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2012

Online at <https://mpra.ub.uni-muenchen.de/53813/>
MPRA Paper No. 53813, posted 07 Mar 2014 19:51 UTC

Industrial production and Confidence after the crisis: what's going on?

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Abstract

The paper provides new evidence on possible structural breaks in the relationship among business Confidence and industrial activity in Europe in the aftermath of the recession. Possible interpretation is that the crisis has determined a change in the pattern of response in surveys, firms now incorporating a lower level of long term output. A confirmation comes from the analysis of survey data on capacity utilisation: we find indeed that perceived potential output or potential output growth has declined throughout the euro area. Results may be rather important for business cycle analysts and policy makers: for the former, the suggestion is to consider business survey data with particular care, since their interpretation has changed as a consequence of the crisis. Policy makers on the other hand should consider that the recession has changed long term expectations of agents, possibly significantly affecting transmission channels of both monetary and fiscal policies.

Key Words: Business cycles; Business surveys; potential output growth; structural breaks

JEL Classification: C12; C32; E23; E32

1. Introduction¹

The recession has determined a dramatic fall of manufacturing activity in the Euro area. After a relatively fast recovery in the second part of 2009 and the first months of 2010, industrial activity stalled, remaining broadly stable until the first two quarters of 2011 and then declining again in the third quarter. On average, Euro area production levels in September 2011 were still more than ten percentage points below those of the previous peak. Also Confidence indicators elaborated by the European Commission fell during the recession to historical lows, but they recovered since spring 2009, eventually returning in the first quarter 2011 on their pre-crisis levels. Hence, there is evidence that the crisis has caused a break in the relationship between Confidence indicators and activity (Artus, 2011; Biau and D'Elia, 2011). What may have caused the de-coupling between industrial activity and firms' perceptions? A possible interpretation is that patterns of response to survey questions have changed as a consequence of the crisis: firms may answer having in mind a lower level of long term industrial output, and hence their (qualitative) replies may get better even if actual production is still lower than before the crisis. In other words, the fact that in some countries Confidence seems to overestimate the intensity of the recovery may be interpreted as an evidence of a long term effect of the crisis on firms' perceptions about their own potential output. The aim of this paper is to better investigate this hypothesis, providing evidence on firms' opinions about their long term output; these opinions are derived from the answers to the quarterly question on capacity utilisation. Indeed, in the standard output gap interpretation (see on this Malgarini and Paradiso, 2011), the index of capacity utilisation derived from the EU manufacturing survey is interpreted as the perceived current-to-potential output ratio. Hence, at the aggregate level the production-to-capacity ratio may be considered as a proxy of the idea of potential output which is consistent with the current level of production and the reported level of capacity utilisation.

The paper is structured as follows: section 2 provides an analysis of the cyclical characteristics of both industrial production and Confidence and then section 3 investigates on evidence of possible breaks in the relationship among the two series; section 4 introduces our measure of potential output as perceived by the firms and then checks for evidence of a structural break in the series. Our results suggest that such a break has actually occurred in a number of Euro area countries, providing further evidence that the crisis has had a negative effect on potential industrial output and possibly potential growth in Europe. Some considerations on the results obtained and on possible research developments conclude the paper.

2. The relationship among industrial activity and Confidence

2.1 Industrial activity and confidence

According to CEPR, the last peak in economic activity in the Euro area occurred in the first quarter, 2008, followed by a trough in the second quarter, 2009. During the recession, industrial production in the manufacturing sector fell on average by 22 percentage points; looking at the country of the Euro Core², production fell by 24, 26.7 and 20.4 percentage points respectively in Germany,

¹ I wish to thank Gian Paolo Oneto for useful discussions on a previous version of the paper, together with the participants to both the CIRET/KOF/HSE-Workshop on "National Business Cycles in the Global World", Moscow, September 15-17, 2011 and the Fifth Joint EU-OECD Workshop on International Developments in Business and Consumers Surveys, Bruxelles, November 17-18, 2011. The usual disclaimers apply.

² According to the definition provided in Cesaroni, Malgarini, Maccini (2011)

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Italy and France; outside the Euro area, production fell by 13,6% in the UK. Since the spring of 2009, industrial activity recovered, generally remaining below its pre-crisis levels. More precisely, in the Euro area average in September, 2011 industrial production still was more than ten points below the values reached at the peak of the previous cycle; it remains almost 18 points below the peak in Italy, while Germany is the only country in which it has returned around its pre-crisis levels.

Manufacturing production developments are generally considered to be closely monitored by those of the manufacturing Confidence Indicator (CI), calculated on a monthly basis from the results of the Business Surveys performed by various Institutes throughout Europe in the framework of an EU-Harmonised project (see on this Cesaroni et al., 2011). The survey asks a representative sample of manufacturing firms their evaluation on, among other things³, the current and expected level of demand, production and inventories. Questions are qualitative, in the sense that firms have to report whether the variable of interest is either considered normal (or sufficient, or stable), above normal (or more than sufficient, or growing) or below normal (or less than sufficient, or decreasing). A synthetic measure of firms' opinions is generally calculated in the form of the balance among the shares of positive and negative replies⁴. CI is then defined as the simple average of the three balances concerning the current level of orders and inventories (the latter entering with a negative sign) and the expected level of production three months ahead. In order to ensure cross-country comparability, data are extracted from the European Commission website (http://ec.europa.eu/economy_finance/db_indicators/surveys/index_en.htm); they are seasonally adjusted using Dainties.

In order to examine the relationship among Confidence and industrial activity, we first have to establish whether the business cycle features of the Confidence indicator are better related either to the concept of *classical, deviation or growth cycle* of the quantitative indicator (for a recent analysis referred to the Italian economy, see Bruno et al, 2011). In the first case (classical cycle), the Confidence indicator is to be directly related to the level of the quantitative series. When the deviation cycle approach is considered, Confidence is related to the cyclical component of the quantitative series, extracted with an appropriate filter; in the following we will use both the Hodrick-Prescott and the asymmetric Christiano-Fitzgerald band pass filter allowing to consider also the final period of the sample⁵. Finally, in the growth cycle approach, the cycle is extracted using the seasonal difference of (the log of) the production index. Table 1 presents cross correlations among Confidence and the various definition of industrial production cycle, reporting both the contemporaneous and the max correlation among the series. The analysis confirms that in the Euro area as a whole and in its main countries Confidence and industrial production are closely correlated; moreover, Confidence is particularly related to the cyclical component of industrial production extracted according to the growth cycle approach. Moreover, the cross correlation function among Confidence and productions peaks at lag 0; this means that statistically Confidence is a mostly coincided indicator of industrial production growth. However, it should be considered that industrial production data are available on average with a delay of 45 days, whilst Confidence is usually available some days in advance with respect to the end of the reference period: in this sense, Confidence may be considered as a leading indicator, with a lead of more than one month, with respect to the effective availability of quantitative data on industrial production growth.

