structural shocks is described in Figures 11–12. We can see that both patterns trace fairly well the economic developments in the EA, e.g. the expansion phase up to 2007:08 followed by the recession (upper panel), and the recovery before the spike in sovereign risk in summer 2011 (lower panel).

4.1 Macroeconomic variables

Adverse business cycle shock. Figure 13 reports the impulse responses of macroeconomic EA factors to the business cycle shock. The shock to the EA-wide industrial production is equal to -0.5 on impact, and it takes about 10 months before reverting back to its pre-shock level. HICP inflation is reduced by almost 0.1 percentage points, displaying a very sluggish adjustment. The policy rate moves downward, capturing a countercyclical reaction of the monetary authorities to the adverse business cycle. Consistently, the exchange rate is lowered for about 6 periods. Loans to non-financial corporations strongly react to the downturn, reverting to their steady state level only after two years and half. Finally, sovereign risk rises on impact but only stays statistically significant above its baseline level for about 3 periods, consistently with the behavior of the variable during the crisis of 2008-09.

Sovereign risk shock. The impulse responses to the sovereign shock uncover some stylized facts of the recent crises (see Figure 14). First, industrial production is reduced for over one year, displaying a maximum reaction by almost 1.5 percentage points. Second, inflation tends to rise on impact and for a bunch of periods subsequent to the shock, before starting to decrease. This result may reflect the heterogeneity reaction across countries. For example, the rise in inflation may be related to changes in indirect taxes and administrative prices (in the peripheral countries), or loose financial conditions in a low-unemployment environment (core countries; see Neri and Ropele, 2014). Third, the central bank strongly reacts to uncertainty shocks by lowering the policy rate strongly and long-lastingly. Fourth, loans to non-financial corporations are severely and persistently depressed by the rise in sovereign risk, reflecting the exposure of banks to this kind of assets.

4.2 Country–specific variables

We now move to describe the effects of the two different crises on sector-specific variables, i.e. on different industrial production sectors. For each country we focus on the general index, capital goods, intermediate goods, consumption goods and energy goods. Then, we also show the median response across sectors.

Adverse business cycle shock. Figure 15 reports the impulse responses of macroeconomic EA factors to the business cycle shock. Figure 9 displays the IRFs to the business cycle shock, aimed at capturing the GFC impact on manufacturing sectors. We can observe that the three countries experiment a similar response, both in terms of shape and magnitude. The only exception is the French energy sector, which shows a flatter response than Germany and Italy: this stems from a lower elasticity of this sector to economic fluctuations with respect to the other two countries.

Sovereign risk shock. Figure 16 displays the IRFs to the sovereign shock that occurred in summer 2011, aimed at replicating the feature of the SDC impact on manufacturing sectors. The picture is very different from the one commented before. Indeed, apart from intermediate goods, which display a more or less similar reaction across countires, Italy experiments the biggest and deepest fall in each sector. The contraction of the general index is almost two and a half times greater than the French and German counterpart, highlighting how deeply Italy suffered from the crisis that started in summer 2011. Furthermore, it should be stressed that the decline in Italy is more persistent (by about 18 periods after the shock) than the one observed in France and Germany.

5 Concluding remarks

The paper focuses on the recent behavior of industrial production in Italy, Germany and France. First, it describes the main stylized facts emerging from the double-dip crisis that hit

the EA, comparing not only the general index but also the activity sectors. Then, a FAVAR model is estimated to evaluate the dynamic response of manufacturing sectors to a business cycle shock, mimicking the 2008-09's downturn, and a sovereign risk shock, which originated the crisis of 2011-12. Our main findings are the following. First, between 2008 and 2013 the loss of industrial activity in Italy, which has been much larger overall than the one recorded in France and Germany over the same period, has been widespread across most sectors and particularly severe in the "machinery and equipment", "electrical equipment" and "transport" ones, while "chemicals and pharmaceutical" and "food" experimented milder contractions. Second, the strong decline in industrial output, particularly since the SDC, has been almost entirely driven by a marked fall in domestic demand, as shown by the contraction of the domestic component of real turnover; on the other hand, Italian foreign turnover has recovered most of the cumulated loss since 2008. Third, the recovery that started in the summer of 2013 has so far diffused to only half of the Italian industrial production index, a value similar to the one observed in the brief recovery that occurred between the two crises. Fourth, the econometric analysis we provided is able to capture the main features of the recent macroeconomic dynamics in the EA. The estimates of a FAVAR model show that the GFC produced a similar impact on manufacturing sectors in Italy, France and Germany, whereas the SDC exerted a stronger impact on Italian sectors, producing a large and persistent fall in industrial production. Hence, the rise in sovereign risk has been the main source of divergence of Italian industrial output from that of its main EA partners. Moreover, impulse response functions show that the slow resumption of credit growth, following the SDC, could also negatively impact on the current Italian industrial recovery. In future developments, we propose to conduct a variance decomposition in order to assess the relevance of the estimated shocks for fluctuations observed in each industrial grouping. Finally, counterfactual simulations on alternative paths for the Italian sovereign risk would allow for estimating the share of activity losses directly linked to the sovereign shocks, after controlling for other macroeconomic factors.

