

# MPRA

Munich Personal RePEc Archive

## **Confidence and economic activity in Europe**

Saccal, Alessandro

3 January 2022

Online at <https://mpra.ub.uni-muenchen.de/117482/>  
MPRA Paper No. 117482, posted 31 May 2023 13:23 UTC

# Confidence and Economic Activity in Europe

Alessandro Saccal\*

Independent Researcher, Italy

January 3, 2022

## Abstract

This study supplies additional empirical evidence of responses in real economic activity to shocks in confidence. A Structural Vector Autoregression (SVAR), featuring confidence, real consumption and real output, is constructed with respect to the Euro Area (EA) and eight European nations. The results are mixed: responses exhibit reversibility and irreversibility, suggesting the formulation of a theoretical mechanism capable of formalizing such a variety. The potential causes behind confidence in the same nations are, moreover, evaluated through a panel data regression. The results indicate aversion towards output, inflation, unemployment, monetary independence and financial openness, but favor population, exchange rate rigidity and the accumulation of sovereign debt.

*JEL classification numbers: C32; C33; E37.*

*Keywords: confidence; economic activity; Europe.*

## INTRODUCTION

Market efficiency versus state intervention is a historic dispute in economics, but explicit research on the role of confidence therein is relatively scarce. That notwithstanding, two views emerge: the Keynesian and the Pigovian. The first view conjectures confidence as pure sentiment<sup>1</sup> waves, while the second admits it as a proxy for news shocks to economic fundamentals (and noise shocks).

The Keynesian view is perhaps best exemplified by Angeletos et al. (2018), wherein higher order beliefs are regarded as potentially expansionary and effective transmitters of pure sentiment shocks. The other prominent references are Angeletos and La'O (2013) and Lorenzoni (2009). The Pigovian view, having gained ampler attention, is instead fittingly typified by Barsky and Sims (2012) [as well as by Cochrane (1994) and Beaudry and Portier (2006)]. In their work, the signal extraction problem of news and noise shocks faced by agents is resolved as follows: because news and noise processes are not theoretically observable<sup>2</sup>, confidence is devised as their theoretical and empirical proxy, so that empirical Structural Impulse Response Functions (SIRFs, i.e., orthogonalized) in real consumption and real output upon changes in confidence reveal the nature of the underlying shocks, as Sims (2012) had indicated. Barsky and Sims (2012) applied it to the US.

In this study, the same empirical exercise is carried out with respect to the ensuing sample: Euro Area (EA), France, Germany, Greece, Ireland, Italy, Portugal, Spain and the United Kingdom (UK). Other than wishing to depict Europe's corresponding situation, the present scope involves the amplification of the germane SIRFs spectrum in order to expand upon the empirical basis for the two views. Be that as it may, this study chooses to ascribe neither news nor noise shocks to ones in empirical confidence, thereby accounting for Chahrour and Jurado's (2018) remark by which news and noise proxies are equivalent

---

\*sacal.alessandro@gmail.com. Disclaimer: this is a private version of the work's publication in *The IUP Journal of Applied Economics*, Volume XXI, January 2022, 1: 55-67. [https://www.iupindia.in/0122/Applied%20Economics/Confidence\\_and\\_Economic.asp](https://www.iupindia.in/0122/Applied%20Economics/Confidence_and_Economic.asp)

<sup>1</sup>Pure sentiment (i.e., demand, noise) is in contrast to sentiment, which is a typical confidence statistic.

<sup>2</sup>Such is the reason for which Blanchard *et al.* (2013) might not empirically recover news and noise shocks, as also stressed by Sims (2012).

representations of economic fundamentals and beliefs<sup>3</sup> (i.e., news and noise processes). Lastly, a panel data regression with respect to the same nations is run to the end of probing for possible confidence constituents, thereby providing a better sense of its characterization (even in reverse causality).