Figure 1 shows Confidence together with the cyclical component of industrial production (calculated both according to the deviation cycle and the growth cycle approach) for the period

³ For the complete questionnaire, see European Commission (2007), available at http://ec.europa.eu/economy_finance/db_indicators/surveys/method_guides/index_en.htm.

⁴ For a review of the various methods of quantification of survey data, see for instance Pesaran and Weale (2005).

⁵ More specifically, in the application of the HP filter, according to Ravn and Uhlig (2002) we use a value of λ equal to 14,400; for the asymmetric version of the CF filter, we assume that confidence variables are stationary and that the low and high values of the cycle period are equal to 18 and 96.

January 1986-June/September 2011⁶. The cyclical components of Industrial production and Confidence generally show a quite similar pattern across the business cycle; looking at the most recent period, both Confidence and production fell abruptly from the end-2007/beginning of 2008 until the beginning of 2009. After that, the two series show however different patterns: industrial production accelerates until the summer of 2010, eventually stabilising after that; on the other hand, Confidence recovers at a slower pace in the first months of 2010, but continues to grow until the first quarter, 2011. After that, it starts to weaken again, in most countries returning during the summer on the levels of one year before. Hence, starting from mid-2010 industrial production growth has not been as strong as it may have been expected on the basis of survey results; after that, Confidence has become a lagging – instead of a mostly coincident - indicator of the cyclical developments in industrial production. Looking at individual countries, a similar pattern is observed for France, the UK, and Italy. In Germany on the other hand the two series seems to move together even in the most recent phase.

2.2 The cyclical chronology

In order to gain a better understanding of the business cycles characteristics of CI vis-à-vis those of industrial activity, we also calculate the business cycle reference dates, using the standard Bry-Boschan routine⁷; table 2 presents a synthesis of the results, with the number of turning points identified for each series, the number of turning points of industrial activity correctly identified by the CI, those missing and the extra cycles, together with the average lead/lag, expressed in months, of Confidence at turning points (the complete business cycle dating is available with the author upon request). Confidence emerges as a leading indicator of Industrial activity at turning points in all countries but the UK; the lead is equal to 4,7 months for the Euro area and is higher in Italy (4,9 months) than in Germany (1,2) or France (2,1). Most turning points of industrial production are correctly gauged by the indicator, even if Confidence generally shows one or more extra cycles and in some cases fails to correctly track the reference cycle. In the latest recession, Confidence has generally been a leading indicator at the latest peak and a coincident indicator of the last trough in economic activity, generally occurred between the first and second quarter, 2009. After that industrial production is still in an expansionary phase, while the statistical procedure is able to identify a peak for the Confidence series in the first months of 2011, an event that should be confirmed by further analysis when new data will become available.

2.3 Business cycle stylized facts

Table 3 then provides for each country various business cycles statistics, including the average duration of complete cycles, expansions and contractions, their amplitude and steepness (i.e. the amplitude divided by the duration). The table also reports a measure of asymmetry of the fluctuations – the excess of cumulated movements (E) – which shows the deviation from a constant expansion/contraction: more precisely, a value close to zero of the indicator implies that the cyclical fluctuation is (almost) linear, while during an expansion a negative sign implies non-linear behaviour with a progressive intensification of gains (concave expansions) and a positive sign instead indicates a convex expansion, with a slowing down of output gains towards the end of the fluctuation. On the other hand, during a recession, a positive sign of E is interpreted as indicating a “convex recession”, where output losses are particularly intense at the beginning of the fluctuation. Conversely, a negative sign is an indicator of a “concave recession”, where losses are particularly intense towards the end of the fluctuation. In the Euro area expansionary phases for both Industrial production and Confidence

⁶ For Italy, the period considered starts from January 1991 according to the availability of industrial production data

⁷ Similar results are also obtained with the Harding-Pagan method.

have been longer and ampler than recessions, while the latter are generally steeper than the former. Both industrial production and Confidence show the tendency to a progressive intensification of gains during an expansion (negative sign of the Excess expansion indicator) and of particularly intense losses at the beginning of a recession (positive sign of the Excess recession indicator).

All in all, cyclical analysis confirms that industrial production and Confidence are closely related, even if in some cases the Confidence indicator is not capable of correctly tracking industrial activity across the business cycle: this seems indeed to have happened during the latest recovery, when a substantial stabilisation of activity has been matched first by a continuous growth and only later by a weakening of the Confidence indicator. In other words, graphical and cyclical analysis shows a possible instability in the relationship among activity and Confidence, a hypothesis that can be more thoroughly tested with appropriate econometric techniques.

3. A test for structural change in the Industrial production-confidence relationship

In this section we test for possible structural breaks in the Production/Confidence relationship. We follow Biau and D'Elia (2011) and estimate the following simple bridge model linking Confidence and activity:

$$\Delta IP_t = \alpha + \Sigma \beta \Delta IP_{t-i} + \delta CI_t + \Sigma \gamma_i \Delta CI_{t-i} + u_t \quad (1)$$

