Employment and the "Investment Gap": An Econometric Model of European Imbalances

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Abstract

We specify a VEC model based on six main macroeconomic imbalances to explain the Great European Recession, in Germany, France, Spain and Italy, from 1999 to 2013, estimating their long-term relationships. We focus on employment and unemployment as the main imbalances and identify consumption and investment slumps, prompted by fiscal consolidation, as the causes and current account rebalance and low inflation as the main consequences. Our main results are the following: a) public investment is the main policy instrument which can foster employment, prompting private investment and growth, exports can only partly balance a falling domestic demand; b) the unemployment-current account trade-off is a structural constraint to a lower unemployment level; c) mild deflation set in as a consequence of the consumption slump and oil price decline; d) breaks dates for consumption and inflation thresholds are estimated; and e) Germany successfully passed through the European recession by sharply increasing its exports and reshaping its economic role.

JEL Classifications: E21, E22, E24, E31, F32, F45, O52
Keywords: Europe, employment, unemployment, consumption, investment, current account, inflation.

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1. Introduction

Unlike the U.S. Great Recession that began in 2008, Europe went through a second recession in 2012-2013 stemming from the sovereign debt crisis: public debt, as a ratio to GDP, has steadily increased since 2008 as consequence of slowing or declining GDP.

The timing of the fiscal consolidation, implemented to reduce the public debt/GDP ratio, has been increasingly questioned: the issue is whether public debt reduction pursued with austerity measures can promote economic growth or, vice versa, whether an expansionary fiscal policy in a depressed economy could be self-financing, promoting economic growth and public debt reduction (De Long and Summers (2012). The implementation of the first policy option, after two years of recession and an increasing public debt to GDP ratio, has cast serious doubts on its effectiveness, prompting a more careful analysis of the second option, at which our paper is aimed.

The economic debate has been primarily focused on the value of the fiscal multiplier: as Ramey's survey (2011) shows, its value for a temporary, deficit financed increase, the type of stimulus package adopted in the US, has a wide range of estimates, from 0.8 to 1.5. Moreover, a single multiplier is a weighted average between a period of expansion and recession, with the further constraint that deep recessions are few, with nonlinearities hard to estimate (Parker, 2011). Blanchard and Leigh (2011,2013) find a negative relationship between growth forecast errors and planned fiscal consolidations during the crisis, mainly in Europe, implying a higher than expected fiscal multiplier. They note that the "forecaster significantly underestimated the increase in unemployment and the decline in private consumption and investment", with the consequence that consumption came to depend much more on current rather than future income, while investment depended more on current rather than future profits. Problems of nonlinearity of impulse responses have been addressed with an econometric procedure proposed by Jordà (2005) on episodes of prolonged recessions: empirical results imply medium-term multipliers, over five years, of -2 for output, -3 for employment and 1,5 for unemployment (Dell'Erba, Koloskova, Poplawski-Ribeiro, 2014).

In Europe, the economic debate is more focused on the value of the "output gap", which is the difference between the potential output and the effective output: the "output gap" is the cornerstone on which the cyclical adjusted budget is measured and the national fiscal policies are approved and implemented. A crucial intermediate step is the estimate of the NAWRU (Non-accelerating wage rate of unemployment),

a concept related to the NAIRU (Non-accelerating inflation rate of unemployment) from which an equilibrium unemployment rate can be derived, to map the labour force in potential employment and potential output (Havick et al., 2014).

This paper argues instead that economic policy should be focused on filling the "Investment Gap", defined as the gap of investments necessary to increase employment and reduce unemployment at the pre-crisis levels: investments are also the carrier of innovation, increasing productivity and better standards of living.

These different strands of research converge when looking to the impact of government expenditures on the employment/unemployment relationship. A positive and significant relationship is estimated in the US, where it is estimated that an increase of government spending of 1 percent of GDP prompts an employment multiplier of approximately 1,5 at its peak. Interestingly, the authors find that their results hold when complementarity between consumption and employment is coupled with price stickiness (Monacelli, Perotti, Trigari, 2010). In the US, the American Recovery and Reinvestment Act (ARRA) of 2009, focused heavily on infrastructure spending and fiscal aid to state governments, allowed a more careful analysis of the positive impact of stimulus funds, estimated at $125.000 per job (Wilson, 2012).

In Europe, the research pattern is similar, coupling fiscal consolidation with its effects on employment (Escudero and Mourelo, 2014), as well as a straightforward approach to the relationship between investment and growth (DIW Economic Bulletin, 2014) and public investment and growth, through the stimulus to the domestic demand and the spillover on other European countries (Elekdag and Muir, 2014).

The paper is focused on unemployment and employment as the primary social goals, whose improvement is required for a generalized economic recovery in Europe: we unbundle the main causes and consequences of the Great European Recession to provide a framework for our economic policy implications.

The plan for our paper is the following. Section 2 presents stylized facts about the European crisis and a description of the data used for the econometric estimates, section 3 details the model specification, and section 4 covers, in three sub-sections, the suggested interpretation for the Great European Recession and the related policy implications. Section 4.1 analyses policy implications, namely the investment-employment and unemployment relationships, section 4.2 identifies the consumption and investment slumps as the main causes of the recession, when and why structural breaks occurred, and section 4.3 analyses the consequences: the sharp inflation drop, the unemployment-current account relationship, and the role of Germany and of its success through the second European recession (Burda et al. 2011; Dustman et al. 2014).

2. Stylized facts and data description

The Sovereign Debt Crisis, following the US crisis of 2008, prompted a second recession in the European Southern countries: the main consequence has been a

sudden stop of the economic convergence between European countries. The bigger countries with a significant GDP loss, between 2000 and 2013, were Italy and Spain, and, among the smaller countries, Greece, Portugal and Cyprus. Around one third of the EU population lost a sizable volume of GDP. Germany was the country with the biggest GDP improvement, together with the U.K. and France (Table A.2).

The GDP divergence was mirrored by an increasing gap between countries whose unemployment rates rose sharply, such as Spain, Italy, Greece, and Portugal, and countries where the unemployment rate remained at a low level or even declined, such as Germany, Austria, and Luxembourg. The unemployment rate in France increased only slightly, but at a rather high level. As a consequence, between 2008 and 2014, the simple standard deviation of the unemployment rates inside the European Union (28) tripled, while the weighted standard deviation quadrupled.

The increasing economic and financial interconnectedness between European countries, a primary achievement of the normal times, has been the root of the European economic divide as well as of the contagion and systemic instability in the countries more severely hit. The degree of resilience of some countries is now the most serious issue for the EU because of the impending slow growth, or even stagnation: the basic question is how long it will take to regain pre-crisis levels. The normal business-cycle pattern after WW II—long sustained growth and short recession—has been overturned by a long period of recession and a slow recovery. The case of Italy (figure 1) exemplifies a problem common to other countries.

The double-dip recession, in 2009 and 2011-2014, reduced by 15 years the levels of domestic consumption and investment: as suggested by figure 1, export increases were not sufficient to balance the reduction in domestic consumption. The long period of steady investment decline may have reduced the potential output and the prospects of a rapid unemployment reduction. The crucial question is therefore how long it will take, in Italy and other countries, to return to pre-2008 economic levels, avoiding the trap of low growth.

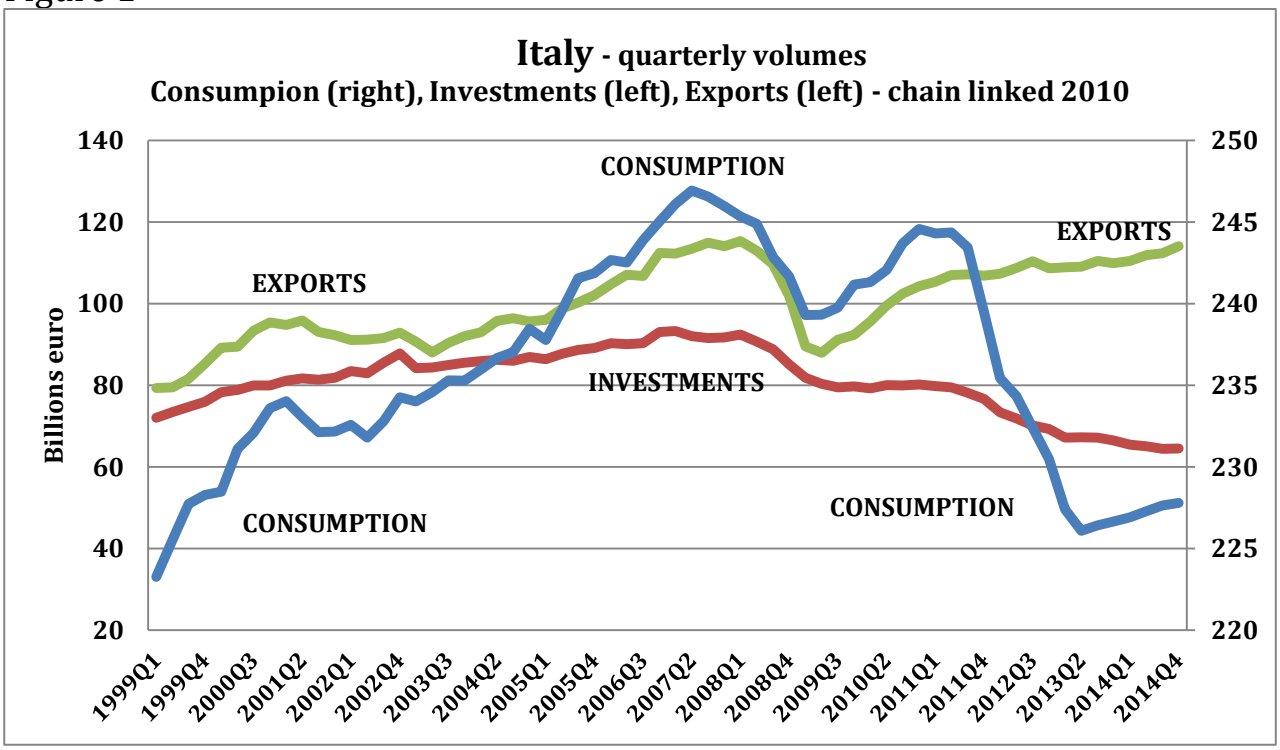
Overall, the investment volume for the EU (28) countries remained stable over the 2000-2013 period (-0.2%), going through an upswing of +20% from 2000 to 2008, and a sharp slowdown of -17% from 2008 to 2013. The investment slump after 2008 was widespread in all European countries, with many countries cancelling out, partly or totally, the increase achieved from 2000 to 2008: France still ended up with a significant increase, Germany and U.K. returned to the same level of 2000, while in Spain, Italy and the Netherlands, investment fell significantly over the entire period. Poland was the only country where investment increased before and after the crisis.

The main economic consequence of the European recession was a sudden stop of the previous economic achievements in terms of convergence, reflected in the prolonged economic slowdown for one third of the European population. The chain reaction of the crisis is not yet over and, since the end of 2014, has taken the form of a creeping risk of deflation.

To analyse causes, consequences and economic policy implications of the European crisis, we selected four major European countries—Germany, Spain, France and Italy—which account for 77% of the Euro Zone GDP and can represent

the different behaviours and interactions within the Euro Zone before and after the 2008 crisis. We chose to select six main variables, for which we had available homogenous series of quarterly data, from 1999q1 to 2013q4, for each country: they are the main economic imbalances on which our analysis is based. Two of these imbalances are included in the scoreboard of the European Union Alert Mechanism. Data are from Eurostat, according to the ESA95 system of accounts: ESA2010 has been introduced at the end of 2014. Tables and figures including recent data for 2014 are, for homogeneity, from ESA2010. A detailed list and explanation of the variables is available in the Legend in the Appendix.

Figure 1



Source: our calculations on the Eurostat database

3. Model specification

To unbundle the inside mechanisms of the Great European Recession, we chose to focus on a subset of economic variables that measure the main economic imbalances brought about by the crisis: employment, unemployment, consumption, investments, current account and inflation.

We posit a demand-driven casual chain: the drop of domestic final consumption drives the fall of investment, and as a consequence an increase in unemployment and a slowdown in employment. Furthermore, we track the chain of reactions on the current account balance and the falling inflation rates. Finally, we exploit the employment/unemployment relationship with investments and exports to analyse the main policy implications of our results.

To model and check this casual chain, we proceed with a two-level estimation strategy. First of all, we set up a basic Vector Error Correction Model, for each

variables and each country, with the purpose of identifying the long-term elasticities for each relationship and comparing them between the four countries on the basis of the same specification. The investment equation was instead estimated with an OLS because no valid VECM specification could be identified: we will suggest an economic interpretation about this.

Then, we proceed to an in-depth examination of two equations—consumption and inflation—to test their robustness. Inflation was also estimated with SUR to detect the economic interactions between the four countries and the role of domestic consumption on the inflation slowdown. We also tested the role of households saving for consumption with an OLS specification and both consumption and inflation were tested for breaks.

The robustness of the parameter estimates over the entire period, 1999-2013, is heavily influenced by the economic shock of 2008, while estimates over the period 2008-2013 are carried out with a smaller number of observations.