## METHODOLOGY

### Structural Vector Autoregression (SVAR), SIRFs and Forecast Error Variance Decompositions (FEVDs)

Consider the following trivariate VAR of order 4 :

$$x_t = \Pi_1 x_{t-1} + \dots + \Pi_4 x_{t-4} + w_t, \quad (1)$$

for  $x_t = [s_t, c_t, y_t]^\top$ , depicting economic sentiment (i.e., confidence), real consumption and real output, respectively, and  $w_t$  as a white noise. Real consumption is placed ahead of real output in the light of its ampler informational content [i.e., the permanent income hypothesis, whereby consumption is a sufficient statistic for future output; see Cochrane (1994)]. Upon parameters estimation and a short run restriction, it is transformed into a structural VAR(1) :

$$z_t = \Gamma z_{t-1} + \varepsilon_t,$$

for  $z_t = [x_t, x_{t-1}, x_{t-2}, x_{t-3}, x_{t-4}]^\top$  and  $\varepsilon_t = D\eta_t$ , wherein  $D$  is a  $(5 \times 5)$  lower triangular matrix,  $\mathbb{E}_t [\varepsilon_t \varepsilon_t^\top] = DD^\top$  and  $\mathbb{E}_t [\eta_t \eta_t^\top] = I$ . Causality gives rise to a Structural Vector Moving Average (SVMA) of infinite order:

$$z_t = \sum_{j=0}^{\infty} \Gamma^j D \eta_{t-j}, \quad (2)$$

for SIRFs  $\sum_{j=0}^{\infty} \Gamma^j D$  and FEVDs  $Var(e_{t+h}) = Var\left(\sum_{j=0}^{h-1} \Gamma^j D\right)$ .

The trivariate VAR(4) in question features an estimation in log-levels across all three variables because data therein are renowned to be generally cointegration robust. In order to describe the response of either real economic activity variable to a single impulse in economic sentiment, one considers partial derivatives of real consumption and real output with respect to a short run restricted shock in economic sentiment (i.e., SIRFs), at a horizon of 40 lags:

$$\frac{\partial z_t}{\partial \eta_{t-j}} = \Gamma^j D, \quad \forall j = 0, 1, \dots$$

### Data

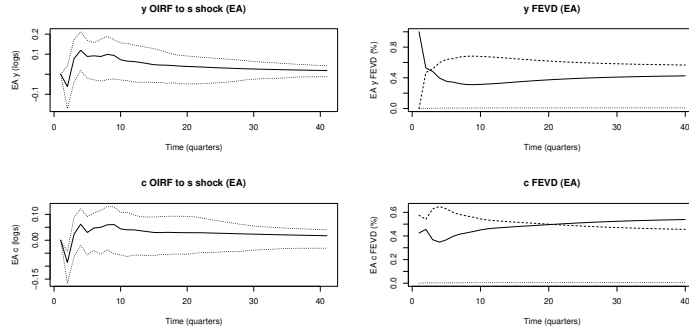
The quarterly data (1996-2021) on the economic sentiment indicator were supplied by the European Commission Directorate General for Economic and Financial Affairs. Quarterly and nominal consumption expenditure and Gross Domestic Product (GDP), seasonally and calendar-adjusted and in millions of euros, and the Consumer Price Index (CPI) instead belong to the Eurostat accounts. Real consumption and real output are computed by dividing their nominal counterparts by the CPI. The construction of the economic sentiment indicator is located at page 21 of “The Joint Harmonised EU Programme of Business and Consumer Surveys” user guide.

### Results and Discussion

Following an immediate plunge (see Figure 1), EA SIRFs display increasing short-run reactions. As of the 15th quarter or so, a new steady state is approached. EA responses exhibit a pattern of delayed irreversibility. The economic sentiment shock hardly accounts for real economic activity variations. The real consumption shock ultimately explains about 50% of the respective changes in real output and itself. The real output shock ultimately explains about 40 and 50% of the respective changes in real consumption and itself.