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Tables and Figures

Table 1: Cumulated changes in industrial activity: 2008m1-2014m8.

	Italy	France	Germany
General Index	-24	-15	-6
Food	-7	-3	-3
Textiles and wearing apparel	-25	-37	-20
Leather	-12	-17	19
Wood	-46	-24	-3
Paper	-23	-23	-8
Chemicals and pharmaceutical	-8	-2	-1
Rubber and plastic	-19	-18	1
Metals	-30	-27	-5
Machinery and equipment	-27	-30	-6
Electrical equipment	-32	-18	-3
Transport equipment	-36	-9	-6
Coke and refined petroleum	-31	-37	-11
Non-metallic products	-31	-28	-10
Mining	-27	-25	-42
Electricity	-17	-5	-9
Furniture and other manufacturing	-17	-18	0
Repair and installation of machinery	-14	-4	0

Note: working days and seasonally adjusted indices.

Table 2: Italian industrial production cumulated changes

	General index	Intermediate	Capital	Consumption	Energy
GFC	-25	-34	-32	-13	-11
First recovery	14	20	24	5	2
SDC	-11	-13	-15	-8	-7
Current stagnation	-1	-1	1	2	-4
Overall period	-24	-31	-27	-15	-20

Source: Eurostat. *Note*: GFC: 2008m1-2009m4; First recovery: 2009m4-2011m8; SDC: 2011m8-2013m7; Current stagnation: 2013m7-2014m8; Overall period: 2008m1-2014m8.

Table 3: French industrial production cumulated changes

	General index	Intermediate	Capital	Consumption	Energy
GFC	-19	-29	-23	-9	0
First recovery	10	17	10	5	3
SDC	-4	-8	-2	-2	-2
Current stagnation	0	1	1	-2	1
Overall period	-15	-22	-15	-8	-1

Source: Eurostat. *Note*: GFC: 2008m1-2009m4; First recovery: 2009m4-2011m8; SDC: 2011m8-2013m7; Current stagnation: 2013m7-2014m8; Overall period: 2008m1-2014m8.

Table 4: German industrial production cumulated changes

	General index	Intermediate	Capital	Consumption	Energy
GFC	-24	-26	-30	-9	-9
First recovery	28	35	40	4	5
SDC	-2	-4	-2	0	3
Current stagnation	-2	0	-2	1	-9
Overall period	-6	-5	-5	-4	-11

Source: Eurostat. *Note*: GFC: 2008m1-2009m4; First recovery: 2009m4-2011m8; SDC: 2011m8-2013m7; Current stagnation: 2013m7-2014m8; Overall period: 2008m1-2014m8.

Table 5: Cumulated changes in industrial activity during the soverign debt crisis: 2011m8-2013m7.

	Italy	France	Germany
General Index	-11	-4	-2
Food	-5	-2	1
Textiles and wearing apparel	-10	-1	-7
Leather	-5	1	-7
Wood	-18	-10	4
Paper	-16	-8	-5
Chemicals and pharmaceutical	-7	-3	2
Rubber and plastic	-10	-7	0
Metals	-11	-7	-2
Machinery and equipment	-10	1	-4
Electrical equipment	-11	-6	-9
Transport equipment	-18	0	-2
Coke and refined petroleum	-15	-10	-1
Non-metallic products	-22	-13	-2
Mining	-10	1	-8
Electricity	-7	-2	7
Furniture and other manufacturing	-12	-6	5
Repair and installation of machinery	-28	0	0

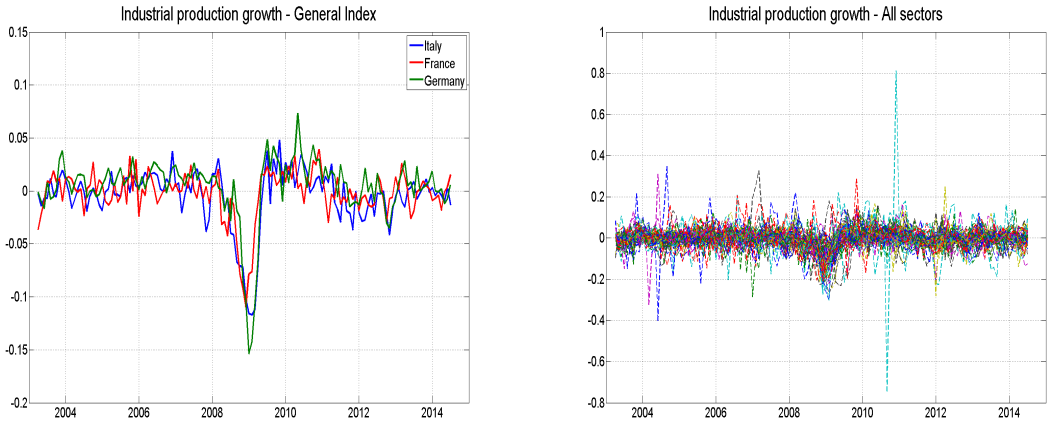
Note: working days and seasonally adjusted indices.