For a neater presentation of the VEC specifications, we exclude lags, whose length is instead shown in each table with the summary estimates of the long-term elasticities: all variable are in log, thus measuring elasticities. With the exception of the investment equation, estimated with OLS, the VEC specification is estimated with the Johansen procedure. The following equation numbering is organized to match the number of the corresponding tables, which summarize the long-term estimates, and to avoid cumbersome notation we use the same subscripts for each equation. Auxiliary specifications are in the Appendix.

$$\Delta E_t = \alpha_0 + \alpha_1 \Delta I_t + \alpha_2 \Delta X_t + \delta(E_{t-1} - \beta_1 I_{t-1} - \beta_2 X_{t-1}) + u_t \qquad (1)$$

E = Total Employment
I = Fixed Investment
X = Exports

$$\Delta U_t = \alpha_0 + \alpha_1 \Delta I_t + \alpha_2 \Delta X_t + \delta(U_{t-1} - \beta_1 I_{t-1} - \beta_2 X_{t-1}) + u_t \qquad (2)$$

U=unemployment rate
I = Fixed Investment
X = Exports

Both the equations (1) and (2) were also estimated distinguishing between public and private investments:

$$\Delta E_t = \alpha_{0,} + \alpha_1 \Delta PR_t + \alpha_2 \Delta PU_t + \delta(E_{t-1} - \beta_1 PR_{t-1} - \beta_2 PU_{t-1}) + u_t \qquad (1.1)$$

$$\Delta U_t = \alpha_0 + \alpha_1 \Delta PR_t + \alpha_2 \Delta PU_t + \delta(U_{t-1} - \beta_1 PR_{t-1} - \beta_2 PU_{t-1}) + u_t \qquad (2.1)$$

PU=Public Fixed Investment
PR= Private Fixed Investment

$$\Delta C_t = \alpha_0 + \alpha_1 \Delta Y_t + \alpha_2 \Delta FW_t + \alpha_3 \Delta R_t + \alpha_4 FS + \\ + \delta(C_{t-1} - \beta_1 Y_{t-1} - \beta_2 FA_{t-1} - \beta_3 R_{t-1} - \beta_4 FS_{t-1}) + u_t \quad (3)$$

C=Final Consumption expenditures of households,
Y= Gross Disposable Income of households,
FW=Financial wealth,
R=Interest rate,
FS=Fiscal stance (collective consumption/direct+indirect taxes)

Consumption is further estimated, as an OLS, with the following specification:

$$C_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 FW_{t-1} + \alpha_3 R_{t-1} + \alpha_4 SR_{t-1} + u_t \quad (3.1)$$

SR=Saving rate

$$\Delta I_t = \alpha_0 + \alpha_1 \Delta C_{t-4} + \alpha_2 \Delta X_t + \alpha_3 \Delta PR_t + u_t \quad (4)$$

I=Investment,
C=Consumption,
X=Exports,
PR=Profits

$$CA_t = \alpha_0 + \alpha_1 U_t + u_t \quad (5)$$

CA=Current Account (% GDP)
U=Unemployment rate

$$\pi_t = \alpha_0 + \alpha_1 \Delta C_t + \alpha_2 \Delta OIL_t + \delta(\pi_{t-1} - \beta_1 C_{t-1} - \beta_2 OIL_{t-1}) + u_t \quad (6)$$

π = Inflation (annual - yoy)
C=Consumption
OIL=Oil price (€)

Inflation is also estimated with a Seemingly Unrelated Regression for the four countries, with the following specification:

$$\pi_t = \alpha_0 + \alpha_1 \pi_{t-1} + \alpha_2 \pi_{t-2} + \alpha_3 \Delta C_{t,t-4} + \alpha_4 \Delta OIL_{t,t-1} + \alpha_5 \Delta U_{t,t-4} + u_t \quad (6.1)$$

For all the specifications, we assume that the error terms are $u_t \sim IID(0, \sigma_u^2)$.

Lags lengths are selected on the basis of the Lag Length Criteria: if the cointegration test fails or the sign and size of the elasticities is theoretically incorrect, we use different lengths, but closer to the prevailing criteria. Tests for cointegration,

heteroskedasticity and serial correlation are carried out. Main estimates, specified above, are in the main text, and auxiliary estimates are in the Appendix (Table 7.B).

4. Empirical Results and Policy Implications

4.1. Policy Implications

Employment and unemployment are the main economic imbalances of the European Union, while investments and exports are the main drivers of lower unemployment and higher employment. However, while exports are an exogenous variable, the government, indirectly through fiscal policies or directly with higher public investments, can promote higher domestic investments. Investments are crucial for economic growth because, beyond their impact on unemployment and employment, they are carriers of technological innovation. From 2008 to 2013, investments declined in Italy and Spain, remained stable in Germany and slightly decreased in France. In 2014, the investment growth turned positive in Germany and Spain, but remained negative in Italy and France. At the same time, export growth was higher in Germany and Spain than in France and Italy, and employment responded accordingly, with higher growth in Germany and Spain.

4.1.1. Employment and the "Investment Gap"

Full employment can be defined as the level of labour and capital for which the economy is on the frontier of its potential production function. To avoid uncertainty and shortcomings surrounding the measurement of potential output, we choose to take as a reference the pre-crisis level of employment. The relationship between employment, investments and exports is measured in terms of elasticities, which can easily be translated in terms of the investment multiplier as a measure of "how much employment has to be increased to yield an increase in real income sufficient to induce [the public] to do the necessary extra saving" (Keynes 1936, 117).

The VEC estimates for the four countries over the entire period, using the same specification, are summarized in Table 1. We can check the results against the employment downfall during the crisis: from the peak, at the end of 2007, to the trough at the end of 2013, employment fell by 3,6 million in Spain (-17,4%), 1,2 million in Italy (-5%), and 0.4 million in France (-1%). On the basis of these estimates, we can conduct an economic policy exercise.

In Italy, a 10% investment increase implies a long-term increase of 3% in employment (22 million), which corresponds to approximately 660.000 employees; therefore, to recover the lost employment of 1,2 million, an increase of +18% would be required. The investment required could be less if exports also increase: a 20% increase of exports would imply a long-term 2.5% increase of employment (0.126*2), i.e., 550.000 jobs. A joint increase of 10% in investments and 20% in exports would still make up for the employment loss.

Table 1

Vector Error Correction Estimates
Log (total employment) = α_0 + α_1*log(total investment) + α_2*log(export)
Period: 1999q1 2013q4
Cointegration equation

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
Total investment	0,304 (5,69)	0,578 (12,98)	0,296 (6,80)	0,409 (3,44)
Export	0,126 (2,69)	0,124 (2,18)		0,182 (6,15)
C	5,148	2,076	6,766	3,533
Lags	2*	2**	2*	2**
White Test prob	0,1571	0,0125	0,3976	0,2431
LM (F-Stat) 1°	41,30	14,70	1,50	21,85
LM (F-Stat) 4°	35,17	7,44	8,41	26,48

t-statistics in parenthesis
* Cointegration is significant at 5% or less
** Cointegration is significant between 5% and 10%
T – trend added

The case of Germany is different because employment has steadily increased since 2005: employment rose from 36,4 million in 2005 to 39,5 in 2013, with an increase of 3,1 million, i.e., +8,7%; real investments rose +13,4% and export volumes +38,6% (ESA2010). The contribution of investments to higher employment can be estimated as +0,53% (0,409*13,4%), while the contribution of exports to higher employment can be estimated as +7% (0,182*38,6%). The joint contribution of investments and exports can be estimated as (+0,53) + (+7%) = +7,5%, a figure close to the effective value (+8,7%). The estimated decomposition shows that in Germany almost all the employment increase can be ascribed to the export increase and, presumably, the related expansion of investment capacity.

The same exercise also shows that between 2008 and 2013, the employment decline in Spain, Italy and, to a minor extent, France can be ascribed to the fall of investments.

In the case of Italy, we also performed a more detailed analysis of the direct impact on employment, by detailed sectors, of an exogenous increase (+10%) of real fixed investments, using the input-output matrix of the Italian economy in the year 2010, extended to 2013. The results are summarized in Table B.1.

The input-output simulation for the Italian economy is focused on domestic demand, including imports, assuming the structure of exports as exogenous; the highest impact on employment is on the construction sector, which accounts for 41% of total employment, double the impact of employment in manufacturing. The impact on employment of a 10% increase in investments is estimated as 340.000 jobs, around half the total impact implied by the previous long-term estimate of 660.000. An extended input-output model, with a partly endogenous final consumption, could account for a part of the gap (Toffoli, 2015).

4.1.2. Unemployment and the "Investment Gap"

The unemployment rate is a measure of labour market imbalance in the European Union, which shows a clear diverging pattern for the four countries during the crisis. From 2007 to 2014, the unemployment rate doubled in Italy, tripled in Spain, slightly increased in France and sharply fell in Germany. Contrarily, from 1999 to 2007 the unemployment rates for the four countries were decreasing or stable. The whole period from 1999-2013 is, therefore, the union of two distinct sub-periods: a period of "normal times" and a period of "exceptional times", with the unemployment rates skyrocketing to 26% in Spain and doubling to 12% in Italy.

The relationship over the entire period, between the (log of) employment rate and the (log of) unemployment rate is non-linear and backward bending in Italy and Spain (figure C.1, C.2) and linearly negative in Germany, where, since 2005, the unemployment rate has been steadily falling and the employment level rising. Contrastingly, there is no clear relationship in France. As a consequence, the unemployment-investment and the employment-investment relationships could not be specified in the same way. Moreover, the impact of the 2008 crisis was much stronger on the unemployment rates, causing a higher instability of the parameters. To cope with these problems, and extract some economically informative parameters, we chose to run three VEC estimates: one for the entire period (table B.2 in the Appendix) and two separately for the subperiods 1999q1-2007q4 and 2008q1-2013q4 (in the main text). Because the cost of separate estimates is a limited number of observations, we kept a parsimonious length structure. We make reference to the pre-crisis unemployment rate to avoid the remarks raised by the European Commission to the NAWRU (2013).

The main results are the following: a) unemployment rates and investments are cointegrated with the correct negative sign for all the countries and b) joint cointegration of the unemployment rates with investments and exports holds in Italy, but only in "normal times", and in Germany in both periods, even if the parameters are weakly significant because of collinearity.

On average, the unemployment rate–investments elasticity is between -1 and -2, depending on the period and the country. Over the two separate periods, it ranges from a low of -0,6/-0,9 in France to a high of -3,6 in Germany, which becomes -2,1 if we exclude exports. In Italy, the elasticity is -2,3 while in Spain it is in the range of -1,5/-1,7. In the case of France, the elasticity increases to -1,3 if we consider the entire period (Table 2.a and 2.b).

Exports could partly replace the "investment gap", but at the cost of a lower potential output. In Italy, the export variable is statistically significant, jointly with investment, over the entire period and from 1999q1 to 2007q4. It is significant, but with the wrong sign, during the crisis. In Germany, the estimate of a long-term relationship between unemployment, investments and exports is fraught with problems of collinearity. For the joint estimates of investments and exports in the "normal times", investments are significant, while exports are with the right sign but not significant: in the "exceptional times", both investments and exports are weakly

significant. Considering the two variables separately, investments become significant in both periods, but exports are not cointegrated or have an implausible elasticity. Our VEC specification could not detect exports as a variable jointly cointegrated with investments in France and Spain.

Table 2.a

Vector Error Correction Estimates

Log (unemployment rate) = $\alpha_0 + \alpha_1$*log(total investment) + α_2*log(export)
Period: 1999q1 2007q4
Cointegration equation

Variable\Country	ITALY	SPAIN (1)	FRANCE (1)	GERMANY	GERMANY	GERMANY
Total investment	-2,278 (-5,16)	-1,712 (-2,50)	-0,604 (-4,13)	-3,638 (-3,45) T	-2,116 (-7,17) T	
Export	-0,790 (-2,82)			-0,463 (-0,44) T		-13,93 (-3,54) T
C	36,667	19,610	8,988	49,487	26,465	167,775
Lags	2**	2*	1*	3*	1*	1 no-coint
White Test prob	0,0850°	0,5746	0,4675	0,3846	0,2350	0,5870
LM (F-Stat) 1°	6,91	2,11	2,95	13,41	3,22	7,58
LM (F-Stat) 4°	6,83	1,94	10,28	19,84	2,84	5,05

t-statistics in parenthesis
* Cointegration is significant at 5% or less. No-coint means that the variable is not cointegrated
** Cointegration is significant between 5% and 10%
T : trend added

Table 2.b

Vector Error Correction Estimates

Log (unemployment rate) = $\alpha_0 + \alpha_1$*log(total investment) + α_2*log(export)
Period: 2008q1 2013q4
Cointegration equation

Variable\Country	ITALY	SPAIN (1)	FRANCE (1)	GERMANY	GERMANY	GERMANY
Total investment	-2,287 (-38,97)	-1,498 (-5,71)	-0,867 (-4,06) T	-0,336 (-1,36) T	-0,560 (-3,84) T	
Export	0,472 (6,52)			-0,207 (-1,23) T		-6,568 (-3,55) T
C	22,129	19,329	11,485	9,295	9,360	82,683
Lags	2*	2*	1*	4*	1*	1*
White Test prob	0,2205°	0,3488	0,0970	n.a.	0,2716	0,1593
LM (F-Stat) 1°	10,03	16,19	6,82	8,66	14,46	4,98
LM (F-Stat) 4°	11,75	9,97	1,39	6,11	1,89	2,88

t-statistics in parenthesis
* Cointegration is significant at 5% or less
** Cointegration is significant between 5% and 10%
T : trend added

The main policy implication is that, relying solely on investments, in Spain and Italy it will take a long time to achieve the pre-crisis unemployment rates (from 2007) because of the severe investment drops of -37% in Spain and -27% in Italy. Even taking exports into account, halving the unemployment rate in Italy would require a

long-term investment increase of +10% jointly with an export increase of 25%, which could imply an unemployment reduction of (-28%)+(-20%)=(-48%).

4.1.3. The Role of Public Investments

Public investment is a small share of total fixed investment, which on average accounts for 11% in Germany, 14% in Italy, 15% in Spain, and 18% in France (1997-2013) of total fixed investments. However, public investment can be a crucial economic policy instrument in a period of prolonged crisis, when new private investments become very prudential and could benefit from an exogenous jump-start. To check the impact of public investments on employment and unemployment, we disaggregate total investments into public investments—for which Eurostat data are available—and private investments, which we measure as the difference between total investments and public investments. We use data at current prices, without seasonal adjustments, and run a VEC estimate jointly on private and public investments. The results regarding employment levels are shown in Table 1.1.