<sup>3</sup>Sims (2012) had implicitly conveyed so and Barsky and Sims (2012) had implicitly applied it by choosing confidence as the equivalent representation of the underlying news and noise processes, as seen above.

Figure 1: EA SIRFs and FEVDs



*Note:* The first column depicts EA SIRFs and confidence intervals (i.e., solid and dotted lines) of real output and real consumption to a shock in economic sentiment at a 10-year horizon. The second column depicts EA FEVDs of real output and real consumption, wherein solid, dashed and dotted lines respectively graph the contributions of real output, real consumption and economic sentiment.

French SIRFs (see Figure 2) exhibit an immediate plunge and an oscillating and only partly successful return to the steady state therefrom, as of the 15th quarter circa. Both real output and real consumption increase the most around the fifth quarter, but the latter's oscillation is about the new steady state, whereas the former's follows a regressing expansion. French responses globally display a pattern of immediate irreversibility. The economic sentiment shock again hardly accounts for real economic activity variations. The real consumption shock ultimately explains about 50 and 70% of the respective changes in real output and itself. The real output shock ultimately explains about 30 and 40% of the respective changes in real consumption and itself.

German SIRFs globally display an immediate rise and are ultimately non-reverting. Real consumption increases the most around the 10th quarter and real output around the fifth, both approaching the new steady state around the 20th. German responses globally exhibit a pattern of immediate irreversibility. The economic sentiment shock does not likewise account for real economic variations. The real consumption shock ultimately explains about 40 and 60% of the respective changes in real output and itself. The real output shock ultimately explains about 40 and 60% of the respective changes in real consumption and itself.

Greek SIRFs exhibit an immediate plunge, lasting until the 10th quarter circa, as of which the new steady state is softly approached. Greek responses display a pattern of delayed irreversibility. The economic sentiment shock similarly accounts for little variation in real economic activity. The real consumption shock ultimately explains 60% or so of the respective changes in real output and itself, though plunging to less than 40% as regards the latter, around the 10th quarter. The real output shock ultimately explains 30% or so of the respective changes in real consumption and itself, though peaking to more than 60% as regards the former, around the 10th quarter.