In (1) IP_t is the industrial production index and CI_t is the Confidence indicator, i is an appropriate number of lags, Δ and $\Delta 1$ respectively are the seasonal and first difference operators and u_t is a series of white noise residuals. Estimates are carried for the same countries as in table 1 for the period 1986-2011 (1991-2011 for Italy); given that both industrial production growth and Confidence tend to be auto correlated, we choose to estimate (1) on the quarterly transformation of the original series. We proceed to identify the appropriate model using a general to specific strategy, considering the number of lags for both the dependent variable and the change in Confidence insuring that residuals are white noise⁸. Figure 2 presents actual and fitted values of the regression for the Euro area as whole; similar results emerge for individual countries (available with the author upon request). The fit of the regression is rather good and the residuals are indeed white noise, as confirmed by the standard specification tests (results of which are available with the author upon request). In order to evaluate the stability of the relationship, we then estimate it with recursive methods; recursive methods have the advantage of not requiring a-priori identification of break date(s), as in the case of the more traditional Chow stability test. More precisely, we look both at the stability of recursive residuals and at the probability of the value of the dependent variable at time t to have come from the model estimated from the dataset up to $t-1$ (fig. 3): a probability below the 5% threshold, together with the recursive residuals being outside of its standard error band, is interpreted as evidence of instability in the Production-Confidence relationship. According to the data, the equation linking industrial production growth and Confidence shows clear sign of instability since mid-2008, in keeping with the chronology of the recession: recursive residuals fall below the .05 probability threshold both in the Euro area aggregate and in individual countries. Indeed, the relationship among production and Confidence showed sign of instability also during previous recessions in Germany, Italy and the UK, while in the past it has been relatively more stable for France and in the Euro area as a whole.

⁸ We generally allow for four lags of both the dependent variable and the change in Confidence.

4. Possible interpretations of the de-coupling among Production and Confidence

4.1 The qualitative nature of survey data

Both business cycle stylized facts and structural stability analysis confirm that in the recent period there is evidence of a break in the Production/Confidence relationship. What is the possible interpretation of this result? It is just a signal of “myopic” responses on behalf of the firms, or it may hint to some change in the underlying long term trends in industrial activity? A more careful consideration of the nature of the survey questionnaire may help to shed some light on these issues. The three questions included in the CI respectively ask about the current level of orders and inventories and the expected level of output. Following Carlson and Parkin (1975), we may consider that the response given by the i^{th} firm about recent developments in x_{it} (say, the i^{th} firm's current level of orders) is based on the subjective probability density function, conditional on the available information, Ω_{it} . Denote this subjective probability density function by $f(x_{i,t+1} | \Omega_{it})$. Let's assume that the responses are constructed in the following manner:

- if $x_{i,t} \geq b_{it}$, respondent i assess that orders are “above normal”;
- if $x_{i,t} \leq -a_{it}$, respondent i assess that order are “below normal” ;
- if $-a_{it} < x_{i,t} < b_{it}$, respondent i assess that orders are “normal”.

where $x_{i,t} = E(x_{i,t} | \Omega_{i,t-1})$ and $(-a_{it}, b_{it})$ is the indifference interval for given positive values, a_{it} and b_{it} , that define perceptions on the level of the variable of interest. In other words, firms will answer that orders are above normal if they assess that the current level of the variable is above the individual threshold b_{it} , while they will report that it is “below normal” if they consider it below the $-a_{it}$ threshold, the interval $(-a_{it}, b_{it})$ representing the values of the variable for which the firm will report normality. The values $(-a_{it}, b_{it})$ are usually considered to be stable over time; this in turn implies that firms consider constant (or, better, comprised between the constant interval $-a_{it}, b_{it}$) the “normal” level of orders. However, it is well possible that this interval varies over time: according to a recent analysis performed by Wood (2011) indeed most survey respondents (70%) change their reference “normal” levels over time. In this respect, in the following we would like to test the hypothesis that during the current recovery firms have in mind a lower normal level of orders, against the alternative that the normal interval is constant, or, more formally:

$$H_0: b_{i,t>2009} = b_{i,t<2009} \text{ and } a_{i,t>2009} = a_{i,t<2009}$$

$$H_1: b_{i,t>2009} \neq b_{i,t<2009} \text{ and } a_{i,t>2009} \neq a_{i,t<2009}$$

Unfortunately, the survey does not allow a direct estimation of the “normal” level for the variables of interest. However, an analysis of the data concerning the current level of capacity may provide interesting insight about possible changes occurred in the “normal” level considered in answering survey questions.

4.2 A measure of perceived potential output

In the literature there is ample evidence that financial crises may have a severe impact not only on short term activity but also on long term prospects (see for instance on this Furceri and Mourougane, 2009). In this section, we try to provide additional evidence on this using data on

capacity utilization stemming from the same European survey, expressed as a percentage of full capacity. Indeed, according again to the recent analysis on survey answering practices in the UK, more than 60% of survey respondents intend the concept of normality with reference to capacity levels: an analysis of the level of capacity may hence shed some light also on the related concept of “normality” firms have in mind answering survey questions. In the standard output gap interpretation (see on this Malgarini and Paradiso, 2011), capacity utilization derived from the EU manufacturing survey is interpreted as the ratio between the current level of output and its (perceived) potential level:

$$cu_t = \frac{IP_t}{pot_t} \cdot 100 \quad (2)$$

Where cu =capacity utilization; IP =industrial production; pot =perceived potential output. From (2), we can simply derive an estimate of perceived potential output as the ratio of production to capacity utilization:

$$pot_t = \frac{IP_t}{cu_t} \cdot 100 \quad (3)$$

In other words, the production-to-capacity ratio may be considered as a proxy of the idea firms have in mind about their own perceived potential level of output, i.e. a measure of potential output consistent with the current level of production and the reported level of capacity utilization. With respect to the topic of discussion in section 3, if firms have in mind a lower level of “normal” output when they answer survey questions, they should also implicitly report a lower level of perceived potential output (derived as in (3)) when answering about the level of capacity utilization. We check for evidence of this result on the data, first of all looking at the behavior of the series over time and then formally testing for a change in mean perceived potential output and mean perceived potential output growth before and after the last recession. In this respect, figure 4 shows our measure of perceived potential output together with its y-o-y growth. According to our estimates, perceived potential output in the Euro area declines sharply during the recession, partially recovering after the trough of the second quarter of 2009. However, in some countries it seems to have stabilized on levels well below those reached during the previous cycle, and also potential growth in some countries seems lower than before the crisis.

Table 4 then presents a formal test of a change in perceived potential output levels and growth rates after the crisis. More specifically, we consider the paired t-statistic (allowing for possible heteroscedasticity in the two periods) for the periods immediately before and after the peak occurred in 2008, first quarter, hence considering a window of 15 quarters before and after the starting point of the recession. We provide the result of the test for both the one tail and two tails t distribution. Results show that there is evidence of a negative shift in the level of perceived potential output in France, Italy and the UK, while perceived potential output continues to grow in Germany and in the Euro area average. As for potential output growth, the recession does not seem to have had a significant impact in the United Kingdom, while evidence is less clear cut in other countries, with a widespread tendency towards a reduction of growth in the aftermath of the recession.