The main result of these estimates regards Germany, which is the country where the employment impact of a public investment program would be the highest within the country and, possibly, would spillover on the other European countries.

Table 1.1

Vector Error Correction Estimates

Log(total employment) = α_0 + α_1*log(private investment) + α_2*log(public investment)

Period: 1999q1 2013q4

Cointegration equation

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
Private investment	0,235 (27,01) T	0,319 (21,91) T		0,060 (0,60)
Public investment	0,026 (5,15) T	0,028 (3,29) T	0,171 (5,65)	0,395 (5,99)
C	7,146	6,042	8,488	6,210
Lags	4*	4*	4**	2*
White Test prob	0,8010°	0,0236°	0,2955°	0,7964
LM (F-Stat) 1°	8,12	6,26	6,98	54,42
LM (F-Stat) 4°	13,53	14,77	10,60	36,78

t-statistics in parenthesis

* Cointegration is significant at 5% or less

** Cointegration is significant between 5% and 10%

° White Test 1999-2008: Spain 0,5604

In France, the coefficient on public investment is also high, perhaps explaining the highest share of public on total investments. In Italy and Spain, the impact of public investments on total employment is the lowest, which could imply two policy implications: a) public investments are pro-cyclical and should be redressed to the goal of stabilizing employment levels and indirectly promoting private investments,

and b) private investments are nonetheless more effective and should be promoted, sustaining private consumption jointly with fiscal and monetary policies.

The estimates of the long-term relationship between unemployment and investments, public and private, are consistent with our previous results. With one exception, all the long-term elasticities of unemployment with respect to private and public investment are significant and the elasticities for private investments are higher than the elasticities for public investments. Our previously estimated elasticities on total unemployment lay in the range -1 to -2: the distinction between private and public investment extends the lower bound from -1 to -0.3.

Table 2.1

Vector Error Correction Estimates

Log(unemployment rate) = α_0 + α_1*log(private investment) + α_2*log(public investment)

Period: 1999q1 2013q4

Cointegration equation

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
Private investment	-1,943 (-18,95) T	-0,747 (-4,19) T		-1,927 (-7,27)
Public investment	-0,307 (-5,14) T	-0,065 (-0,59) T	-0,852 (-2,75) T	-1,460 (-11,22)
C	26,161	10,648	10,016	37,551
Lags	2*	2**	2*	2*
White Test prob	0,1055	0,2726	0,2149	0,3038
LM (F-Stat) 1°	15,43	25,78	10,16	71,42
LM (F-Stat) 4°	10,71	18,86	14,44	15,75

t-statistics in parenthesis

* Cointegration is significant at 5% or less

** Cointegration is significant between 5% and 10%

T: trend added

The case of Germany stands again on its own: the elasticity of public investment is the highest among the four countries and is not far away from the elasticity of private investments in Germany, which in turn have a value close to that of Italy.

These two sets of estimates lend support to the idea that public investments are indeed crucial for economic recovery during this economic slump and, in the form of self-financing fiscal policy (Delong and Summers, 2012), could be pivotal in putting the economy back on a sustainable growth path (Fitoussi and Saraceno, 2013).

4.2. Causes of the European Recession

The economic policy of fiscal consolidation in Southern European countries has been the cause of a sudden decline in households' disposable incomes through a higher fiscal burden and a government spending reduction. Less disposable income has brought about a severe consumption slump and a negative shift of consumers' expectations. The underlying question is why households facing a sudden fiscal burden increase did not revert to saving to smooth consumption. The sudden consumption slump turned into a simultaneous investment drop because firms halted

their investment plans for domestic demand. Foreign demand, through increasing exports, could not balance the fall of domestic demand and a second recession ensued.

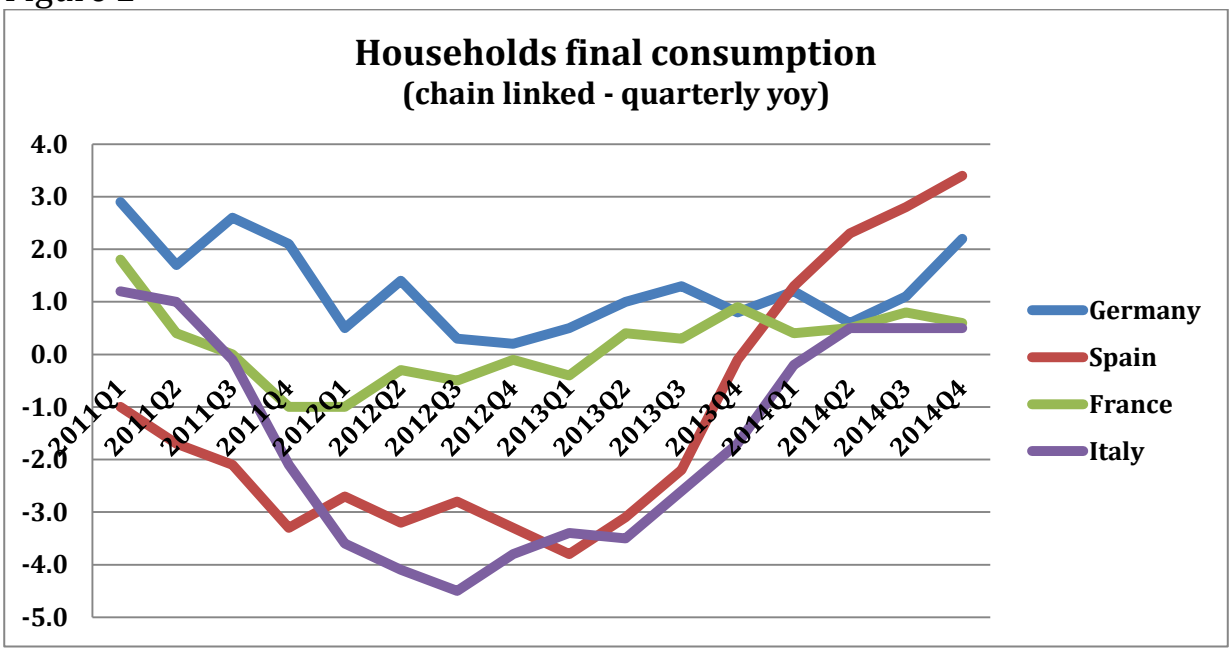
4.2.1. Consumption Slump and Precautionary Saving

The dynamics of household consumption is the key to unbundle the chain of relationships underlying the second recession, from 2011q1 to 20013q4, and the different patterns of recovery since 2014.

In Germany, household final consumption was always increasing, while in France, the rate of growth became negative for 6 quarters, from 2011q4 to 2013q1. In Spain and Italy, the consumption downturn was longer. In Spain, household consumption became negative for 11 quarters, from 2011q1 to 2013q3, the same length as in Italy, which entered the negative zone somewhat later, from 2011q3 to 2014q1. In Italy, the trough of the consumption slump was in 2012q3 (-4,5%), while in Spain, it was in 2013q1 (-3,8%). Spain resumed a positive growth of exports in 2013q2, two quarters earlier than in Italy; since then, Spanish exports have grown at a higher growth rate than those in Italy. The positive relationship between consumption and imports, which holds for all four countries, brings back the overlooked constraint of the current account balance and the relationship with the unemployment rate, which is analysed in section 4.3.1.

The household private consumption function we estimate is a function of gross disposable income, as measured homogenously by Eurostat sector accounts; therefore, disposable income for households is the sum of all income sources, namely labour, capital interest and dividends, public and private transfers, and the net of direct and indirect taxes and social contributions.

Figure 2



Source: our calculation on Eurostat database

Consumption can be private or public. General government final consumption expenditures can be divided into individual consumption expenditures, which satisfy the needs of household members, with some degree of rivalry, such as health, education and social protection, and collective consumption expenditures, which provide services simultaneously to all the members of the community, without rivalry and explicit agreement, such as general public services, defence, and public order (Eurostat, 2011, 37). Our focus is on private final consumption: the difference between disposable income and saving is an accurate estimate of saving, a "buffer" on which to draw to smooth consumption.

Our estimates are based on the values of gross disposable income and individual consumption for the Household Sector (including NPISH) of the European Sector Account, and also the National Accounts, when using data for individual and collective consumption expenditures of the general government. We use current values to allow for comparisons between countries, and between private and public consumption; we do not deflate variables because inflation decreases the purchasing power of income flows but may also increase the purchasing power of financial assets. Moreover, the annual inflation differential with Germany is small in the short run. Because the econometric estimates for consumption functions are based on gross disposable income, the coefficients are by construction the net addition of current income, permanent and transitory, and the yields from financial wealth. Our strategy is to estimate the consumption function stepwise: we first estimate a VEC model for the basic relationship between consumption and disposable income and then proceed to the full model. The long-term relationships, summarized in Table B.3, show different elasticities and a marginal propensity to consume between the four countries: the average propensity to consume is, however close, which implies a different intercept, usually interpreted as a measure of subsistence consumption.

Because we base our estimates on gross disposable income, we cannot proceed to further estimates based on the sources of income, and a distinction between permanent and transitory components. We can however propose a meaningful comparison with a different set of data from the Bank of Italy, which covers a longer and overlapping period, from 1980q1 to 2006q4 in Italy, shortly before the onset of the Great Recession. Thus, we extend our basic estimates to include financial wealth as well as interest rates. A distinct feature of the Bank of Italy's estimate is its attempt to accommodate two structural breaks, in 1992q3 and 1998q1. Two procedures are proposed. The first is a deterministic control in the cointegration vector and the second is the inclusion of collective (public) consumption as measure of fiscal stance (Bassanetti and Zollino, 2008). In Table 4, we show two estimates of the Bank of Italy together with our estimates, tracking their variables as closely as possible. Without the adjustment for the structural breaks, the coefficients on disposable income estimated by the Bank of Italy have a weaker economic meaning, while the inclusion of collective (public) consumption strikingly improves the results (column F of Table B.4).

The comparison of the coefficients over the two overlapping periods (Eurostat does not cover housing wealth data) shows similar elasticity coefficients for

consumption with respect to disposable income and financial wealth. However, in our estimates, the coefficients on bonds and collective consumption have the same magnitude, but positive signs (the opposite of the Bank of Italy estimates), meaning that a fall in bond yields and collective consumption lowers disposable income. The sharp increase of the tax burden and the sovereign debt crisis can explain the different signs.

In 2012q4, the fiscal burden in Italy (direct+indirect taxes/GDP) reached its highest level, with a sudden increase of 2 points of GDP with respect to 2011q4 (figure C. 3). In 2012q4, collective consumption decreased by -7% with respect to 2011q4 (figure C.4). In our estimates, consumption declines with the decrease of collective consumption, which we take as a measure, direct and indirect, of the fiscal stance. In 2014, the tax burden, including social contributions, in Italy peaked at 45.5% of the GDP.

This argument is consistent with a closer look at the official data. In Italy and Spain, collective consumption began to decline (quarterly yoy) in 2012q1 and plunged to -10% in Spain and -7% in Italy in 2012q4, while in France and Germany collective consumption kept growing. In Italy, total taxation (direct plus indirect) kept constantly growing (yoy) from 2011q1 to 2012q4, while in Spain and, to a lesser degree, in France, total taxation spiked abruptly in 2012q4. The estimates in Table 3 are consistent with this empirical evidence.

Finally, the coefficient on the 10 years Italian bonds is positive and quite significant. We interpret the result as a measure of the risk premium on Italian bonds, beyond what was already accounted for by the gross disposable income, which allowed a direct positive impact on the consumption of the subset of financial investors.

We extend our estimate of the consumption function to Spain, France and Germany, with some adaptations for each country (Table 3), taking into account our previous analysis of the empirical evidence on collective consumption and total taxation (direct plus indirect).

In Spain, the high consumption elasticity is related to the housing bubble. From 1999 to 2007, real household consumption expenditures recorded the highest increase in Spain, +34%, followed by France, +20%, Italy, +8%, and Germany, + 5%. In Spain, the housing bubble was therefore associated with a consumption spree, followed by a retreat when the bubble burst and fiscal burden became tighter. Consumption tumbled by -10% between 2007 and 2013. We detect the impact of the fiscal stance in Spain with the value of direct and indirect taxes (total taxation), which peaked +13% in 2012q4 (yoy). The variable “total taxation” enters the regression with the expected negative sign, and decreases direct consumption after controlling for gross disposable income. With regard to the yields on 10 years bonds, the result is similar to the one for Italy. We chose to regress consumption on the German spread to obtain a more significant coefficient and allow a further test of the crisis. In 2013, consumption in Spain was still +20% higher than in 1999.

In France, household consumption increased steadily and regularly, by +22% from 1999 to 2013 and by +2% from 2007 to 2013; the elasticities coefficients on

disposable income and financial wealth are similar to the consumption function in Italy, but French income and consumption paths are on a higher and more stable level.

In Germany, consumption increased steadily, by +11% over the period 1999-2013, as did disposable income. The elasticity coefficient on gross disposable income, which is 0,941 when income is the only dependent variable, increases significantly to 1,596 if we include financial variables and collective consumption as a measure of fiscal stance. The financial variables, which also have a positive sign, are not statistically significant, which is consistent with the fall of financial yields on Germany's bonds. The specification, including financial wealth, is necessary to obtain a correct estimate.

According to Eurostat statistics, Germany recorded an upward trend in the household net financial wealth to disposable income ratio, after the Internet bubble of 2000. The ratio in Germany increased from to 1,47 in 2000—it was 1,12 in 1996—to a high of 1,93 in 2013. The German fiscal stance remained more favourable to consumption and saving, and the collective consumption expenditures of the general government recorded an increase of +22%, from 1999 to 2013. The saving rate remained stable, sustained by high social protection benefits.

A comparison with Table 3.1 improves our understanding of the turning points of the crisis and the role of saving as a "buffer". Germany is the only country where no break occurred over the entire period.