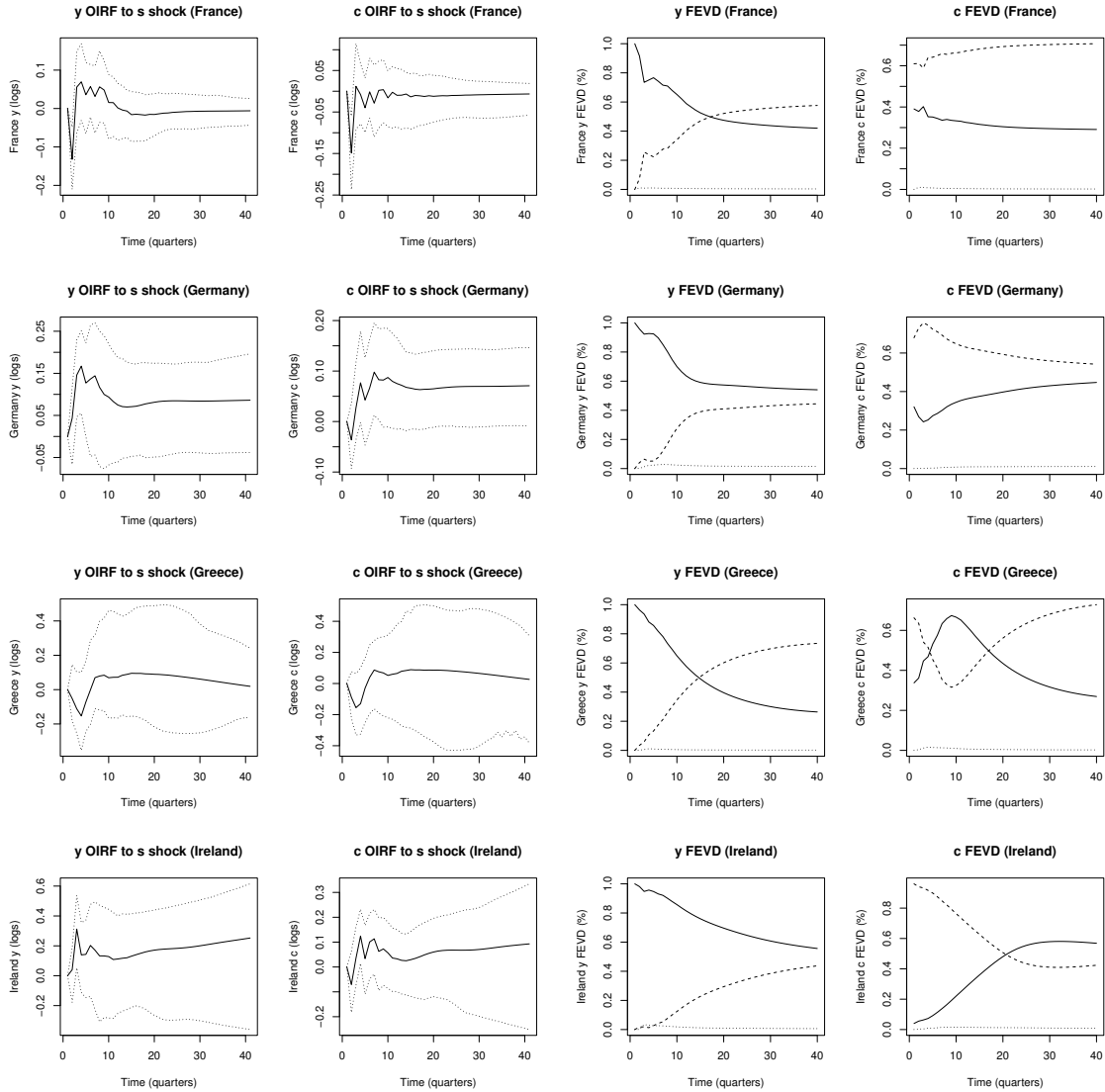
Irish SIRFs globally display an immediate rise and are ultimately non-reverting, as German ones. Both real consumption and real output increase the most around the fifth quarter, approaching the new steady state around the 20th. Irish responses globally exhibit a pattern of immediate irreversibility. The economic sentiment shock once again accounts for little variation in real economic activity. The real consumption shock ultimately explains 40% or so of the respective changes in real output and itself, as of the 20th quarter. The real output shock ultimately explains 60% or so of the respective changes in real consumption and itself, as of the 20th quarter.

Italian SIRFs (see Figure 3) exhibit an immediate rise and a gradual, though slightly oscillating, return to the steady state, as of the 15th quarter circa. Both real output and real consumption increase the most around the fifth quarter. Italian responses display a pattern of delayed reversibility. The economic sentiment shock barely accounts for real economic activity variations afresh. The real consumption shock ultimately explains about 30 and 75% of the respective changes in real output and itself. The real output shock ultimately explains about 60 and 25% of the respective changes in itself and real consumption.

Portuguese SIRFs globally display an immediate rise and a gradual convergence towards the new steady state, as of the 20th quarter circa. Both real output and real consumption increase the most around the fifth quarter. Portuguese responses globally exhibit a pattern of immediate irreversibility. The economic

sentiment shock likewise accounts for little variation in real economic activity. The real consumption shock ultimately explains 60% or so of the respective changes in real output and itself. The real output shock ultimately explains 40% or so of the respective changes in real consumption and itself.