Table 6: Cumulated changes in industrial activity during the current stagnation: 2013m7-2014m8.

	Italy	France	Germany
General Index	-1	0	-2
Food	0	-1	-3
Textiles and wearing apparel	-3	0	4
Leather	1	-7	18
Wood	-1	3	-5
Paper	2	1	0
Chemicals and pharmaceutical	7	0	1
Rubber and plastic	7	3	-1
Metals	7	0	2
Machinery and equipment	0	0	4
Electrical equipment	-3	-4	4
Transport equipment	12	8	-10
Coke and refined petroleum	-8	-6	0
Non-metallic products	-8	0	-5
Mining	-9	-9	-8
Electricity	-3	2	-11
Furniture and other manufacturing	6	-4	0
Repair and installation of machinery	5	-1	3

Note: working days and seasonally adjusted indices.

Figure 1: Comovement and heterogeneity in industrial production.



Notes: 3-month growth rates of industrial production in France, Germany and Italy (general index, left panel; all sectors, right panel).

Figure 2: Total industrial turnover

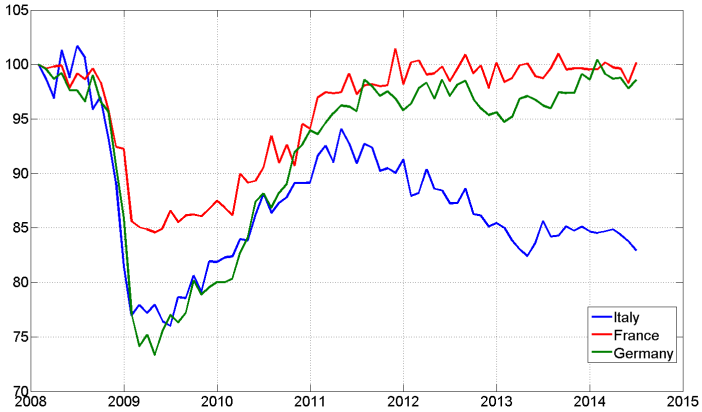


Figure 3: Domestic industrial turnover

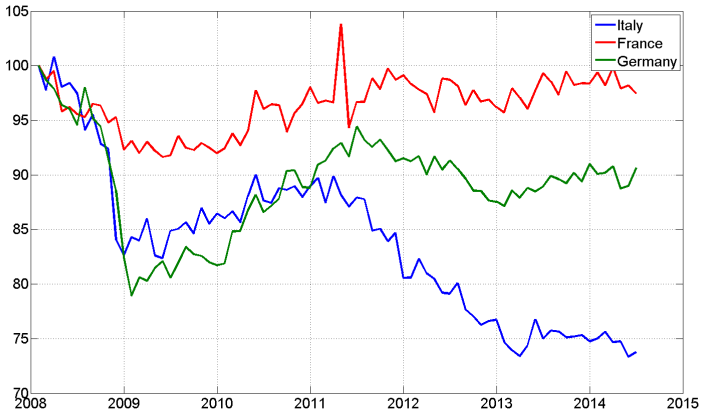
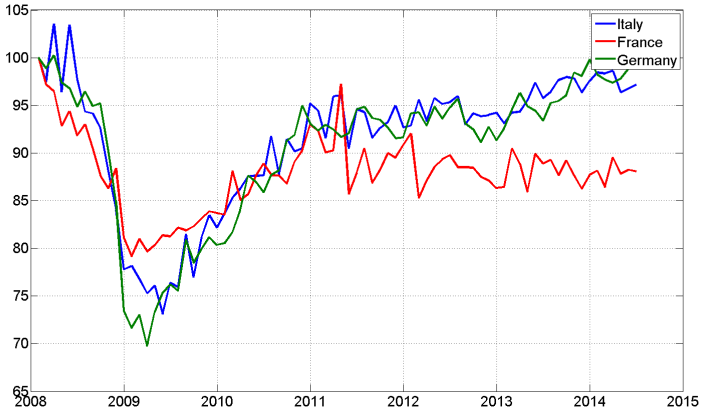
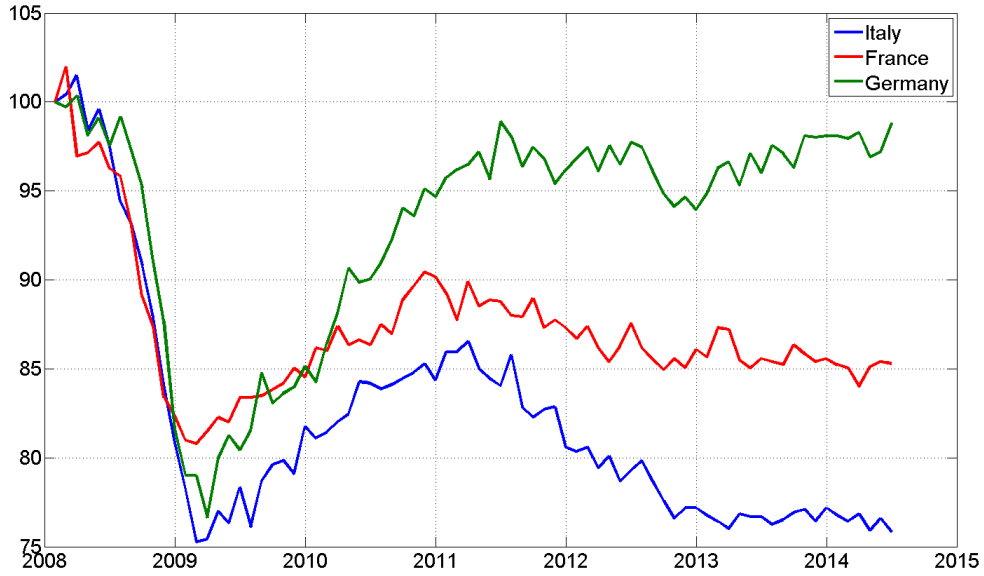