Table 3

Vector Error Correction Estimates

Log(Individual consumption) = α_0 + α_1*log(disposable income) + α_2*log(net financial assets)+ α_3*(interest rate) + α_4*log(collective consumption/total taxation)

Period: 1999q1 2013q4

Cointegration equation

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
Disp. Income	0,644 (3,46)	1,321 (12,26)	0,804 (15,00)	1,596 (16,12) T
Fin. Assets	0,142 (1,48)	0,122 (1,48)	0,159 (4,07)	0,030 (0,95) T
Bonds 10 year	0,052 (6,13)		0,011 (2,26)	
Collective consumption	0,312 (2,93)			0,114 (3,47) T
Spread (Germany)		0,027 (9,02)		
Total taxation		-0,239 (-2,20)		
Bond 3 months				0,0006 (0,71) T
C	-1,310	-3,081	-0,082	-9,417
Lags	4*	4*	4*	2*
White Test prob	0,5480	0,4380	0,3351	0,1719
LM (F-Stat) 1°	33,36	28,09	20,21	64,17
LM (F-Stat) 4°	41,05	29,55	13,15	29,90

t-statistics in parenthesis

T: trend added

* Cointegration is significant at 5% or less

4.2.2. The Structural Breaks

This section has a double purpose: to identify structural breaks and test the role of saving as a "buffer" during the crisis. To detect the break dates, we use the Bai-Perron procedure (2003) and then compare the break dates with the economic policy of the quarter identified. We use the same variables lagged one period, excluding the fiscal stance and including the level of the saving rate; the inclusion of the saving rate is motivated by our previous analysis (Campiglio, 2013) as well as the role of household saving as a "buffer-stock" (Carroll, 1996). We use OLS because it allows the identification of the break dates, according to two possible methods, sequential and repartition (Table 3.1).

Table 3.1.

Ordinary Least Squares Estimates

Log(Individual consumption) = α_0 + α_1*log(disposable income$_{t-1}$) + α_2*log(net financial assets$_{t-1}$)+ α_3*(interest rate$_{t-1}$) + α_4*log(saving rate$_{t-1}$)

Period: 1999q1 2013q4

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
Disp.Income$_{t-1}$	0,514 (5,90) T	0,833 (28,01)	0,436 (3,93) T	0,819 (3,67)
Fin.Assets$_{t-1}$	0,154 (2,92) T	0,222 (4,51)	0,063 (1,09) T	0,016 (0,16)
Bonds 10 year$_{t-1}$	-0,005 (-1,45) T	0,001 (0,20)	0,009 (1,47) T	-0,007 (-0,99)
Saving rate$_{t-1}$	-0,088 (-5,61) T	-0,014 (-2,53)	-0,108 (-4,92) T	0,017 (0,48)
C	3,780 (4,82)	-1,134 (-2,03)	6,133 (4,38)	1,891 (1,12)
Breaks				
Criteria	sequential / repartition	sequential / repartition	sequential / repartition	sequential / repartition
	2008Q4	2007Q4	2008Q1/2008Q4	no break
	2011Q3		2010Q4	
White Test prob	0,123	0,338	0,022	0,108
Breusch-Pagan-Godfrey pr	0,104	0,476	0,193	0,003
LM (F-Stat) 1°	1,49	0,59	0,10	2,58
LM (F-Stat) 4°	18,44	16,17	35,97	49,35

t-statistic in parenthesis
T: trend added

In Italy, we detect two break points: 2008q4—just before the beginning of the 2009 crisis—and 2011q3, which marked the beginning of a prolonged period of recession, currently defined by the NBER as a "significant decline in economic activity spread across the economy, lasting more than a few months". Italy's second recession complies with this definition, lasting 14 quarters (with the exception of 2013q3). In the last quarter of 2011, the new government in office approved and enacted a law regarding pensions and the labour market. In France, the 2008q1-

2008q4 break marks the onset of the following 2009 crisis, while 2010q4 marks the initial downturn in household final consumption, lasting 6 quarters, from 2011q4 to 2013q1. In Spain, 2007q4 marks the peak of fixed investments and the turning point of the housing bubble, and the two following consumption crisis. The first lasted 7 quarters, from 2008q3 to 2010q1, and the second 12 quarters, from 2011q1 to 2013q4.

A further question is why the increasing fiscal burden, which prompted the second European crisis, had a severe impact on consumption, missing the smoothing coming from household saving. The question has to be split into two: the first is whether the saving rate, or its change, has a significant impact on consumption. In the affirmative case, the second is why the households did not draw on their savings.
The estimates of Table 3.1 confirm a negative relationship between the consumption level and the lagged level of the saving rate in Italy, Spain and France. In Italy, the negative elasticity of -0,09 implies that a 10% decrease in the savings rate level prompts a +0,9% increase in the level of consumption. In Germany, the sign is positive but not significant. If we substitute the level with the percentage change of the savings rate, the coefficients are all significant with negative signs, including in Germany (Table B.5).

Saving has therefore a crucial precautionary role because it can be used as a "buffer" to smooth consumption. Its impact on consumption depends, however, on the savings (and wealth) distribution. The savings distribution is more concentrated than the income distribution, as happens with the wealth distribution. The higher the concentration, the lower the share of households with positive precautionary saving; however, a lower share of households with positive savings can precipitate a crisis in a more severe slump and delay the timing of the recovery. This is clear when lower income families are in debt, with negative savings. Carroll (1992) drew due and early attention to the lower tail income, pointing to the economic meaning of zero, or near-zero, incomes as an economic fact rather than a measurement error.

As Keynes already noted, "unemployment is likely to be associated with *negative saving* (our emphasis) in certain quarters, private or public, because the unemployed may be living either on saving of themselves and their friends or on public relief which is partly financed out of loans; with the result that re-employment will gradually diminish these particular acts of negative saving and reduce, therefore, the marginal propensity to consume more rapidly" (Keynes, 136, 121).

This is the process that has marked the US recovery, with the personal savings rate bouncing back to 10.5% in December 2012, and then falling again to 4.9% in December 2014. The generalization of this process to the entire economy is what has come to be named the deleveraging process, especially with regard to the financial sector (Koo, 2008; Eggertsson, Krugman 2013, Wolf 2014).

4.2.3. Investment Slump

The investment function is estimated treating investments as dependent from the consumption demand of domestic households, the foreign demand measured by the exports and a measure of profits. Figure 1 shows, in the case of Italy, the main variables we want to model. Investment increases slowly but steadily until 2007, led

by exports and consumption growth, and then from 2008q1 to 2009q1, consumption, exports and investments collapse simultaneously. In 2011q1, consumption drops again, plunging much more deeply, and the moderate growth of exports cannot balance the collapse of consumption, which returned to the level of 1999. The simultaneity of the changes between investments and consumption points to a crucial asymmetry of the investment process; delaying or halting an investment in progress can be immediate, while the decision to start a new investment, risking capital for a required rate of return, takes a longer time to materialize. A new investment takes a longer time to become operational, while an old investment, or an investment in progress, can be stopped immediately.

The period we estimate underwent a structural change, detected by the breaks we measured above, which means that sudden adjustments occurred and the economic system of the countries analysed are still in the process of a rapid transformation. This is, presumably, the reason why our attempts to find out a long-term estimate between the variables were inconclusive. The main variable, the year-on-year rate of change of household final consumption, can also be interpreted as the cumulated sum of the monthly rate of change of consumption. In this way, we are implicitly assuming a lag for the investment decision. The rates of change of exports and (estimated) profits are instead simultaneous, implying a plausible short response to an increasing foreign demand and the firms' financial stability. Our estimates are the following (Table 4):

Table 4

Ordinary Least Squares Estimates

d(log(total investment)) = α_0 + α_1*d(log(individual consumption)) + α_2*d(log(export))+ α_3*d(profit)

Period: 1999q1 2013q4

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
Real consumption (yoy)	0,191 (3,12)	0,313 (7,02)	0,239 (4,67) T	0,352 (2,48)
Real export	0,273 (4,56)	0,193 (2,85)	0,249 (5,22) T	0,363 (3,80)
Profit	0,144 (1,73)	0,007 (0,10)	0,067 (1,69) T	0,156 (1,34)
C	-0,010 (-3,21)	-0,022 (-6,24)	-0,012 (-2,82) T	-0,016 (-3,02)
White Test prob	0,233	0,057	0,168	0,775
LM (F-Stat) 1°	0,45	0,50	2,86	1,49
LM (F-Stat) 4°	0,80	1,12	1,15	2,88

t statistics in parenthesis
T: trend added

All three variables are significant for all four countries, and their economic meaning can be better understood with reference to the ratio of exports/GDP and the ratio of household final consumption/GDP (figures C. 5 and C.6 – chain linked). Dividing the first ratio with respect to the second, we obtain the ratio exports/household final consumption (figure C.7). We discuss the last one because it summarizes the other two.

From 1999 to 2009, a diverging path prevailed. In Germany, exports jumped and the share of domestic consumption declined, while in the other three countries, export increases were much lower and the consumption share remained constant, or increased only slightly (in France). During the two crises, a "new normal" arose, with an increase of exports and a decrease of household consumption share. From 2009 to 2013, the rates of export increases converged sharply and, with the exception of France, the share of household consumption declined (Germany and Spain) or remained stable (Italy). Export-led growth in the Euro Zone was widespread from Germany to the other countries, and the Euro Zone has become much more export oriented.

4.3. Consequences of the European Recession

4.3.1. The Unemployment-Current Account Trade-Off

Since the onset of the economic crisis in 2008, the issue of current account balance returned to the centre stage, especially for the European economies and their economic policy, and it is a closely watched measure of imbalance by the European Union (EU 2014). The impressive size of gross capital flows that prompted the sovereign debt crisis of Greece, Portugal, Cyprus, Spain and Italy apparently overshadowed the role of the current account in favour of the Net International Investment Position (NIIP), defined as the difference between the economy's gross foreign assets (A) and its gross foreign liabilities (L). Because it can be shown that for most countries, the cumulated current account closely tracks the NIIP, the relationship can mask either a current account balance or represent a signal of elevated macroeconomic and financial stress, which should warn policy-makers about potential stability risks of globalized financial markets (Obstfeld, 2012). The sovereign debt crisis has rekindled the debate regarding possible imbalances of current account and capital movements within the Euro Zone, whose cross-border debits and credits are processed through the Target2 system.

The Target2 system, originally designed for the purpose of cross-border payments, accomplished its role with an almost zero balance until 2007. It has been argued, however, that after the onset of the Great European Recession the Target2 system changed its original role, and became an ECB policy instrument, allowing an indirect funding of Greece, Ireland, Portugal, Spain, Italy, and Cyprus (GIPSIC). The proof would be that the cumulated current account deficits correspond to an equal amount of Target2 claims by Germany, Netherlands and Finland (Sinn 2014, 188).

This argument has been questioned on the ground that Target2 net balances cannot be automatically linked to current-account deficits in specific countries and cannot be directly capped without putting into question the basic functioning of the Euro Zone currency union (Buiter et al., 2011). The currency union argument is echoed by an historical comparison between the Euro Zone countries and the US regional Reserve Banks between 1913 and 1960. Their relationship was characterized by mutual assistance, smoothing the long-term swings of alternative economic

fortunes of different states. According to this experience Target2 should be viewed as a form of cooperation, deemed essential for the Euro Area (Eichengreen et al., 2014).
The issue of alternative economic fortunes is crucial. After the German reunification, the current account remained negative until the year 2000, while the international investment position fell almost to zero. The current account balance bounced back positively in 2002 (Figure C.8), immediately after December 2011, when China became a member of the WTO. It steadily increased since then, with a corresponding growth of the international investment position, reaching a record level of 1.200 billion at the end of 2013 (Deutsche Bundesbank 2014b).

The 2013 Annual Report of the Bundesbank points to the non-price factors, such as brand preferences, behind the outstanding export success enjoyed by German automotive groups, in contrast to the difficulties of the Euro Zone competitors. German competitiveness hinges on innovation and an "employment-friendly stance for most of the last decade, making it easier for industry to keep and extend high-quality production stages of the value chain in Germany, despite labour costs, by international standards, remaining at high level" (Deutsche Bundesbank, Annual Report 2014a, 43). While Hartz reforms of the labour market, in three waves between 2003 and 2005, helped to improve the efficiency of matching in the labour market (Klinger and Roth, 2010), the economic fortunes of Germany turned suddenly positive in 2002 with the opportunity to enter the huge new Asian markets "making the right stuff at the right time" (The Economist, 2013).

In the absence of mutual assistance, which can balance alternate countries' fortunes over decades, unemployment arises as a new binding constraint, which creates a new trade-off between sustainable unemployment rates and zero balance of the current account.

We estimate the current account (% of GDP) as a function of the unemployment rate for Italy, Spain, France and Germany, on the assumption that unemployment is a proxy of domestic demand, which includes imports (we do not use logarithms because of negative values). Table 5 shows the main values using VEC estimates.

Current account and unemployment are cointegrated and the White test is significant, even if at a low level for Spain and France. Indeed, the test is more significant when considering the subperiod 1999-2008, before the crisis. In doing so, however, we do not include the period 2009-2013, when the current account rebalancing occurred. Only if we cover the entire period, 1999-2013, can we estimate the level of unemployment corresponding to a zero balance for the current account.
In the case of Italy, the unemployment rate compatible with a zero current account balance is 11%, a magnitude, which bears a close analogy with the current estimates for the NAWRU. The snag is that a trade-off between unemployment and current account balance arises and, more precisely, with the level of unemployment compatible with zero balance of the current account.