5. Conclusions

Looking at the data for industrial production and Confidence, we find that there is a sizeable decoupling between the two series in the aftermath of the recession. More specifically, industrial production, after a significant positive rebound in 2009 and the first six months of 2010, almost

stabilised since the summer of 2010, while Confidence Indicators continued to grow until the first months of 2011, eventually declining only in the most recent period. Is the decoupling merely a statistical feature? Or does it possibly tell us something about the long run effect of the crisis on industrial activity? In the paper, we have tried to interpret the break as a signal of a possible discontinuity in firms' pattern of response. Indeed, if firms have in mind a lower level of long term output, it is well possible that they would report relatively optimistic opinions even if the underlying actual output growth is modest. If this is the case, the change in firms' opinion should also emerge from their answers to other questions comprised in the questionnaire, most notably in that to the question about the level of capacity utilisation. In fact, in the standard output gap interpretation, firms report their level of capacity utilisation as the ratio between the actual level of production and their perceived level of potential output. From this simple interpretation of the survey question on capacity utilisation, we have hence derived a measure of "perceived" potential output and of "perceived" potential output growth and we have studied their evolution before and after the crisis. If the observed decoupling among Confidence and industrial activity is due to a decline of firms' perceptions about potential output rather than to a simple "myopic" perception, we would expect a decline in our measure of perceived potential output or potential output growth in the aftermath of the recession. Indeed, the data provide first evidence in support of this hypothesis: the level of perceived potential output is found to be significantly below its pre-crisis level in France, Italy and the United Kingdom, while in Germany and in the Euro area average perceived potential output seems to have continued to grow with respect to its pre-crisis levels. However, in the Euro average and in Germany perceived potential output growth seem to have significantly declined instead as a consequence of the crisis. A possible interpretation of these findings is that the crisis has also determined a significant shift of firms' perceptions about the "normal" levels of activity and their implicit assessments on their own long term potential output and potential output growth. This result may be rather important for business cycle analysts and policy makers. For the former, it tells that the crisis has determined a discontinuity in the pattern of response to survey questions, which may possibly biases assessments on business cycle situation based on survey data; for the latter, the analysis confirms that the recession has changed long term expectations of economic agents, with possibly significant effects on the transmission channels of both monetary and fiscal policies.

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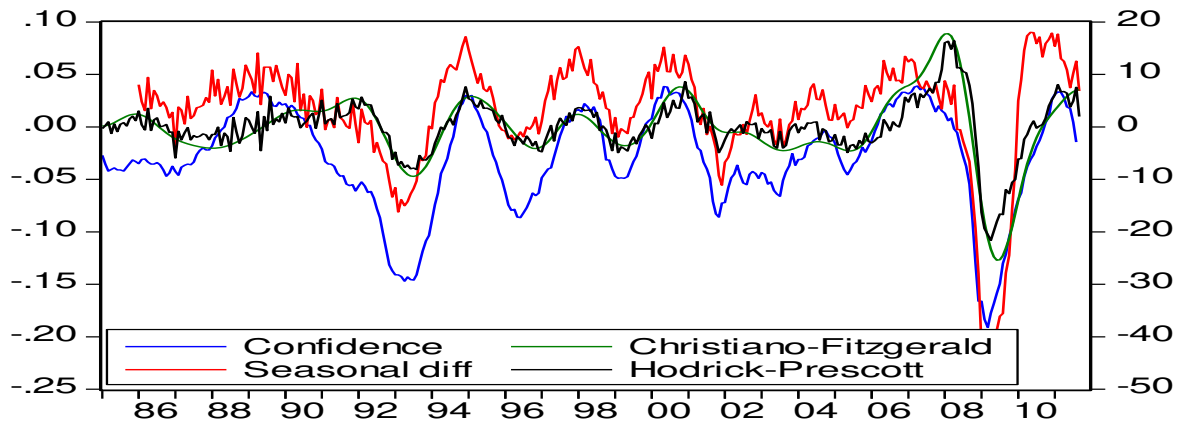
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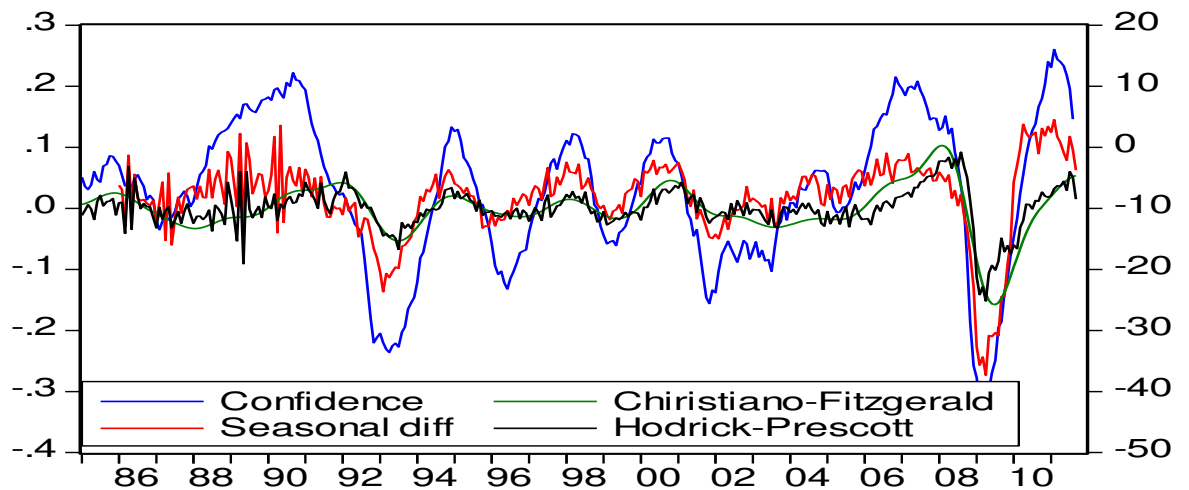
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Figure 1 Production and Confidence