Figure 2: French, German, Greek and Irish SIRFs and FEVDs



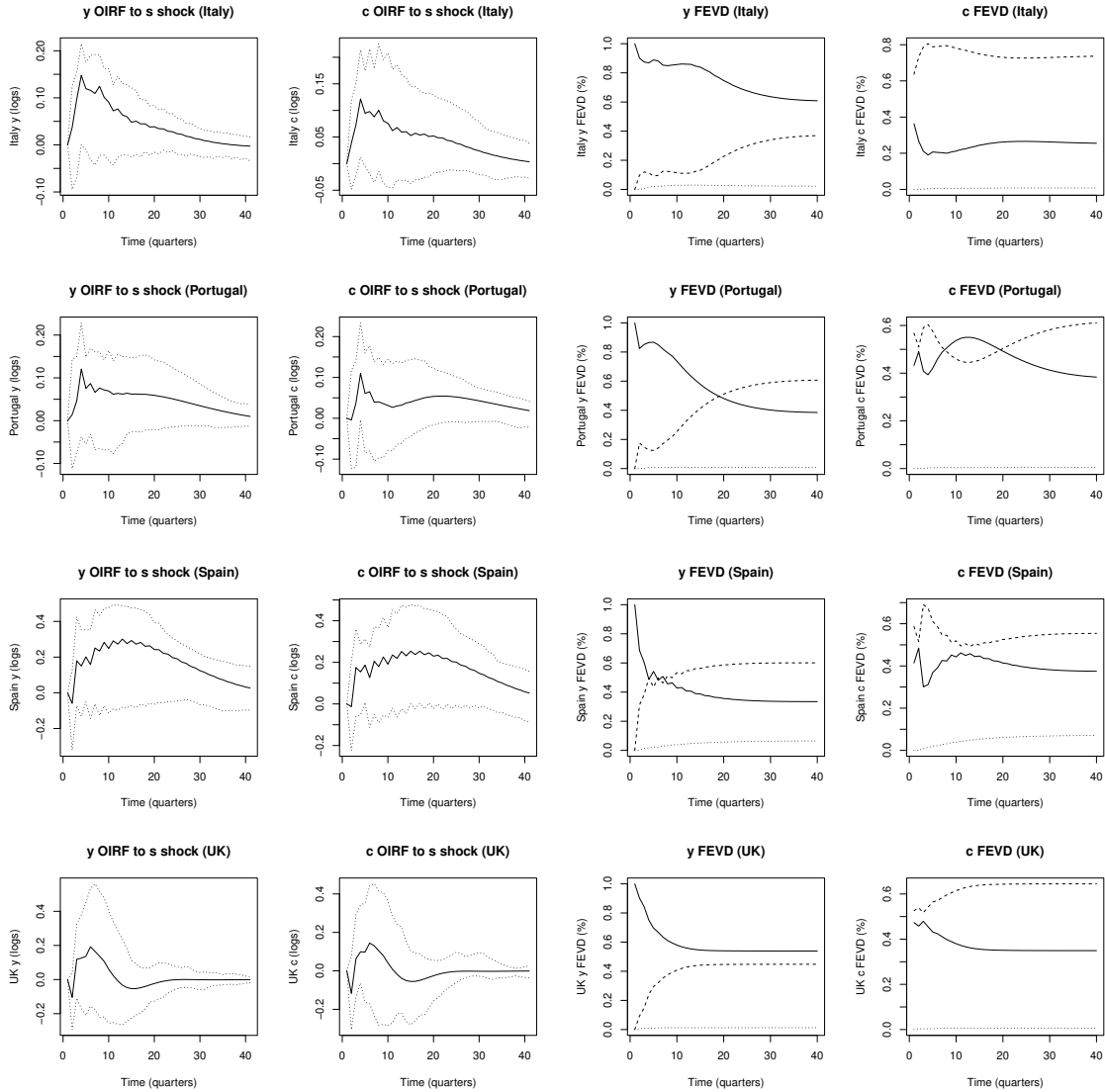
*Note:* The first and second columns depict French, German, Greek and Irish SIRFs and confidence intervals (i.e., solid and dotted lines) of real output and real consumption to a shock in economic sentiment at a 10-year horizon. The third and fourth columns depict French, German, Greek and Irish FEVDs of real output and real consumption, wherein solid, dashed and dotted lines respectively graph the contributions of real output, real consumption and economic sentiment.