Table 5

Vector Error Correction Estimates
Current account= $\alpha_0 + \alpha_1$*unemployment rate
Period: 1999q1 2013q4
Cointegration equation

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
Unemployment Rate$_{t-1}$	0,517 (2,92)	1,010 (6,90) T	0,965 (4,38) T	0,956 (8,72) T
C	-5,561	-11,467	-5,753	-10,463
Lags	4*	4*	4**	4*

Unemployment compatible with zero current account				
Zero Current Account Unemployment Rate	10,756	11,353+0,250*T	5,961+0,102*T	10,944-0,236*T
White Test prob	0,1109°	0,0076°	0,0722°	0,3151°
LM (F-Stat) 1°	1,69	5,82	4,12	3,01
LM (F-Stat) 4°	3,44	11,56	1,22	6,19

t-statistics in parenthesis
* Cointegration is significant at 5% or less;
** Cointegration is significant between 5% and 10%
T: trend added
White Test 1999-2008: Italy 0,673; Spain 0,706; France 0,736

Within the Euro Area, the level of unemployment compatible with zero balance of the current account can stay negative for a long period, as in Germany in the 1990s, allowing the economy the time necessary to readjust its structure. In the cases of Spain and France, the inclusion of a trend allows us to estimate a lower bound of the unemployment rate, which is 11% in Spain and 6% in France. In both cases, the positive trend implies a higher level during the recent crisis. In the case of Germany, the estimate is instead related to an upper bound, rather than a lower bound; the trend coefficient is negative, implying a lower unemployment rate during the crisis. The actual total unemployment rates in 2013 were 12.2% in Italy, 26.1% in Spain, 10.3% in France and 5.3% in Germany.

These estimates imply quite different economic policies; while at present Germany enjoys a very low level of unemployment, almost the same level is reachable in France as a lower bound, improving investments and exports. However, in Italy, and even more in Spain, the lower bound of the unemployment rate is overestimated or too high. If the unemployment rate is too high, a trade-off between a positive current account and a sustainable unemployment rate arises. On the other hand, productivity improvements or lower oil prices could lessen the current account constraint.

4.3.2. Inflation gaps and the threshold of nominal price rigidity

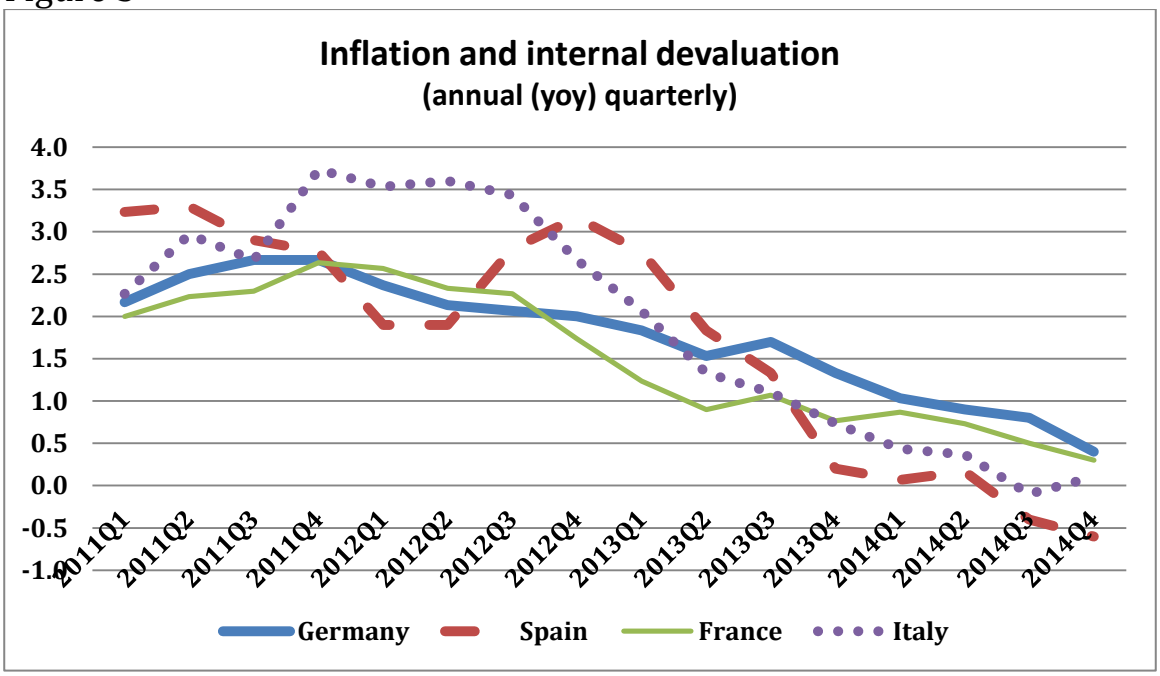
The European crisis is the first experience, since WW II, of a mild deflation spreading through many countries and originating from the goods market. Downward nominal rigidity admits a temporary degree of flexibility through discounts and price policies, while deflation implies downward flexibility of nominal prices, and

therefore a backward chain reaction on the prices, especially wages, which form the global chain of value. While the issues of inflation and hyperinflation can count on a vast theoretical and econometric literature, the same cannot be said about deflation, with the exception of Japan, where deflation was anticipated by an initial burst of the asset bubble in 1990, and only after the second-half of the 1990s spread to the goods market.

A debated question is whether the inflation slowdown in Europe could foreshadow a lasting low inflation or an outright deflation, becoming a cause, jointly with a decline in the full-employment interest rate, of a looming "secular stagnation" (Summers, 2014). Historical estimates show that forecasting the timing and severity of deflation is more difficult than inflation (Burdekin, Siklos, 2004), but, as Bernanke put it, "The sources of deflation are not a mystery. Deflation is in almost all cases a side effect of a collapse of aggregate demand … likewise the economic effects of a deflationary episode, for the most part, are similar to those of any sharp decline in aggregate spending, namely, recession, rising unemployment, and financial stress" (Bernanke, 2002).

Since the inception of the Euro Zone in 1999, the rate of annual inflation in Spain and Italy has been constantly higher than the rate of inflation in Germany, with the exception of 2013. Between 2013 and 1999, the inflation gap with respect to Germany accumulated a divergence of 20 points in Spain, 11 points in Italy, and only a minimal gap of 3 points in France. Given the initial parity conversion to the euro in 1999, the loss of price competitiveness accumulated so far would require, lacking the adjustment through devaluation, a corresponding negative inflation gap, or internal devaluation, with respect to Germany.

Figure 3



Source: our calculations on Eurostat

Over the last two years, the inflation gap has been partially filled by internal devaluation and a mild deflation. We can measure how the gap has been reduced by looking to the quarter when the inflation rates began to be lower than the ones in Germany. The relevant dates are 2012q4 in France, 2013q2 in Italy and 2013q3 in Spain. Comparing the inflation rates in Germany and each country over the corresponding periods, we can estimate a devaluation of -1% in France, -2,2% in Spain and -2,8% in Italy. Should this trend continue for at least two years, the adjustment would be almost complete; the problem is that, as the EU officially acknowledges, "slow growth and low inflation weigh on the reduction of imbalances and macroeconomic risk" (EU 2014, 2).

The crisis, prompted by fiscal austerity measures and the falling internal demand for consumption and investments, dragged on a downside comovement of the inflation rates, well below the 2% inflation target of the ECB. The sequence of the downside turning points of inflation (yoy monthly) was the following: October 2011 in Germany, December 2011 in France, March 2012 in Italy, and October 2012 in Spain. Outright deflation appeared for the first time in Spain in March 2014, in Italy in August 2014, and in France and Germany in January 2015. The growing threat of a European deflation prompted the European Central Bank to announce a package of non-standard monetary measure in March 2015, with the aim of fostering a wider economic recovery and gradually increasing inflation rates.

Table 6

Vector Error Correction Estimates (SA)

$Inflation_t = \alpha_0 + \alpha_1 * d(log(individual\ consumption)) + \alpha_2 * d(log(oil\ price))$

Period: 1999q1 2013q4

Cointegration equation

Variable\Country	ITALY	SPAIN	FRANCE
Real consumption (yoy)	0,114 (2,55)	0,138 (8,40)	0,131 (3,42)
Oil Price (€)	0,978 (0,43)	5,543 (3,68)	4,325 (2,53)
C	1,809	1,785	1,217
Lags	4*	2*	4*

t-statistics in parenthesis

* Cointegration is significant at 5% or less

To analyse the inflation dynamics, we need to focus on the imbalances of the goods market, the oil market—whose price dynamics are crucial for the European economy—and the labour market. A VEC estimate of the rates of change allows us to measure the long-term impact of the rates of change of domestic consumption and the price in euros of oil. The real growth rate of consumption is obtained by deflating the nominal rate with a seasonal price index (SA). We could not obtain similar results for Germany. The estimates are shown in Table 6.

The two variables, real growth of domestic consumption and growth of oil prices, are both significant for Spain and France; the coefficient on oil is significant in Spain and France (but not in Italy), where, however, its magnitude is much higher than the one for real consumption.

The long-term estimates raise the following question: how much of a percentage decline in household real consumption is theoretically required to force a zero rate of inflation? This percentage is the threshold of the consumption drop, which can force a break to the downward nominal price rigidity. Between 2007 and 2013, real consumption decreased in Spain by -10% and in Italy by -8%. The theoretical fall of consumption, which would have implied a zero rate of inflation, is higher and can be estimated as -13% in Spain and -16% in Italy. Spain is the country with the lowest gap between theoretical and effective declines, while in Italy the effective consumption decline is half the theoretical estimate. The estimate for France has a marginal economic meaning because real consumption increased in the period.

However, some caveats are in order. If we split the entire period to before and after 2007, the coefficients become more unstable and volatile, increasing their magnitude substantially after 2007.

Inflation dynamics in the four countries show a close comovement, as the dates of the inflation turning point suggest; therefore, we choose to add a Seemingly Unrelated Regression to the VEC estimate, whose specification and estimates are shown in Table 6.1.

Table 6.1

Seemingly Unrelated Regression Estimates

$Inflation_t = \alpha_0 + \alpha_1 inflation_{t-1} + \alpha_2\ inflation_{t-2} + \alpha_3 * d(log(individual\ consumption)) + \alpha_4 * d(log(oil\ price)) + \alpha_5 * d(log(unemployment\ rate))$

Period: 1999q1 2013q4

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
$Inflation_{t-1}$	0,783 (8,18)	0,836 (8,86)	0,867 (10,50)	0,819 (8,14)
$Inflation_{t-2}$	-0,026 (-0,26)	-0,200 (-2,46)	-0,231 (-3,06)	-0,114 (-1,24)
Real consumption (yoy SA)	0,070 (4,25)	0,067 (4,59)	0,059 (3,76)	0,063 (2,37)
Oil Price (€)	0,829 (2,19)	1,865 (3,43)	1,293 (3,77)	1,407 (4,26)
Unemployment (yoy)	..	..	..	-0,843 (-1,95)
C	0,185 (1,06)	0,472 (2,62)	0,353 (2,94)	0,210 (1,52)
Drop in consumption implied by zero inflation	-13,5	-16,5	-16,8	-14,5

t statistics in parenthesis

.. not significant at 10%

The OLS estimates for each single country identify a common break in 2007q4 in Italy and Spain, which can be associated with the onset of the first crisis, and another in France in 2004q4, for which we do not have an economic explanation. Germany does not show any break (Table B.6).

The break of the 2008 crisis impinges on the size of the elasticity coefficients, as the previous break test suggests, at least in the cases of Italy and Spain; therefore, a separate estimate of the "normal" period (1999-2008) from the "exceptional" period (2008-2013) becomes necessary. The results, with a SUR estimate, are the following (Table 7):

Table 7

Elasticity-Threshold	ITALY	SPAIN	FRANCE	GERMANY
Elasticity of inflation to consumption				
1999q1-2013q4	0,070	0,067	0,059	0,063
1999q1-2007q4	0,081	0,079	0,082	0,036
2008q1-2013q4	0,164	0,070	0,126	0,179
Consumption drop for a zero inflation				
1999q1-2013q4	- 13,5%	-16,5%	-16,8%	-14,5%
1999q1-2007q4	-13,3%	-14,1%	- 9,7%	-27,3%
2008q1-2013q4	- 4,6%	-16,0%	- 7,4%	- 2,7%
Effective consumption drop/increase 2008q1-2013q4				
2008q1-2013q4 (1)	-7,5%	-12,0%	+ 2,3%	+4,5%
2008q1-2013q4 (2)	-7,8%	-10,2%	+ 2,0%	+5,2%

(1) ESA2010, (2) ESA05

The elasticities of inflation to consumption are significantly different between the two periods. In "exceptional times" of crisis, the elasticities are higher than in the "normal" times for all the countries. Therefore, the average estimates mask a non-linearity, which surfaces splitting the two periods. Regarding the threshold measure, as the implied consumption drop, we can check that the ex-post consumption drop exceeds the threshold in the case of Italy. In the case of Spain, which exhibits a sharp rise and fall of consumption (figure 2), the high threshold is below but close to the ex-post consumption drop. In principle, the issue should not be a problem for France and Germany; however, as shown in Figure 3, these countries are also at risk of low inflation or mild deflation. The gap between ex-post inflation and thresholds can be explained as a process of contagion inside the Euro Zone.

The same exercise can be carried out on the coefficients of oil price changes, which measure the ratio (Δ% change inflation rate/Δ% oil price in euros), i.e., the elasticity of inflation with respect to a given oil price change, ranging from a low of 0,829 in Italy to a high of 1,865 in Spain. In addition, a problem with the instability of the coefficient arises with these estimates because of the economic crisis and also as a consequence of the wide swings in oil prices, which ranged from a peak of 120$ in March 2012 to a trough of 50$ at the beginning of 2015. Should the low oil prices stabilize, then the benefits, such as lower unemployment rates compatible with zero current account, will have to be weighted with a radical restructuring of world

demand and supply between OPEC countries and Western countries plus China. In the process, deflation would set in. We do not know enough about how the Euro Zone could bear a mild deflation and the possible contagion between the member countries; indeed, going back to "normal" inflation seems the safer option.