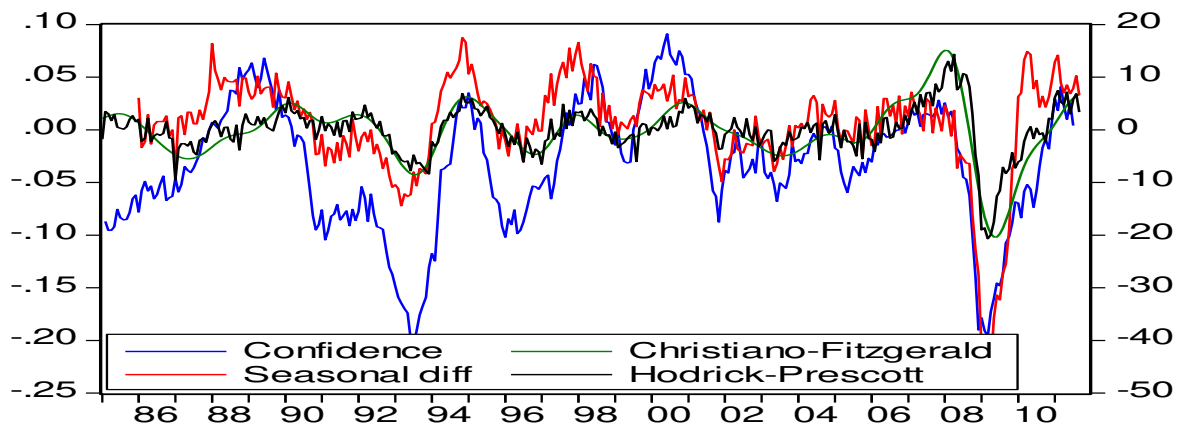
Euro area



Germany

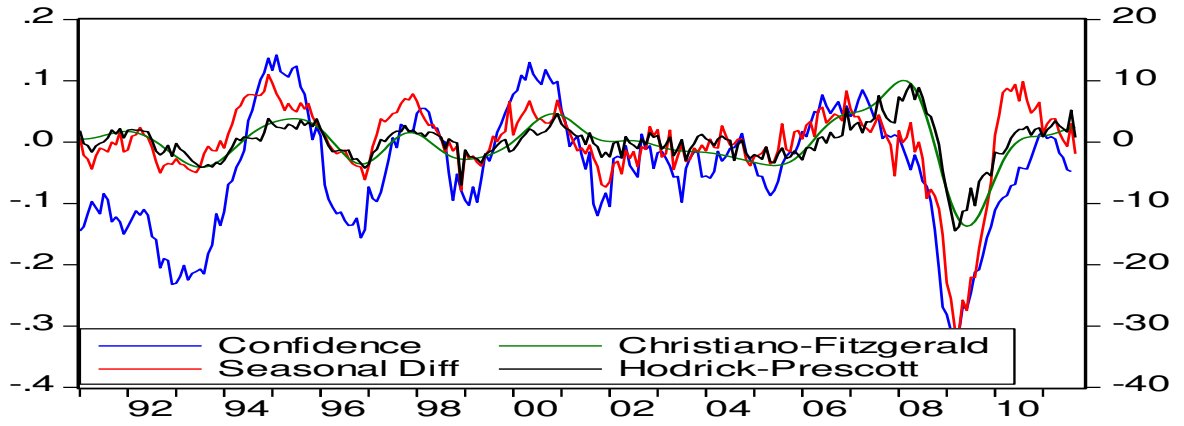


France

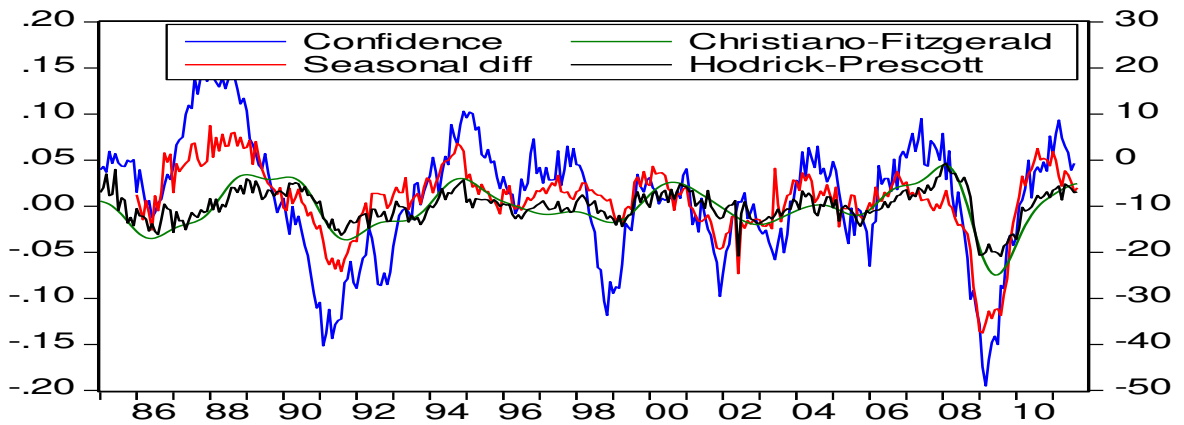


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Italy

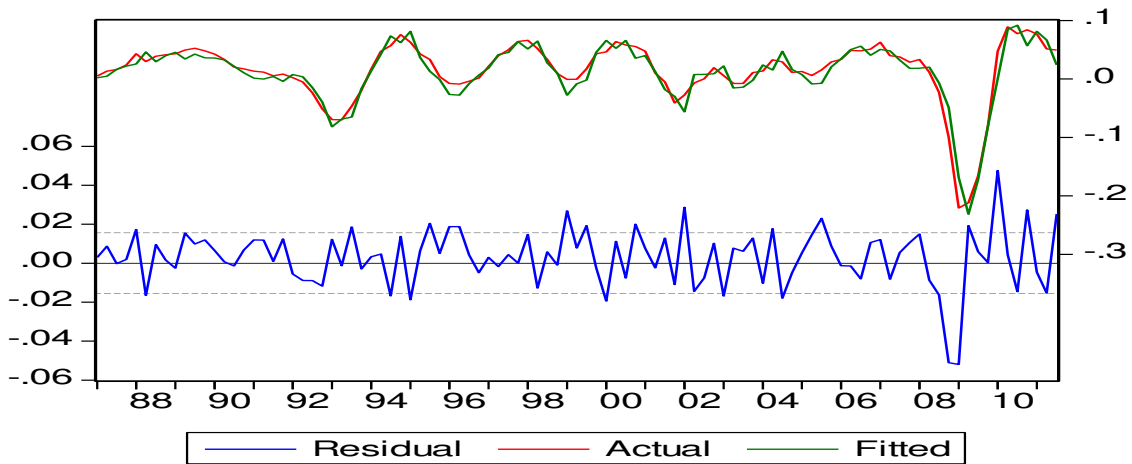


United Kingdom