Figure 4: Foreign industrial turnover



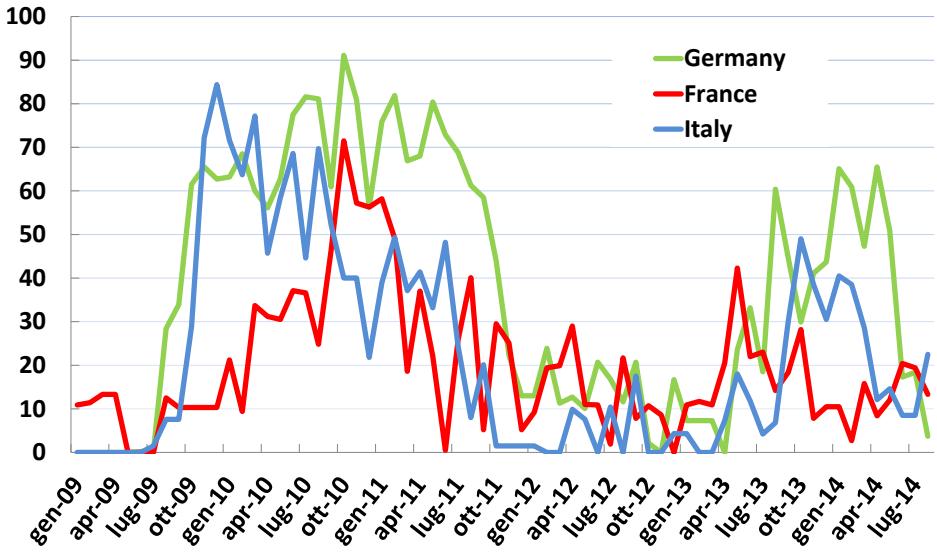
Source: Eurostat. Real terms, seasonally adjusted. 2008=100.

Figure 5: INDUSTRIAL PRODUCTION INDEX



Source: Eurostat. Working days and seasonally adjusted indices. 2008=100.

Figure 6: THE DIFFUSION OF PERIODS OF GROWTH THROUGH SECTORS



Source: Istat. Working days and seasonally adjusted indices.