One final remark on the relationship between inflation and the unemployment rate: Germany is the only country where the negative relationship holds and is significant. The estimate on the entire period breaks down if we split the period before and after the period, and the relationship is very significant only before the economic crisis, from 1999q1 to 2007q4, (it changes sign from 2008q1 to 2013q4).

A higher indirect tax burden also influenced inflation and consumption. Higher indirect taxes directly depress domestic consumption when they are fully passed on in higher prices and indirectly depress domestic consumption when they are only partly passed on because higher indirect taxes depress domestic demand through lower real disposable income or lower profits. Even in the latter case, the tax effect measured by the former hypothesis is a significant approximation of its lowering impact on consumption (Figure C.9)

If we make the hypothesis that higher indirect taxes were implemented and fully passed on to inflation, the cumulated impact on the period 2011q1 to 2014q3 added 2,2 points of inflation in Spain, 1,6 points in Italy and 0,9 in France, while the impact on Germany's inflation was zero. The order of inflation turning points, as noted above, is the exactly the reverse: Germany, France, Italy and Spain. Alternatively, if we deduce the tax effect, inflation in Spain has hovered around zero since April 2013 and in Italy since March 2014. The implication would seem to be that the deflation pressure and contagion, originating from the decreased demand in the goods market, originated earlier than the official measures signalled, with a delay masked by the increase of indirect taxes.

The ECB single mandate for its monetary policy has exacerbated downward deflation pressures in spite of its acknowledgement that "not only inflation above 2% but also deflation, i.e., a self-sustaining fall in the broad price index, is inconsistent with price stability", and that, "it is more difficult for monetary policy to fight deflation than to fight inflation" … "monetary policy may not be able to provide a sufficient degree of support to the economy by using its interest instrument" (The Monetary policy of the ECB 2011, 66). Non-standard monetary measures adopted in March 2015 confirm what was anticipated by the ECB. The Federal Reserve monetary, with its double mandate of price stability and employment, as stated in 1977 (Public Law, 1977), has a wider space for policy action, which is still needed because the shadows of low inflation are still present.

4.3.3. Germany's exports model

Germany's exports model is often proposed as a solution to the sluggish growth of the European countries. Germany's success in foreign markets, and the related boom of its current account balance, is officially claimed as an imbalance to be corrected. The Alert Mechanism Report 2015 has warned against the increasing

current account balance because it is "driven mainly by a reduction in exports to the rest of the euro area, rather than an increase in imports by Germany … [and because it is] the result of low domestic demand, including investments, as well as strong competitiveness" (EU 2014; 7,21). As a consequence, a pattern of divergent growth has resurfaced among the European countries. From 2010 to 2013, economic growth outside the Euro Zone was positive, or non-negative, in the U.K., Poland, Sweden, Romania, Latvia (joining Euro in 2014), Bulgaria, and Lithuania, and inside the Euro Zone in Germany, Austria, Slovakia, Estonia, Malta and France. The countries where real GDP declined were Italy, Greece, Spain, Portugal, the Netherlands, Croatia, Cyprus, Slovenia, and the Czech Republic.

The pattern described for the EU countries can be summarized, over the period 2000-2013, by a positive relationship between GDP and exports changes (Figure C.11). A closer look at this relationship shows that, with the exception of Ireland and the Czech Republic, all the countries with a positive economic performance through the crisis also had a strong economic relationship with Germany. In fact, according to our estimates, the shares of exports to Germany to total exports (intra and extra UE), over the period 2008-2013, in Czech Republic averaged 32%, in Austria 31%, in The Netherlands and Poland 26%, in Hungary 25%, in Luxembourg 21%, in Slovakia 20%, in Belgium and Romania 18%, in France 16% and in Italy and Portugal 13% (Table 8).

Germany's border countries form a cluster, which fully qualify with the goal of reindustrialization proposed in the European Competitiveness Report (2014, 22), quantified with a target of 20% of industry over the total gross value added for the EU countries. In 2013, the only European countries where the manufacturing shares were above the 20% threshold were Germany, the Czech Republic, Romania, Ireland, Hungary, Slovakia, Slovenia, and Lithuania. Germany is obviously at the centre of this cluster. Therefore, a shock to Germany's exports has a bigger impact, positive or negative, primarily on border countries, which dies away as the European countries are geographically farther apart. Spain is an exception because its exports of goods to Germany increased substantially, more than the corresponding increase of exports from Italy and France.

In 1999, Germany's current account balance, as a share of GDP, was still slightly negative. It became positive in 2002 and jumped to 7,5% in 2013; simultaneously, the export/GDP ratio almost doubled, from 26% in 1999 to 47% in 2014 (ESA2010). In Japan, an economy of bigger but comparable size, the corresponding ratio increased from 11% in 2000 to 16% in 2013, while in the US it was 14%. Korea is the only comparable country with a similar pattern of exports, booming to 54% in 2013 (Figure C.10).

The extraordinary export, performance of Germany can be partly explained if we consider only the flow of exports going outside the EU (we use data ESA05). From 1999 to 2013 the 20-point increase in the export/GDP ratio was equally shared between the EU countries and extra-EU countries. If we consider the EU as a single economic entity, the export/GDP ratio of Germany in 2013 becomes 20%, a level still higher than in Japan and the US, but within a more reasonable range.

Table 8

Ranking of countries by German share of total exports of goods		
Country	Share of total exports to Germany	Δ% of exports to Germany 2008-2013
Czech Republic	31,7	25,5
Austria	30,5	7,5
The Netherlands	25,7	15,2
Poland	25,6	33,4
Hungary	25,4	7,7
Luxembourg	21,3	-16,3
Slovakia	20	42,1
Belgium	18,3	-5,8
Romania	18,2	66,3
France	16,1	7,8
Italy	12,7	2,9
Portugal	12,7	11,1
Bulgaria	10,9	98,4
Spain	10,6	20,9
Sweden	10	-2
UK	9,9	-2
Lithuania	8,5	53
Estonia	5	29,8

N.B. The share of total export value to Germany is averaged from 2008-2013.

Our calculation on Eurostat data on international trade HS2-HS4 [DS-016894]

If we select the period 2007-2013, however, the result is quite different. The export/GDP ratio of Germany increases by 3,5 points, with a decrease of 1 point inside the EU area and a further increase of 4,5 to extra-EU countries (as argued by the Alert Report 2015). Germany escaped the Great European Recession thanks to the Asian and the US markets, together with the European countries whose trades are more closely connected to Germany (Table 8). In the case of Spain, data allow us to split the increase only for the period 2007-2011 (which is the period shown in Table 9). However, for the entire aggregate we have data available up to 2013 showing an increase in the export/GDP ratio of 7,4 points in the period 1999-2013, implying a further acceleration of exports in 2012-2013. In fact, this is what aggregate data for Spain's exports confirm, while the previous analysis suggested that exports to Germany were a major driver.

The unfavourable consequence of this process is a slowdown of economic convergence with the other major countries, such as France, Spain and Italy, hampering the process towards an effective currency area. Exports improvement, such as for Spain, seems promising, with a volume growth of +15% from 2010 to 2013, which is higher than in Germany (+12%), France or Italy (+9%). Moreover, between 2007 and 2013 Spain's exports were the most dynamic, and the ratio of

export/GDP increased by 7,2 points. However, the positive performance of the exports was not enough to balance the slump in household consumption; as a consequence, the GDP fell in 2012 and 2013.

Table 9

	Exports of goods and services - % GDP of each country								
	Total			To EU countries			Extra-EU		
Country	1999	2007	2013	1999	2007	2013	1999	2007	2013
Germany	29,4	47,2	50,7	18,7	29,8	28,8	10,7	17,4	21,9
Spain (2011)	26,7	26,9	30,8	19,5	19,5	20,9	7,1	7,4	9,9
France	26,3	26,9	27,2	16,6	16,9	15,8	9,7	10,0	11,4
Italy	24,3	28,9	30,4	14,9	17,4	16,1	9,4	11,5	14,3
	2013-1999			2013-1999			2013-1999		
Germany	21,3			10,1			11,2		
Spain (2011)	4,1			1,4			2,8		
France	0,9			-0,8			1,7		
Italy	6,1			1,2			4,9		
	2013--2007			2013-2007			2013-2007		
Germany	3,5			-1,0			4,5		
Spain (2011)	3,9			1,4			2,5		
France	0,3			-1,1			1,4		
Italy	1,5			-1,3			2,8		

N.B Our calculations on Eurostat data (ESA05): Spain until 2011.

As we show (Figure C.11), a positive relationship holds between GDP and export changes for a cross-section of the EU countries from 2000 to 2013. A similar correlation holds, over the same period, between the changes in final consumption and exports for the EU. These results are especially relevant for the countries in the first quadrant, (positive changes of consumption and exports), which include Germany, Poland, Bulgaria, Romania, Latvia, Lithuania, Austria, Belgium and Luxembourg, while for Germany's other partners, such as the Czech Republic, Slovakia and Hungary, only a slight decrease in consumption occurred.
We explain the positive increase of consumption for these countries with the spillover of the high added value of Germany in the value chain of its exports. As in the Balassa-Samuelson model, the most profitable industries will trickle down as higher wages and profits to the entire economic area involved.

Conclusions

The purpose of this paper is to unbundle the unbalanced Great European Recession, which halted the process of economic convergence and divided European countries. We selected the following set of economic imbalances: employment, unemployment, consumption, investment, current account, and inflation, of which only two—unemployment and current account balance—are included in the 11 Macroeconomic Imbalance Procedure Scoreboard. For each imbalance, we estimated a regression on quarterly data, from 1999q1 to 2013q4, for Germany, France, Spain and Italy, which account for almost 80% of the Euro Zone GDP.

Our estimates confirm the chain of causation we posit, from the consumption slump—caused by the fiscal policy—to the investment drop and to the main consequences, identified with increasing unemployment, decreasing employment, falling inflation, current account improvement due to increasing unemployment in Italy and Spain.

The estimates show that the first crisis, in 2008, and the second crisis, in 2012-2013, caused structural breaks. Italy and Spain went through a prolonged economic crisis of 7 years, which changed the main economic relationship and returned economic activity to the past. In 2014, the real GDP in Italy returned to 1999 levels, while in Spain, which reported positive growth in 2014, the real GDP is still at the 2005 level.

We put the imbalances of unemployment and employment, for which we estimate a significant relationship with investments and exports, at the centre of our analysis. Exports are a crucial driver, in the short run, for lower unemployment and higher employment. However, exports are exogenous, and it is crucial to implement a public investment program with the purpose of promoting private investments and employment to jump start the chain reaction of increasing disposable income and consumption.

Investments create employment and are carriers of technological innovation, productivity and a better standard of living. Therefore, filling the "investment gap" should be the fundamental goal of the European economy.

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APPENDIX

Table A.1 Stylized Facts

Individual Consumption				
period: 1999q1 2013q4 - 60 observations				
Billions	**Mean**	**St. Dev**	**Minimum**	**Maximum**
ITALY	231,5	23,4	164,2	245,6
SPAIN	133,7	21,9	89,1	163,5
FRANCE	250,4	34,4	185,7	303,1
GERMANY	336,7	31,9	278,7	406,6

Total Investment				
period: 1999q1 2013q4 - 60 observations				
Billions	**Mean**	**St. Dev**	**Minimum**	**Maximum**
ITALY	70,3	6,0	57,8	79,6
SPAIN	58,5	8,9	45,6	75,8
FRANCE	82,8	6,6	68,1	94,8
GERMANY	103,0	5,6	93,4	112,4

Total Employment - 60 observations				
period: 1999q1 2013q4				
Millions	**Mean**	**St. Dev**	**Minimum**	**Maximum**
ITALY	22,0	0,7	20,0	23,1
SPAIN	17,8	1,7	14,2	20,6
FRANCE	24,7	0,9	22,4	25,9
GERMANY	37,0	1,4	35	39,7

Total Export				
period: 1999q1 2013q4- 60 obervations				
Billions	**Mean**	**St. Dev**	**Minimum**	**Maximum**
ITALY	93,7	9,3	74,0	109,4
SPAIN	60,5	9,0	43,1	78,1
FRANCE	113,7	11,0	87,2	132,6
GERMANY	243,4	57,7	139,4	334,4

Unemployment rate				
period: 1999q1 2013q4 - 60 obervations				
Rates	**Mean**	**St. Dev**	**Minimum**	**Maximum**
ITALY	8,6	1,6	5,9	12,5
SPAIN	14,4	5,8	8,0	26,3
FRANCE	8,9	0,8	7,1	10,8
GERMANY	8,1	1,7	5,2	11,4

Current Account				
period: 1999q1 2013q4 - 60 obervations				
% GDP	**Mean**	**St. Dev**	**Minimum**	**Maximum**
ITALY	-0,9	1,7	-5,9	2,6
SPAIN	-4,8	3,1	-11,8	1,8
FRANCE	-0,1	1,6	-3,3	3,7
GERMANY	4,3	3,3	-3,3	9,0

Inflation				
period: 1999q1 2013q4 - 60 obervations				
Rates	**Mean**	**St. Dev**	**Minimum**	**Maximum**
ITALY	2,2	0,7	0,1	4,0
SPAIN	2,7	1,1	-0,9	4,9
FRANCE	1,7	0,8	-0,4	3,7
GERMANY	1,6	0,7	-0,4	3,2

Table A.2. Improving and Losing Countries (2013-2010)