Spanish SIRFs globally exhibit an immediate rise and a gradual, though slightly oscillating, convergence towards the new steady state. Both real output and real consumption increase the most around the 15th quarter. Spanish responses globally display a pattern of immediate irreversibility. The economic sentiment shock does not again account for much variation in the real economic activity. The real consumption shock ultimately explains about 60 and 55% of the respective changes in real output and itself. The real output shock ultimately explains 40% or so of the respective changes in real consumption and itself.

British SIRFs globally display an immediate rise and a gradual, though slightly recessionary (around the 15th quarter), return to the steady state. British responses globally exhibit a pattern of delayed reversibility. The economic sentiment shock barely accounts for real economic activity variations afresh.

The real consumption shock ultimately explains about 40 and 60% of the respective changes in real output and itself. The real output shock ultimately explains about 40 and 60% of the respective changes in real consumption and itself.

Figure 3: Italian, Portuguese, Spanish and British SIRFs and FEVDs



*Note:* The first and second columns depict Italian, Portuguese, Spanish and British SIRFs and confidence intervals (i.e., solid and dotted lines) of real output and real consumption to a shock in economic sentiment at a 10-year horizon. The third and fourth columns depict Italian, Portuguese, Spanish and British FEVDs of real output and real consumption, wherein solid, dashed and dotted lines respectively graph the contributions of real output, real consumption and economic sentiment.

The resulting patterns are summarily those of immediate irreversibility (i.e., France, Germany, Ireland, Portugal, and Spain), delayed irreversibility (i.e., EA, Greece) and delayed reversibility (i.e., Italy, UK). Immediate irreversibility signals a news shock to economic fundamentals driven by sustained effort and enthusiasm on the part of firms and households, respectively, before its fulfillment. Delayed irreversibility suggests a news shock to economic fundamentals without the said enthusiasm and effort. Delayed reversibility suggests a noise shock driven by firm effort and household enthusiasm. A structural framework which may give form to such a theorization is therefore sought (within a dynamic stochastic general equilibrium model, ideally). The meager, if not absent, contribution of the economic sentiment shock to the variations in real consumption and real output, on the other hand, importantly demarcates a tangential role for confidence

in Europe's growth and business cycle.

#### PANEL DATA REGRESSION

The influence exerted by internal stability, public finance, population and the macroeconomic trilemma upon the economic sentiment indicator is now assessed by means of a European panel, ranging from 1980 to 2020, composed of the same eight nations: France, Germany, Greece, Ireland, Italy, Portugal, Spain, and UK. For group  $i = \text{France}, \dots, \text{UK}$  and time  $t = 1980, \dots, 2020$  one considers the following longitudinal matrix regression:

$$Y = X\beta + U, \quad (3)$$

wherein explained variable  $Y$ , explanatory variable  $X$ , gradient  $\beta$  and error  $U$  are of respective dimensions  $(n_{it} \times 1)$ ,  $(n_{it} \times n_x)$ ,  $(n_x \times 1)$  and  $(n_{it} \times 1)$ . Specifically, the explained variable is the regressand column  $Y = [s_{it_\alpha}, \dots, s_{it_\omega}]^\top$  over joint periods of group and time  $it = it_\alpha, \dots, it_\omega$ , spanning France 1980 to UK 2020. The explanatory variable is the regressors matrix  $X = [1 \ y_{it_\alpha} \ \pi_{it_\alpha} \ u_{it_\alpha} \ d/y_{it_\alpha} \ P_{it_\alpha} \ er_{it_\alpha} \ mi_{it_\alpha} \ fo_{it_\alpha}, \dots, 1 \ y_{it_\omega}, \ \pi_{it_\omega} \ u_{it_\omega} \ d/y_{it_\omega} \ P_{it_\omega} \ er_{it_\omega} \ mi_{it_\omega} \ fo_{it_\omega}]^\top$  over the same joint periods of group and time  $it$ . The gradient is the column vector of coefficients  $\beta = [\alpha, \dots, \beta_{fo}]^\top$ . The error is the column vector of error terms  $U = [u_{it_\alpha}, \dots, u_{it_\omega}]^\top$  over the same joint periods of group and time  $it$ .