Figure 7: Italian industrial turnover: intermediate goods

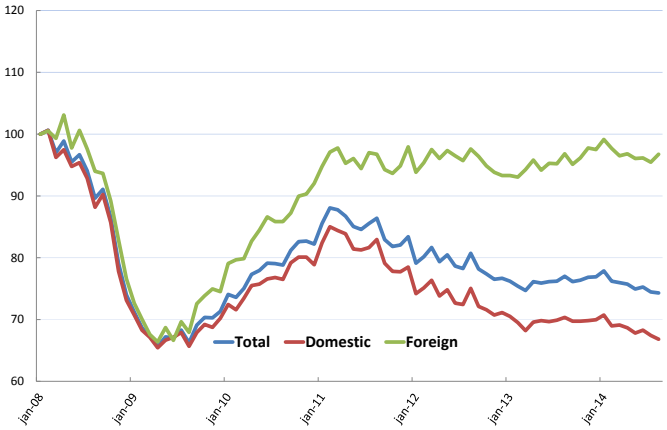


Figure 8: Italian industrial turnover: capital goods

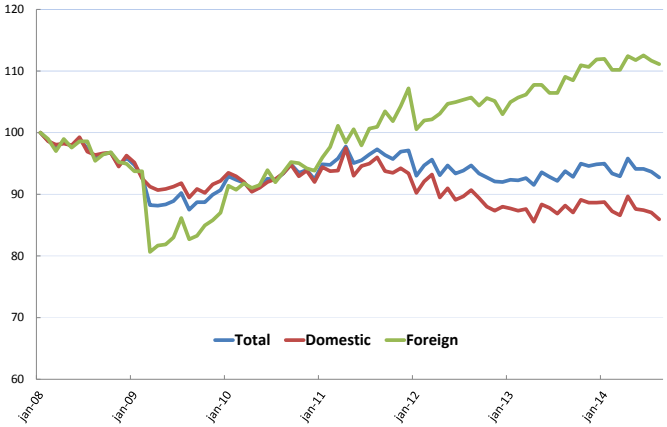
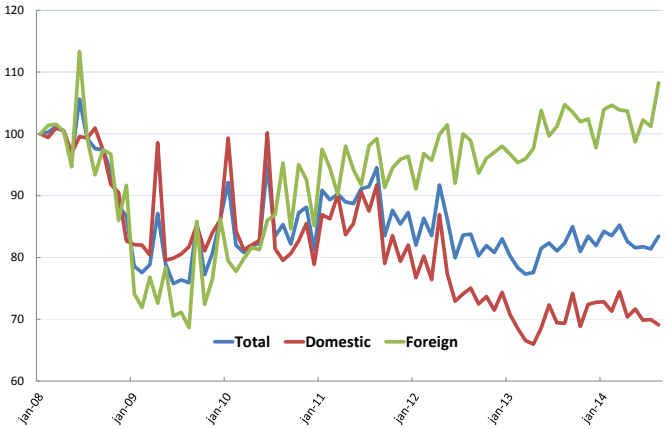
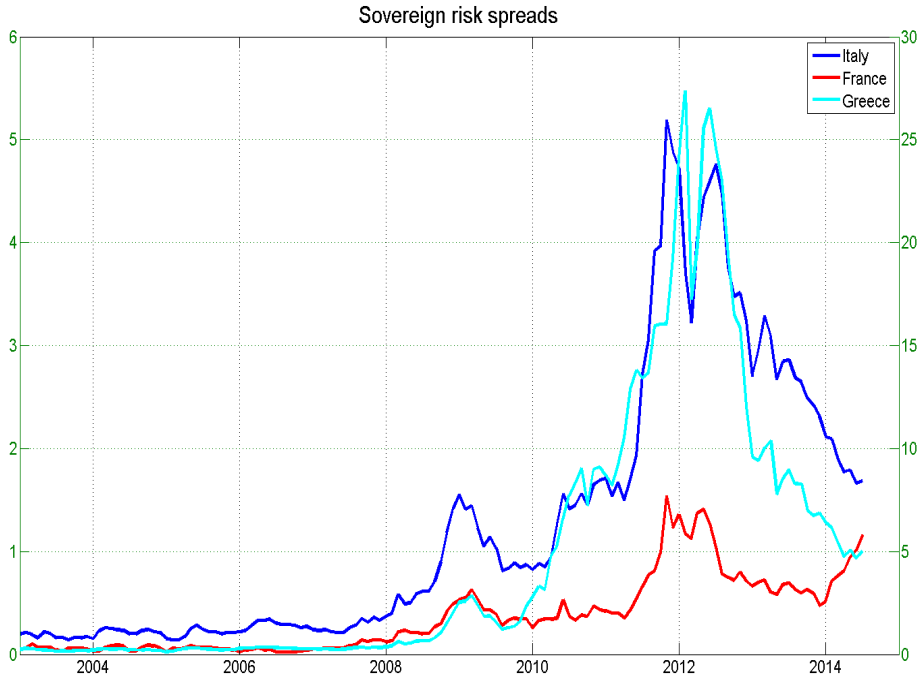


Figure 9: Italian industrial turnover: consumption goods



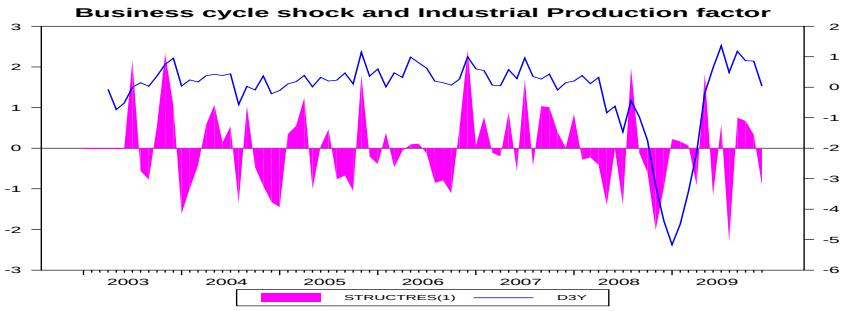
Source: ISTAT. Nominal terms, seasonally adjusted. 2008=100.