	GDP - volumes					Δ%
	2010	2011	2012	2013	2013-2010	2013/2010
Italy	1.418.376	1.424.752	1.391.018	1.365.227	-53.149	-3,7
Greece	193.754	179.986	167.436	160.981	-32.772	-16,9
Spain	948.244	948.721	933.148	921.739	-26.505	-2,8
Portugal	158.544	156.561	151.504	149.374	-9.170	-5,8
Netherlands	549.265	554.453	547.538	543.033	-6.232	-1,1
Croatia	36.875	36.788	35.982	35.654	-1.221	-3,3
Cyprus	15.327	15.394	15.023	14.210	-1.117	-7,3
Slovenia	31.347	31.569	30.767	30.426	-921	-2,9
Czech Rep.	119.442	121.614	120.372	119.248	-194	-0,2
LOSING	3.471.173	3.469.839	3.392.788	3.339.891	-131.281	-3,8
	GDP - volumes					Δ%
	2010	2011	2012	2013	2013-2010	2013/2010
Malta	5.542	5.619	5.680	5.843	302	5,4
Finland	164.164	168.802	167.100	164.795	631	0,4
Hungary	87.760	89.138	87.655	88.618	859	1,0
Bulgaria	26.570	27.059	27.218	27.452	882	3,3
Luxembourg	32.725	33.348	33.289	34.001	1.276	3,9
Estonia	11.258	12.234	12.786	13.073	1.815	16,1
Latvia	12.463	13.125	13.809	14.377	1.914	15,4
Denmark	206.676	208.891	208.141	209.009	2.333	1,1
Slovakia	48.372	49.815	50.712	51.189	2.818	5,8
Lithuania	22.099	23.436	24.293	25.103	3.004	13,6
Ireland	163.483	167.029	167.291	166.723	3.240	2,0
Belgium	321.956	327.604	327.133	327.776	5.820	1,8
Romania	90.735	92.848	93.364	96.655	5.921	6,5
Austria	261.782	269.201	271.545	272.411	10.629	4,1
Sweden	323.348	332.830	335.919	341.419	18.072	5,6
Poland	307.696	321.607	328.018	333.111	25.415	8,3
France	1.772.645	1.808.575	1.808.826	1.812.687	40.042	2,3
U.K.	1.898.237	1.919.448	1.924.779	1.958.337	60.100	3,2
Germany	2.375.659	2.454.848	2.471.753	2.482.430	106.771	4,5
IMPROVING	8.133.169	8.325.454	8.359.312	8.425.011	291.842	3,6

Source: our calculation on Eurostat database

Table B.1

Employment impact of 10% increase of fixed investment on domestic demand (Italy-2013)			
Nace	Sectors	Employment	% total
A	Agricolture, hunting and forestry	3.361	1,0
B	Fishing	54	0,0
C	Mining and quarrying	541	0,2
D	Manufacturing	68.116	19,9
E	Electricity, gas and water supply	1.929	0,6
F	Construction	141.263	41,3
G	Wholesale and retail trade, repair of motor	42.713	12,5
H	Hotel and restaurants	4.500	1,3
I	Transport, storage and communication	28.223	8,2
J	Financial intermediation	6.081	1,8
K	Real estate, renting and business activity	39.640	11,6
L	Public Administration	188	0,1
M	Education	1.380	0,4
N	Heatlth and social work	146	0,0
O	Other community, social and personal services	3.738	1,1
P	Private Households	567	0,2
Q	Extra-territorial services	1	0,0
		342.442	100,0

Source: calculation by Lorenzo Toffoli on input-output table 2010

Table B.2

Vector Error Correction Estimates
log(unemployment rate) = α_0 + α_1*log(total investment) + α_2*log(export)
period: 1999q1 2013q4
Cointegration equation

Variable\Country	ITALY	SPAIN (1)	FRANCE (1)	GERMANY
Total investment	-2,539 (-9,39)	-1,181 (-3,03)	-1,330 (-4,22) T	-8,316 (-4,07)
Export	-0,240 (-1,04)			-1,311 (-3,53)
C	33,237	15,551	-17,051	114,296
Lags	2*	2*	1*	1**
White Test prob	0,0021	0,000	0,1945	0,0842
LM (F-Stat) 1°	6,07	0,29	3,19	5,19
LM (F-Stat) 4°	15,65	6,50	9,21	6,36

t-statistics in parenthesis
* Cointegration is significant at 5% or less
** Cointegration is significant between 5% and 10%
T: trend added

Table B.3

Vector Error Correction Estimates
log(Individual consumption) = α_0 + α_1*log(disposable income)
period: 1999q1 2013q4
Cointegration equation

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
Disp.Income	0,684 (4,95)	1,078 (34,55)	0,966 (78,25)	0,941 (87,98)
C	3,768	-1,065	0,255	0,577
apc	0,853	0,879	0,848	0,837
mpc	0,58	0,95	0,82	0,79
Lags	2*	2*	2*	2*
White Test prob	0,2252	0,0272	0,7486	0,1552
LM (F-Stat) 1°	34,93	20,24	25,07	122,19
LM (F-Stat) 4°	19,99	15,40	15,04	54,86

t-statistics in parenthesis
* Cointegration is significant at 5% or less
** Cointegration is significant between 5% and 10%
T: trend added

Table B.4

Vector Error Correction Estimates

Italy

log(Individual consumption) = α_0 + α_1*log(disposable income) + α_2*log(net financial assets)+ α_3*bonds10years + α_4*log(collective consumption)

Cointegrated equation

Variable	BdI	BdI	Estimate
	Table 2 (F)	Table II-1 (D)	2013
Housing wealth	0,047 (3,879)	0,064 (5,601)	
Financial wealth/ non housing wealth	0,191 (8,463)	0,244 (10,974)	0,142 (1,486)
Disposable income	0,755 (9,008)	0,444 (10,930)	0,664 (3,461)
Bonds10/ interest rate	-0,045 (-6,162)	-0,019 (-3,024)	0,052 (6,131)
Collective consumption	-0,191 (-4,181)		0,312 (2,939)

Banca d'Italia, "Household wealth in Italy", A. Bassanetti and F. Zollino, 2007

Table B.5

Ordinary Least Squares Estimates

log(Individual consumption) = α_0 + α_1*log(disposable income$_{t-1}$) + α_2*log(net financial assets$_{t-1}$)+ α_3*(interest rate$_{t-1}$) + α_4*d(log(saving rate$_{t-1}$))

period: 1999q1 2013q4

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
Disp.Income$_{t-1}$	0,507 (7,61) T	0,816 (35,63)	0,507 (6,97) T	0,758 (3,48)
Fin.Assets$_{t-1}$	0,128 (2,72) T	0,246 (6,64)	0,130 (3,15) T	0,036 (0,40)
Bonds 10 years$_{t-1}$	0,0003 (0,10) T	0,006 (1,25)	0,005 (1,03) T	-0,008 (-1,18)
Δ% Saving rate$_{t-1}$	-0,049 (-7,64) T	-0,016 (-6,14)	-0,091 (-9,39) T	-0,052 (-2,38)
C	3,967 (5,85)	-1,302 (-3,01)	4,029 (3,82)	2,435 (1,43)
Break				
criteria	sequential / repartition	sequential / repartition	sequential / repartition	sequential / repartition
	2010Q3/2007Q2	2007Q4	2008Q4	no break
	2007Q2/2010Q2			
White Test prob	0,025	0,792	0,007	0,004
Breusch-Pagan-Godfrey prob	0,013	0,914	0,055	0,905
LM (F-Stat) 1°	0,87	0,00	0,07	28,59
LM (F-Stat) 4°	12,85	4,49	13,93	42,55

t statistic in parenthesis

T: time trend

Table B.6

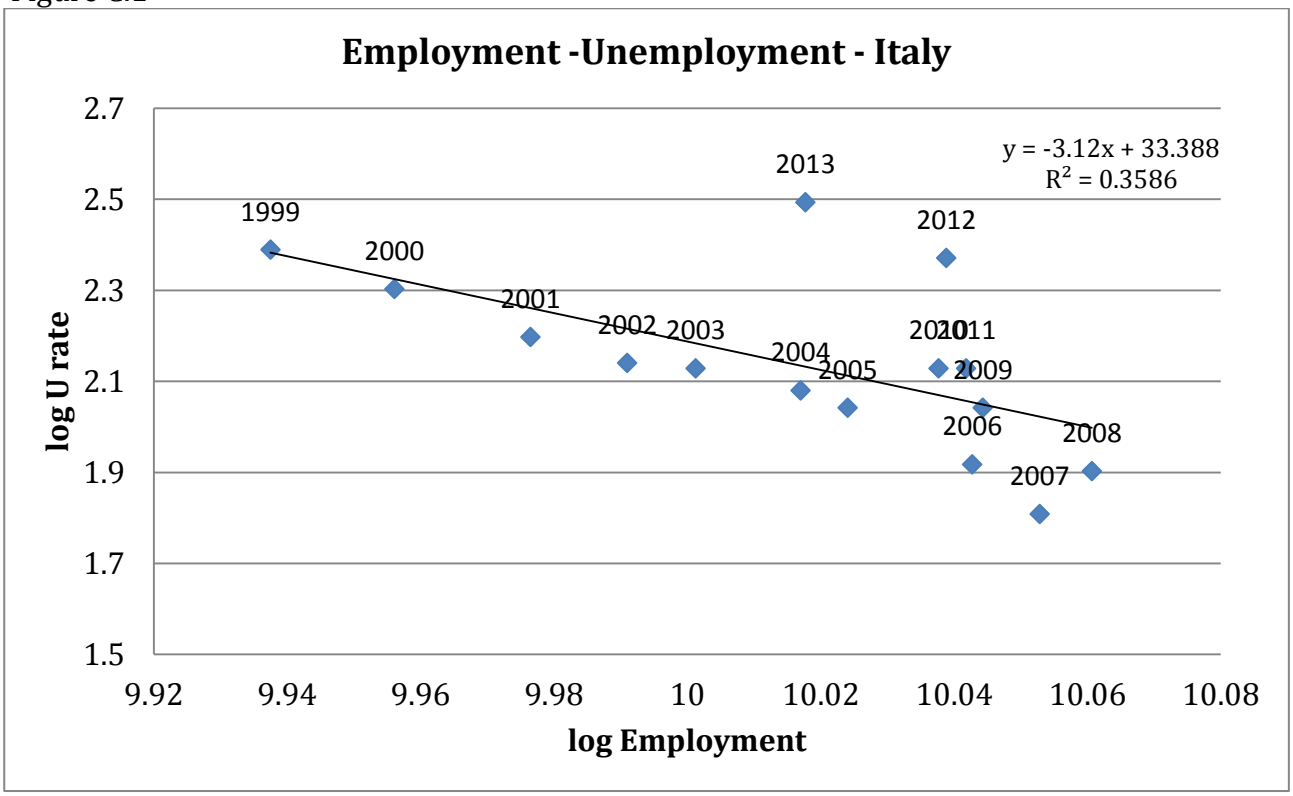
$Inflation_t = \alpha_0 + \alpha_1 inflation_{t-1} + \alpha_2\ inflation_{t-2} + \alpha_3 * d(log(individual\ consumption)) + \alpha_4 * d(log(oil\ price)) + \alpha_5 * d(log(unemployment\ rate))$

Ordinary Least Squares Estimates
period: 1999q1 2013q4

Variable\Country	ITALY	SPAIN	FRANCE	GERMANY
$Inflation_{t-1}$	0,884 (6,72)	0,879 (7,12)	0,909 (7,80)	0,742 (6,14)
$Inflation_{t-2}$	-0,063 (-0,47)	-0,246 (-2,35)	-0,225 (-2,18)	-0,016 (-0,15)
Real consumption (yoy)	0,077 (3,63)	0,076 (3,97)	0,081 (3,69)	0,107 (3,16)
Oil Price (€)	0,973 (2,34)	1,899 (3,14)	1,355 (3,57)	1,441 (4,05)
Unemployment (yoy)	..	..	..	-0,765 (-1,40)
C	0,013 (0,06)	0,451 (2,07)	0,171 (1,13)	0,030 (0,18)
White Test prob	0,908	0,322	0,028	0,524
LM (F-Stat) 1°	0,305	0,955	0,739	0,019
LM (F-Stat) 4°	3,545	0,529	0,904	0,582
Break				
criteria	sequential / repartition	sequential / repartition	sequential / repartition	sequential / repartition
	2007Q4	2007Q4	2004Q4	no break
White Test prob	0,680	0,890	0,680	0,524
LM (F-Stat) 1°	0,867	1,098	0,397	0,019
LM (F-Stat) 4°	3,047	1,269	0,249	0,582