Source: Eurostat; OECD, European Commission

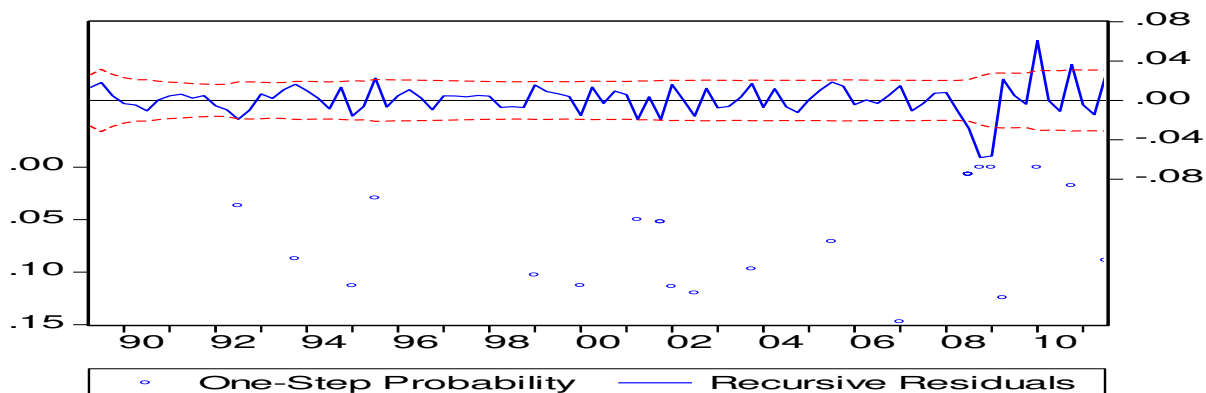
Figure 2 Manufacturing production in the Euro area – fitted values and actual data



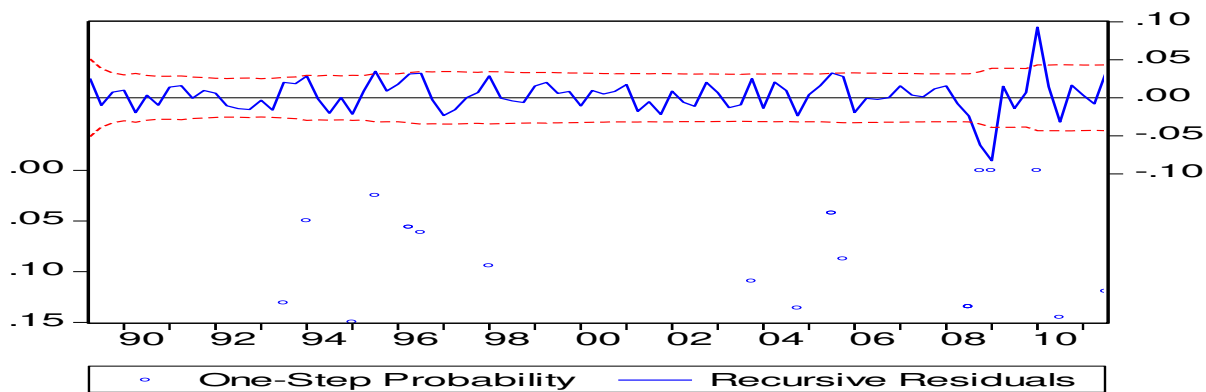
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Figure 4 One step ahead stability test