Figure 10: Sovereign risk tensions in the Euro Area.



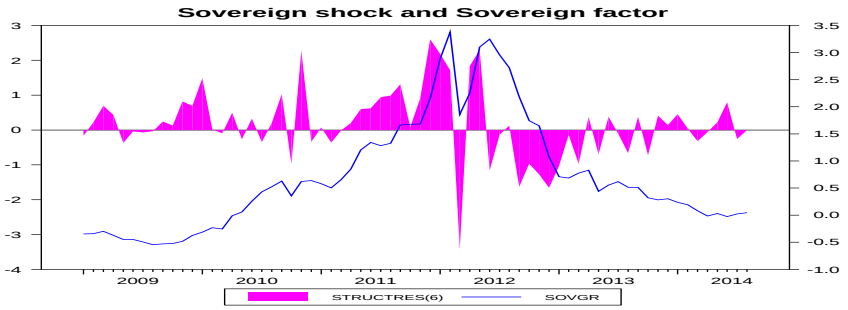
Notes: Percentage values. The dark blue solid line represents the sovereign spread between Italy and German 10 years bond yield (left axis), the magenta solid line denotes the sovereign spread between France and German 10 years bond yield (left axis), while the light blue line displays the sovereign spread between Greek and German 10 years bond yield (right axis).

Figure 11: Identified business cycle shock



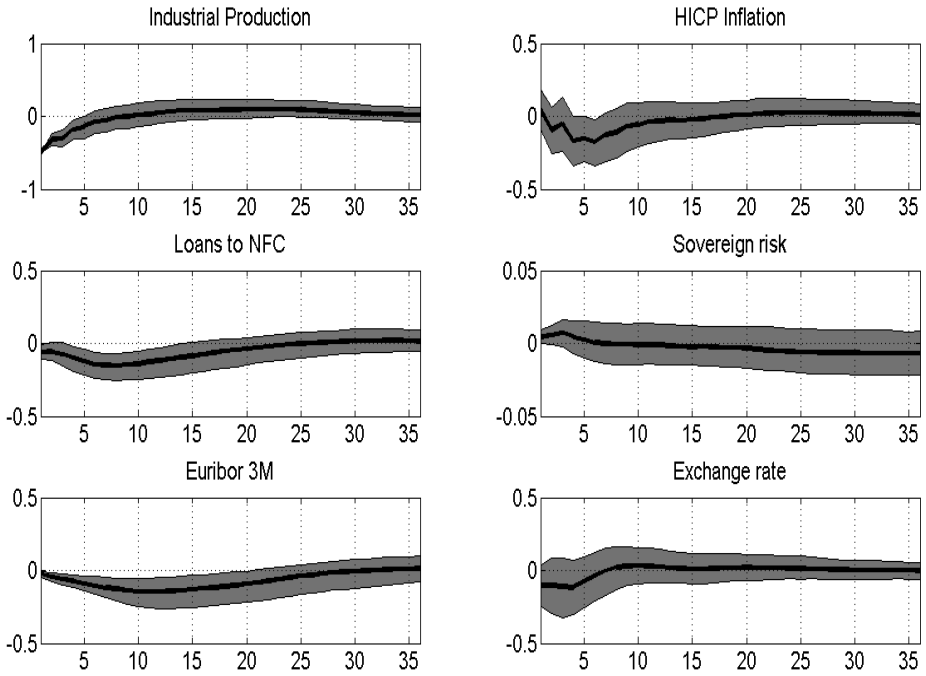
Notes: The dark magenta area denotes the identified business cycle shock, while the blue line represents the euro area industrial production (observable) factor. Sample is 2003:04 - 2009:12.

Figure 12: Identified sovereign risk shock



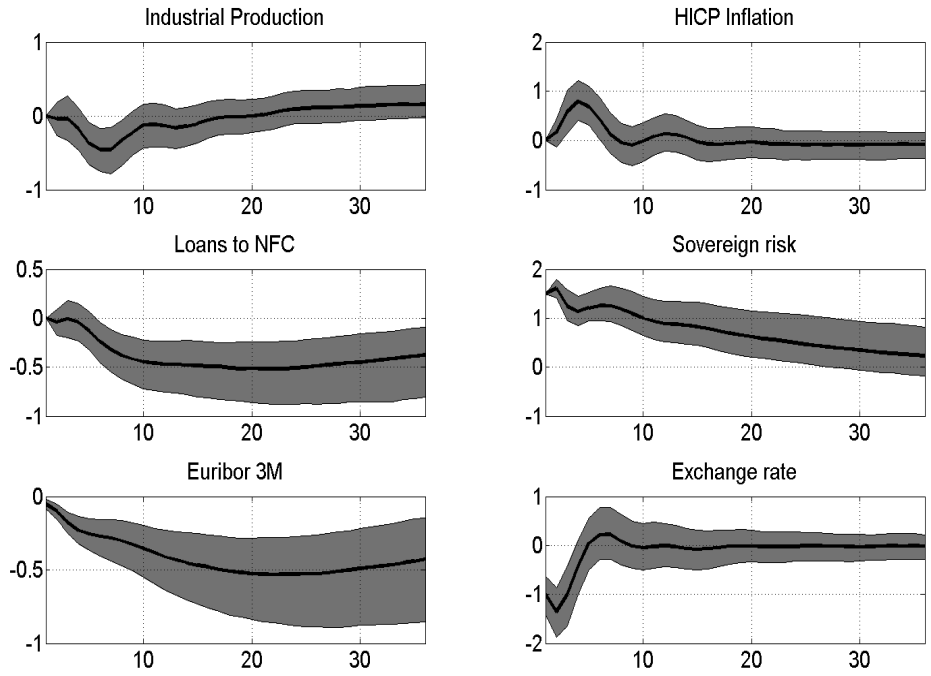
Notes: The dark magenta area denotes the identified sovereign risk shock, while the blue line represents the euro area sovereign risk (observable) factor. Sample is 2009:06 - 2014:07.