Real GDP  $y$  is the quotient of nominal GDP, measured in billions of American dollars, divided by the CPI. Inflation rate  $\pi$  is measured as the annual percentage change in the CPI. Unemployment rate  $u$  is measured as an annual percentage of the total labor force. Debt-to-GDP ratio  $d/y$  is measured as an annual percentage of GDP. Population  $P$  is measured in millions of persons. Exchange rate rigidity  $er$ , monetary independence  $mi$  and financial openness  $fo$  are dummy variables, taking values of one whenever respectively verified and zero otherwise. Quantitative data were taken from the International Monetary Fund (IMF) accounts. Qualitative data were supplied by Aizenman *et al.* (2013)'s Trilemma Indexes.

The Generalised Least Squares (GLS) estimator is homoskedastic and autocorrelation robust, and it is thus adopted to gauge the statistical significance of gradient  $\beta$ 's row entries. Specifically, whenever  $Var(U|X) = \sigma^2\Omega$ , for  $\sigma^2 \in (0, \infty)$ ,  $\Omega = \Gamma^\top \Gamma^{-1}$  and a lower triangular  $\Gamma$  matrix,

$$\hat{\beta}_{GLS} = (X^\top X^*)^{-1} X^\top Y^* \quad (4)$$

is a GLS estimator, for  $Y^* = \Gamma Y$ ,  $X^* = \Gamma X$  and  $U^* = \Gamma U$  such that  $Var(U^*|X^*) = \sigma^2\Gamma\Omega\Gamma^\top$ . In addition, whenever  $\Omega = I_n$  the GLS estimator equals the Ordinary Least Squares (OLS) one:  $\hat{\beta}_{GLS} = \hat{\beta}_{OLS}$ . The  $t$ -statistic practically equals the estimator divided by its standard error, which is the sample standard deviation divided by the square root of the observations:  $t = \frac{\hat{\beta}}{se(\hat{\beta})}$ , wherein  $se(\hat{\beta}) = \frac{s}{\sqrt{n}}$ . The  $p$ -value is the probability of observing values greater than the  $t$ -statistic in modulus under the null hypothesis of no statistical significance:  $p = Pr(> |t| | H_0 : \hat{\beta} = 0)$ ; low  $p$ -values (i.e., typically lower than 0.1) are therefore indicative of statistical significance.

All coefficients are statistically significant: six are so at the null significance level, one at 0.05 and another at 0.1, being those of real GDP and population, respectively. Standard errors are moreover commensurate with coefficient estimates, in turn mostly in line with economic theory (Table 1).

A unit rise in real GDP, inflation, unemployment, monetary independence or financial openness gives rise to a unit fall in economic sentiment. While the negative sign of the inflation and unemployment coefficients may signal aversion towards internal instability, that of the coefficients proper to real GDP and monetary independence is counterintuitive. The negative sign of the financial openness coefficient is instead debatably expectable, for aversion towards the instability of financial markets and the attendant repercussions upon the business cycle is renowned amongst most of the sample (i.e., Greece, Italy, perhaps Portugal, Spain and even France). The unemployment coefficient's magnitude also exceeds that of real GDP and inflation about thrice, that of monetary independence exceeds the former almost thrice in turn, and financial openness' coefficient magnitude exceeds that of monetary independence by two times and a half.

A unit rise in the debt-to-GDP ratio in population and exchange rate rigidity by contrast gives rise to a unit rise in economic sentiment. While the positive sign of the population coefficient might be expected, ultimately empowering growth, that of the coefficient proper to the debt-to-GDP ratio is counterintuitive. The positive sign of the exchange rate rigidity coefficient signals a preference for exchange rate fixation or regulation, for most sampled nations favor the single currency in spite of the havoc (many argue) it wreaked. The said coefficient’s magnitude is furthermore 20-fold that of population, in turn twofold that of the debt-to-GDP ratio.