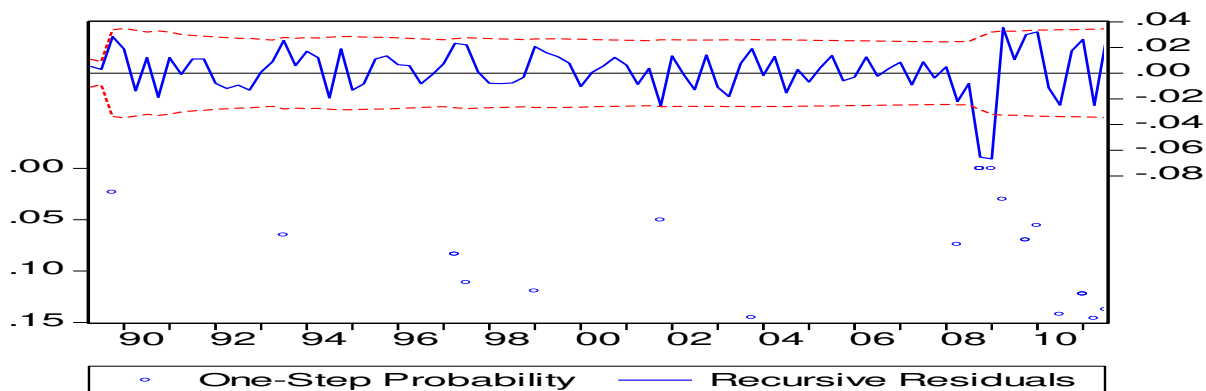
Euro area



Germany

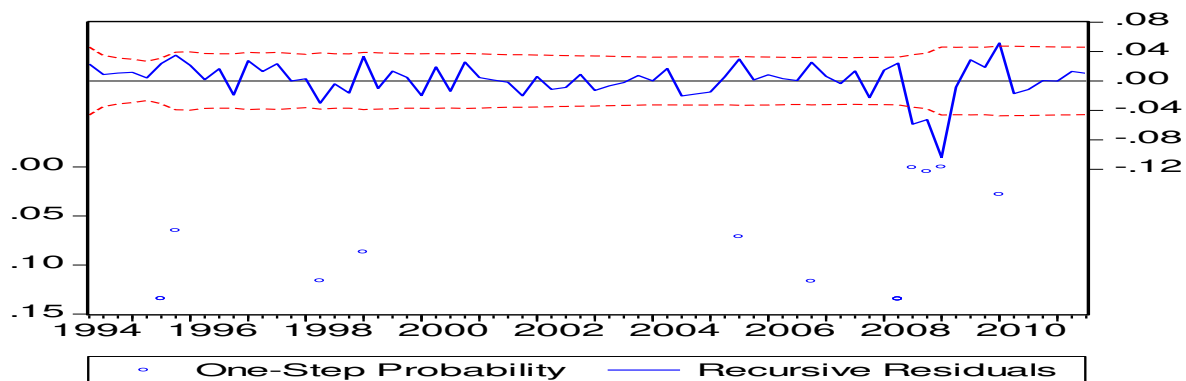


France



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Italy



United Kingdom

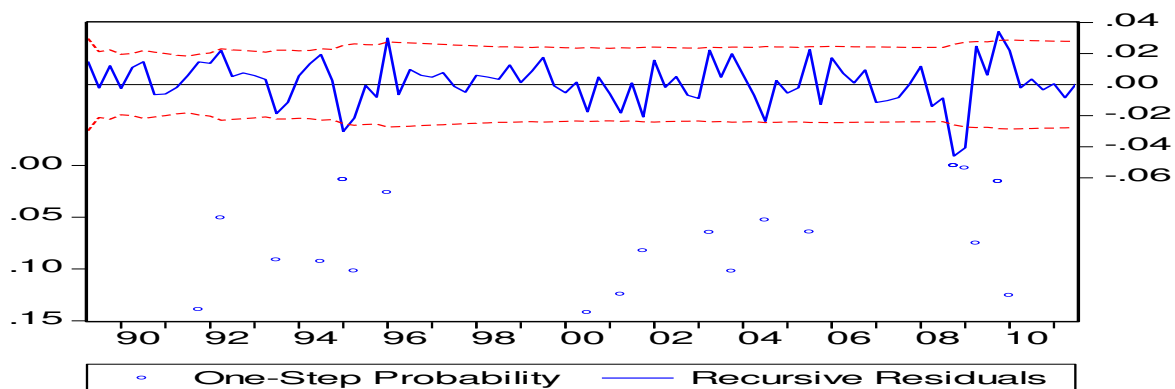
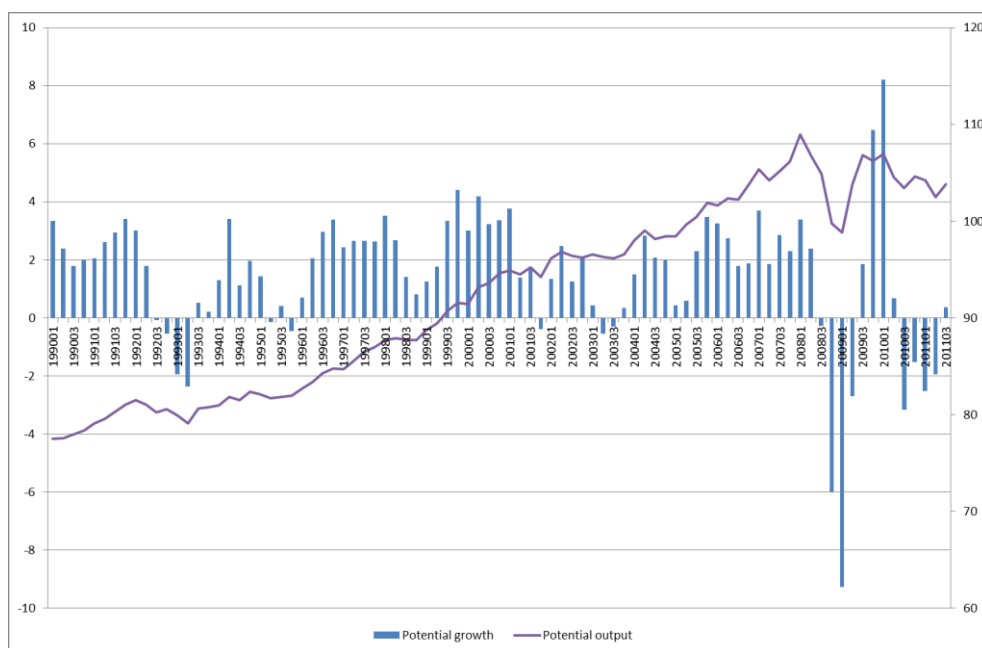


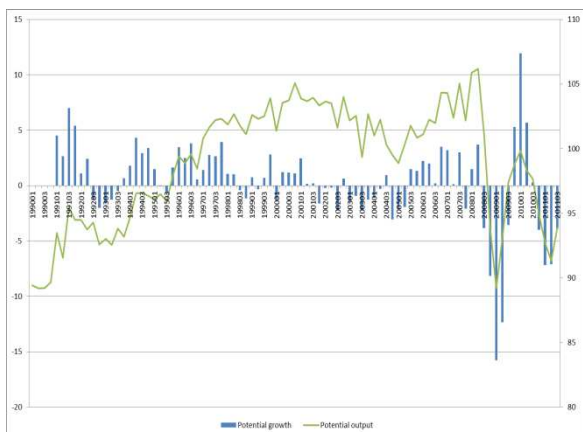
Figure 5 Perceived potential industrial output and potential output growth in the Euro area

Euro area

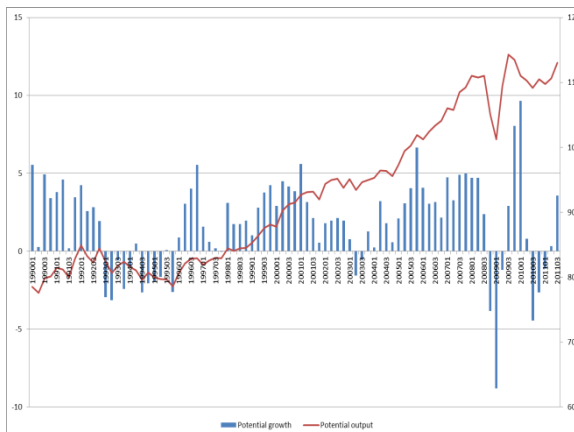


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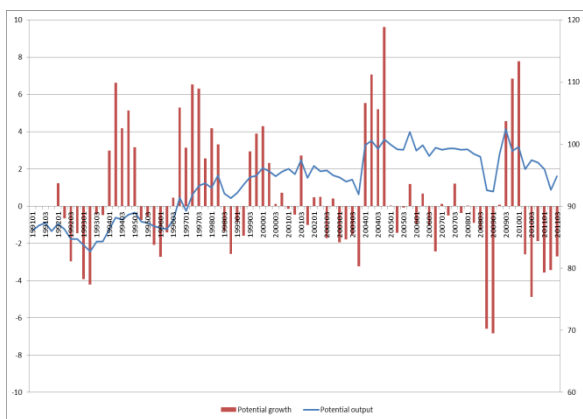
Italy