Figure 13: Impulse response functions to a Business cycle shock.



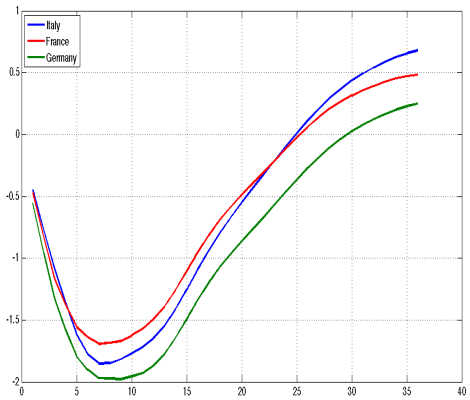
Notes: Standardized percentage values. The dark black line represents the estimated median impulse response, while the grey shaded area denotes its 68% confidence interval. Sample is 2003:04 - 2014:07.

Figure 14: Impulse response functions to a Sovereign risk shock.

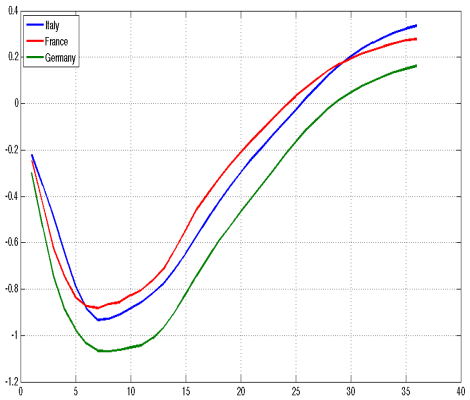


Notes: Standardized percentage values. The dark black line represents the estimated median impulse response, while the grey shaded area denotes its 68% confidence interval. Sample is 2003:04 - 2014:07.

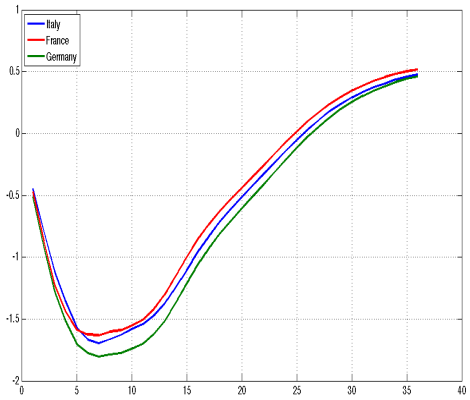
Figure 15: Impulse response functions to a Business cycle shock: selected sectors.