Table 1: European Panel Data GLS Regression Results

Coefficient	Estimate (Standard error)	p-value
$\alpha$	108.227574 (0.642279)	$< 2.2 \times 10^{-16}$
$\beta_y$	-0.159200 (0.069863)	0.02268
$\beta_\pi$	-0.145115 (0.024643)	$3.895 \times 10^{-9}$
$\beta_u$	-0.505573 (0.029940)	$< 2.2 \times 10^{-16}$
$\beta_{d/y}$	0.020799 (0.004596)	$6.027 \times 10^{-6}$
$\beta_P$	0.043338 (0.025563)	0.09001
$\beta_{er}$	0.779649 (0.118970)	$5.627 \times 10^{-11}$
$\beta_{mi}$	-1.441483 (0.188244)	$1.895 \times 10^{-14}$
$\beta_{fo}$	-3.690123 (0.193960)	$< 2.2 \times 10^{-16}$

*Note:* Coefficient estimates, standard errors and p-values of a GLS regression for France, Germany, Greece, Ireland, Italy, Portugal, Spain and the UK from 1980 to 2020. The regressand is the economic sentiment indicator and the regressors are real output, inflation, unemployment, the debt-to-GDP ratio, population, exchange rate rigidity, monetary independence and financial openness.

## CONCLUSION

This study has supplied additional empirical evidence of responses in real economic activity to shocks in confidence. By having computed short-run restricted IRFs and FEVDs with respect to the EA and eight European nations, one has found outcomes spanning immediate and delayed irreversibility and delayed reversibility, invoking a structural framework able to theorize them. A panel data regression with respect to the same eight nations has finally shown aversion towards output, inflation, unemployment, monetary independence and financial openness, and a preference for population, exchange rate rigidity and the accumulation of sovereign debt.

## REFERENCES

- [1] AIZENMAN J, CHINN M D AND ITO H (2013) “The ‘Impossible Trinity’ Hypothesis in an Era of Global Imbalances: Measurement and Testing”, *Review of International Economics*, Vol. 21, No. 3, pp. 447-458.
- [2] ANGELETOS G M AND LA’O J (2013) “Sentiments”, *Econometrica*, Vol. 81, No. 2, pp. 739-779.
- [3] ANGELETOS G M, COLLARD F AND DELLAS H (2018) “Quantifying Confidence”, *Econometrica*, Vol. 86, No. 5, pp. 1689-1726.
- [4] BARSKY R AND SIMS E (2012) “Information, Animal Spirits, and the Meaning of Innovations in Consumer Confidence”, *American Economic Review*, Vol. 102, No. 4, pp. 1343-1377.
- [5] BEAUDRY P AND PORTIER F (2006) “Stock Prices, News, and Economic Fuctuations”, *American Economic Review*, Vol. 96, No. 4, pp. 1293-1307.
- [6] BLANCHARD O, L’HUILIER J P AND LORENZONI G (2013) “News, Noise, and Fluctuations: an Empirical Exploration”, *American Economic Review*, Vol. 103, No. 7, pp. 3045-70.
- [7] CHAHROUR R AND JURADO K (2018) “News or Noise? The Missing Link”, *American Economic*



Review, Vol. 108, No. 7, pp. 1702-36.

[8] COCHRANE J (1994) "Permanent and Transitory Components of GNP and Stock Prices", Quarterly Journal of Economics, Vol. 109, No. 1, pp. 241-265.

[9] LORENZONI G (2009) "A Theory of Demand Shocks", American Economic Review, Vol. 99, No. 5, pp. 2050-84.

[10] SIMS E (2012) "News, Non-Invertibility, and Structural VARs", Advances in Econometrics, Vol. 28, No. 2, pp. 81-136.