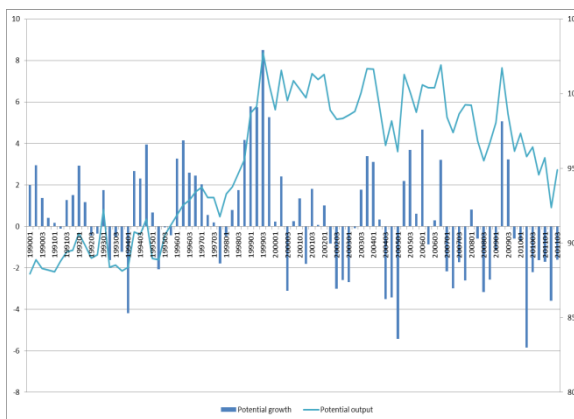
Germany



France



United Kingdom



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Table 1 - Cross Correlations between Confidence Indicators and Industrial Production, 1985-2011

	Level	Christiano-Fitzgerald	Hodrick-Prescott	Seasonal Δ of logs
Euro area				
Correlation at 0	0,25	0,70	0,70	0,85
Max correlation (lead)	0,27 (2)	0,78 (3)	0,75 (2)	0,85 (0)
France				
Correlation at 0	0,52	0,59	0,58	0,74
Max correlation (lead)	0,55 (3)	0,64 (3)	0,63 (2)	0,74 (0)
Germany				
Correlation at 0	0,27	0,66	0,63	0,82
Max correlation (lead)	0,28 (2)	0,74 (3)	0,68 (2)	0,82 (0)
Italy				
Correlation at 0	0,69	0,66	0,63	0,75
Max correlation (lead)	0,74 (3)	0,74 (3)	0,68 (2)	0,75 (0)
United Kingdom				
Correlation at 0	-0,02	0,55	0,52	0,80
Max correlation (lead)	-0,02 (0)	0,65 (4)	0,56 (5)	0,80 (0)

Table 2 – Business cycle chronology, 1985-2011

		Number of turning points	Correctly identified	Missing	Extra turning points	Average lead/lag
Euro area	Industrial Production	10				
	Confidence	16	10	none	6	-4,7
France	Industrial Production	10				
	Confidence	14	8	2	6	-2,1
Germany	Industrial Production	10				
	Confidence	13	8	1	4	-1,8
Italy	Industrial Production	13				
	Confidence	11	10	3	1	-4,9
Uk	Industrial Production	11				
	Confidence	11	7	2	4	7,6

Industrial production and confidence after the crisis: what's going on?

Table 3 – Business cycle Stylised facts, 1985-2011

	Euro area		France		Germany		Italy		Uk	
	Conf.	Industrial Prod.	Conf.	Industrial Prod.	Conf.	Industrial Prod.	Conf.	Industrial Prod.	Conf.	Industrial Prod.
N. of cycles (peaks)	3,0	2,0	3,0	3,0	3,0	2,0	2,0	2,0	2,0	2,0
N. of cycles (troughs)	3,0	2,0	3,0	3,0	2,0	2,0	2,0	3,0	2,0	3,0
Average Dur. – peaks	42,9	48,5	36,8	54,0	50,7	51,0	52,6	39,4	37,5	71,5
Average Dur. – troughs	40,3	47,0	36,2	45,8	38,2	47,3	55,6	35,8	43,4	20,8
Average Dur. – Rec.	19,9	13,6	15,7	23,4	28,0	16,2	23,6	17,2	22,6	50,8
Average Dur. – Exp.	20,9	35,3	21,2	28,0	22,7	34,5	30,3	18,7	20,8	-7,9
Amplitude – Rec.	-21,9	-8,3	-29,1	-8,9	-27,5	-10,6	-29,0	-10,7	-31,0	10,5
Amplitude – Exp.	21,0	11,6	25,2	8,9	30,3	13,4	26,5	8,8	29,2	0,0
Steepness – Rec.	-110,1	-61,1	-185,5	-38,2	-98,2	-65,3	-122,9	-62,3	-137,2	20,7
Steepness – Exp.	100,6	33,0	118,9	31,9	133,8	38,8	87,4	47,1	140,4	0,0
Triangle Approx. – Rec.	-440,3	-195,2	-527,0	-204,5	-525,3	-250,0	-806,2	-191,7	-672,7	108,9
Triangle Approx. – Ex.	219,2	205,1	266,3	125,0	343,8	231,2	401,9	82,1	303,7	0,0
Excess - Recessions	21,1	13,7	31,7	8,4	17,8	14,8	32,9	10,5	28,4	-1,9
Excess - Expansions	-9,5	-5,5	-11,4	-4,1	-13,8	-6,3	-12,4	-3,9	-13,2	0,0

Table 4 Potential output and potential output growth before and after the crisis

Potential output					
	2004q2-2007q4 Averages	2008q1-2011q2 Averages	t test	$H_0: M_1 \neq M_2$	$H_0: M_1 > M_2$
Euro area	101,8	104,4	2,7	0,01	0,00
France	99,6	96,9	-3,4	0,00	0,00
Germany	101,8	111,0	5,8	0,00	0,00
Italy	101,8	96,9	-3,6	0,00	0,00
United Kingdom	99,1	96,7	-3,5	0,00	0,00
Potential output growth					
	2004q2-2007q4 Averages	2008q1-2011q2 Averages	t test	$H_0: M_1 \neq M_2$	$H_0: M_1 > M_2$
Euro area	2,3	-0,3	-2,2	0,05	0,02
France	1,2	-1,0	-1,6	0,12	0,06
Germany	3,5	1,0	-1,9	0,08	0,04
Italy	0,6	-2,5	-1,5	0,14	0,07
United Kingdom	-0,5	-1,1	-0,5	0,59	0,29