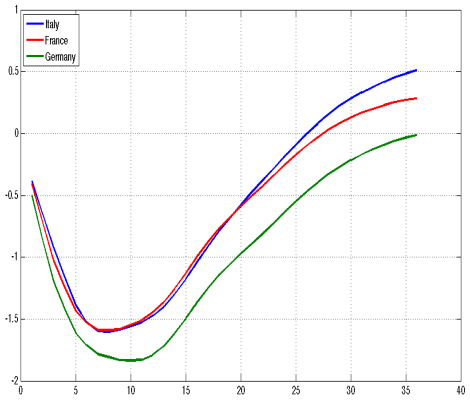
(a) General Index



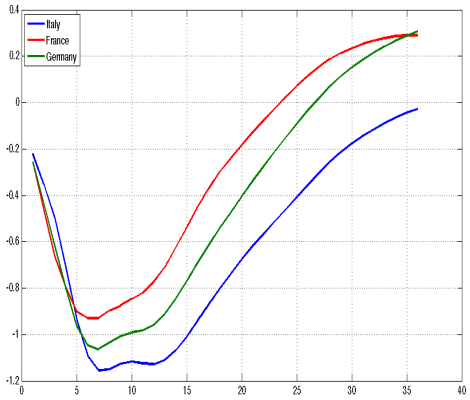
(b) Median across sectors



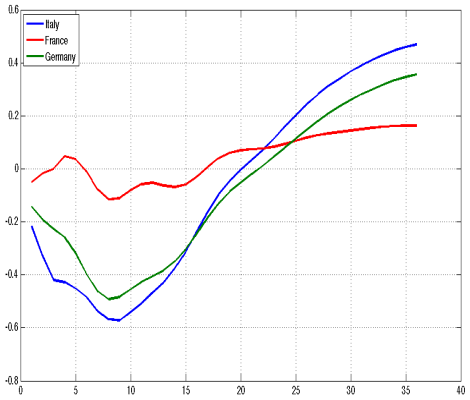
(c) Intermediate goods



(d) Capital goods

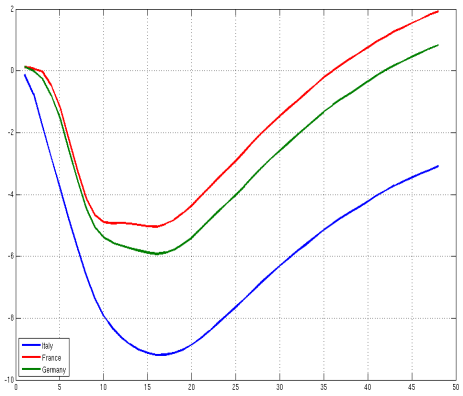


(e) Consumption goods

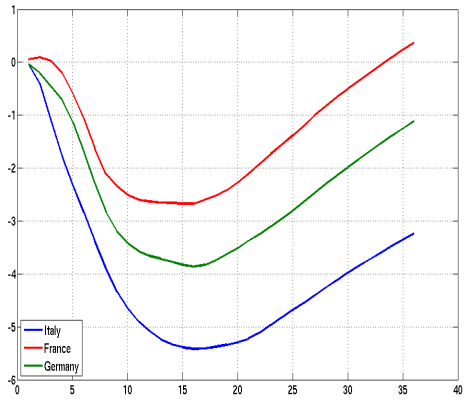


(f) Energy goods

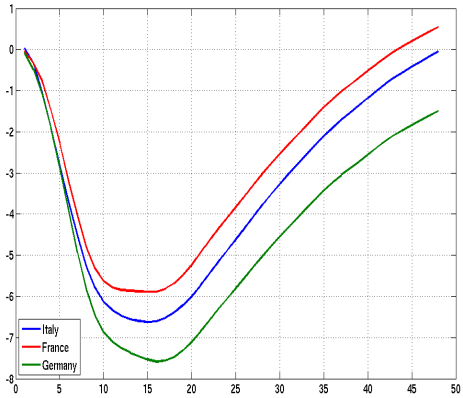
Figure 16: Impulse response functions to a Sovereign risk shock: selected sectors.



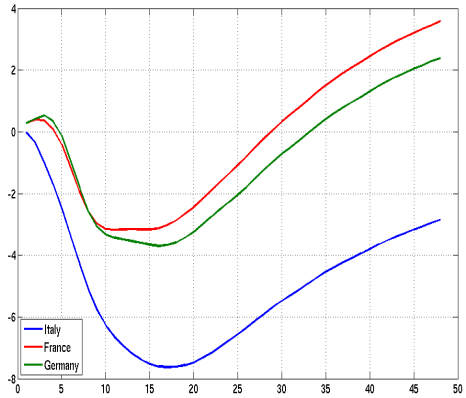
(a) General Index



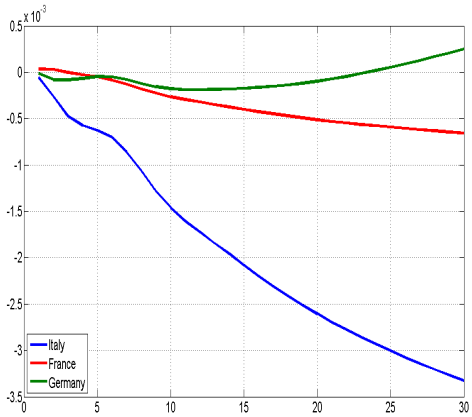
(b) Median across sectors



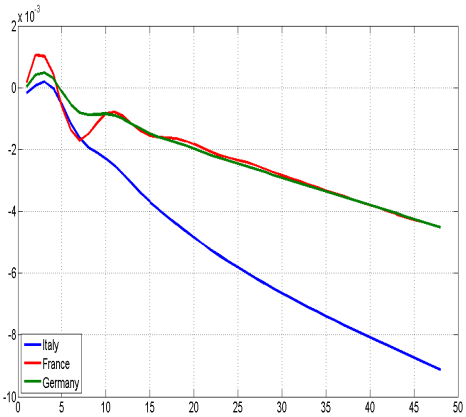
(c) Intermediate goods



(d) Capital goods



(e) Consumption goods



(f) Energy goods