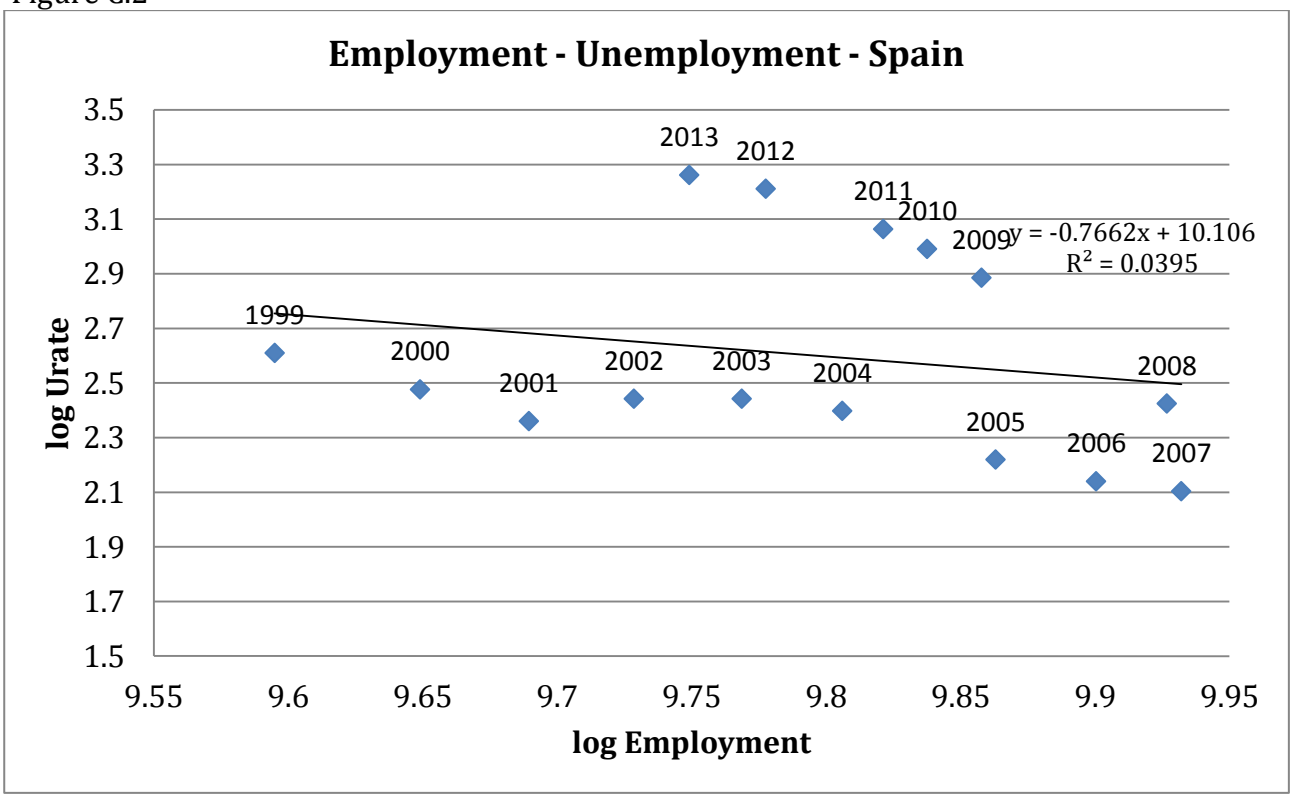
t statistic in parenthesis
T: a time trend is added for stationarity

Figure C.1



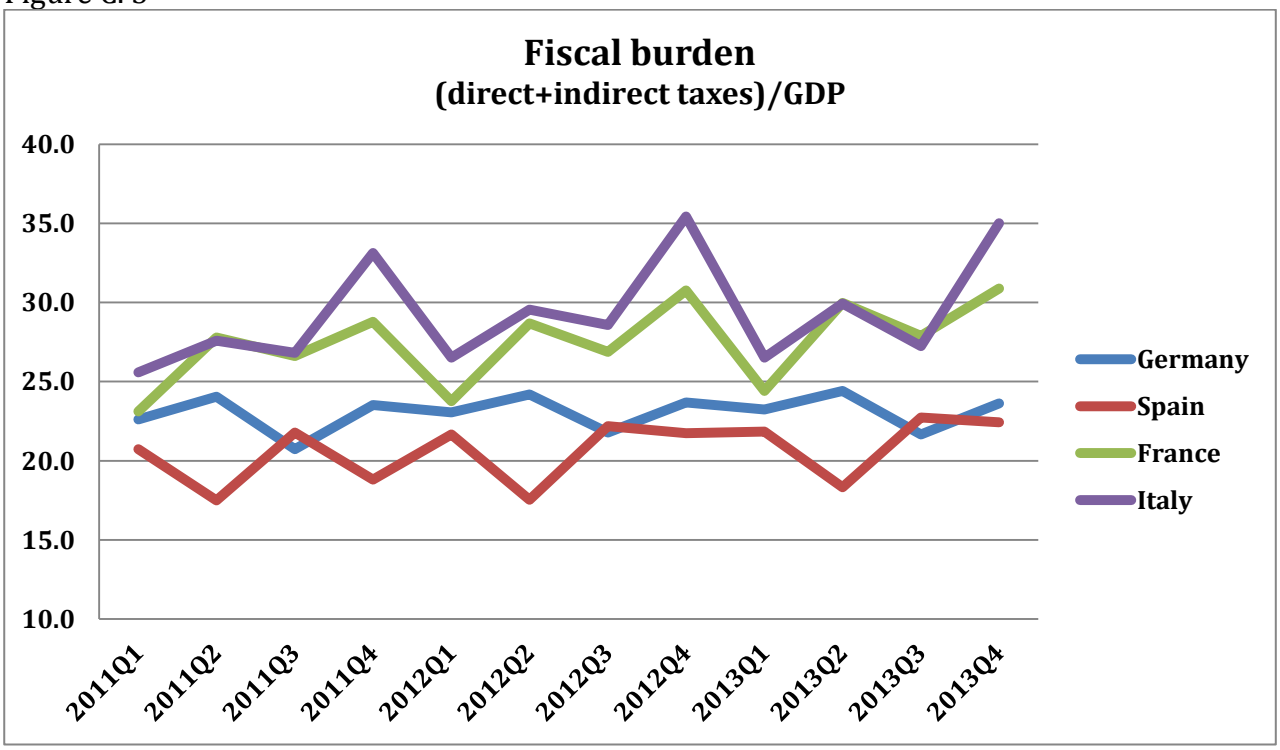
Source: calculations by Maurizio Baussola

Figure C.2



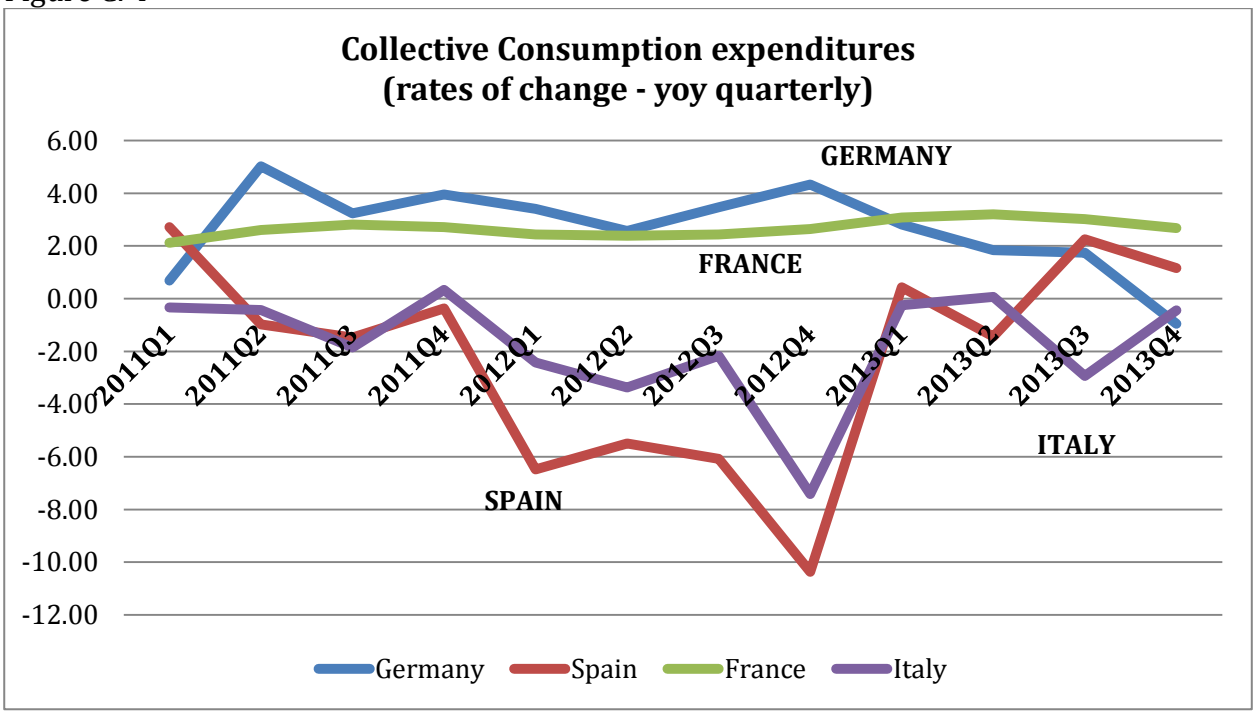
Source: calculations by Maurizio Baussola

Figure C. 3



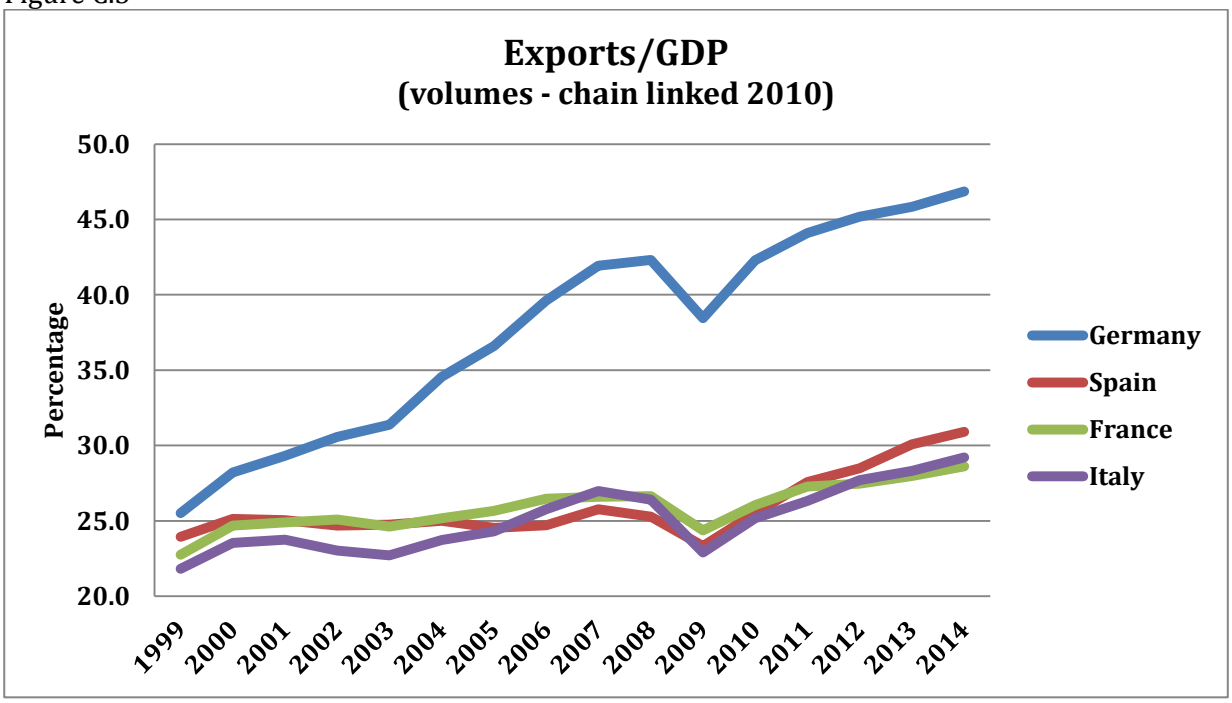
Source: our calculation on Eurostat database

Figure C. 4



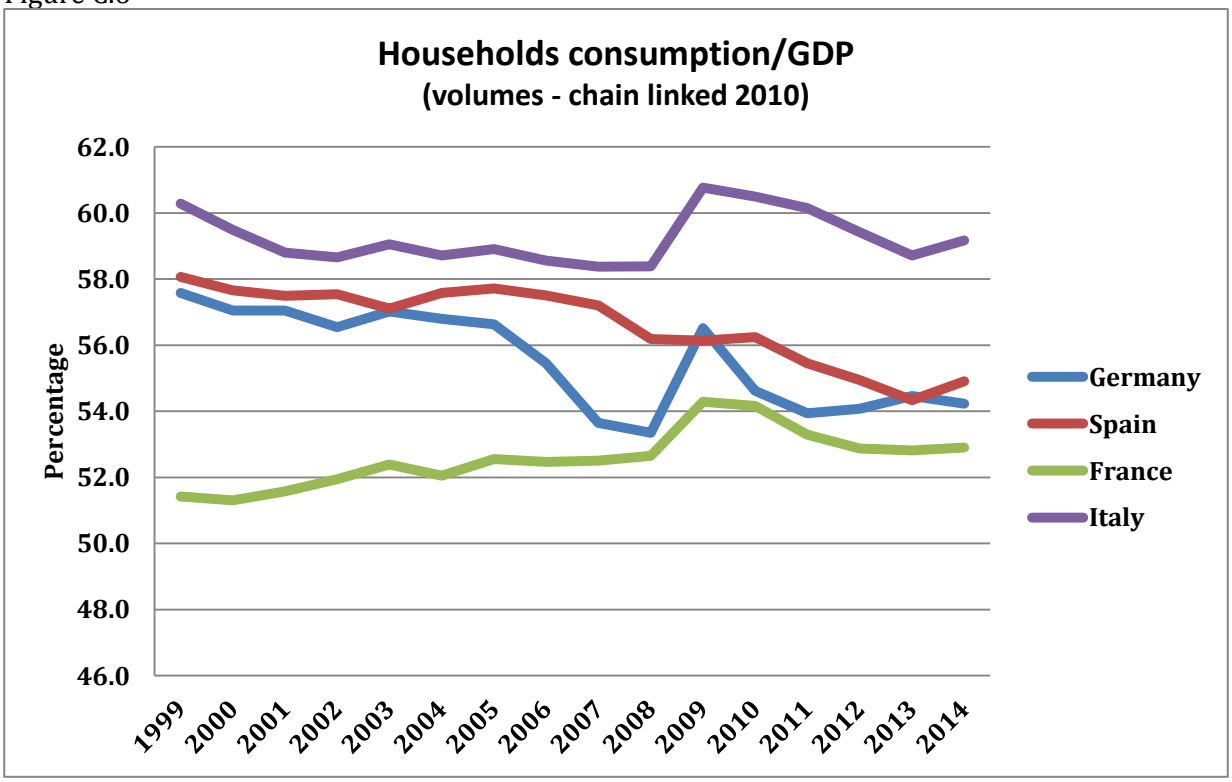
Source: our calculation on Eurostat database

Figure C.5



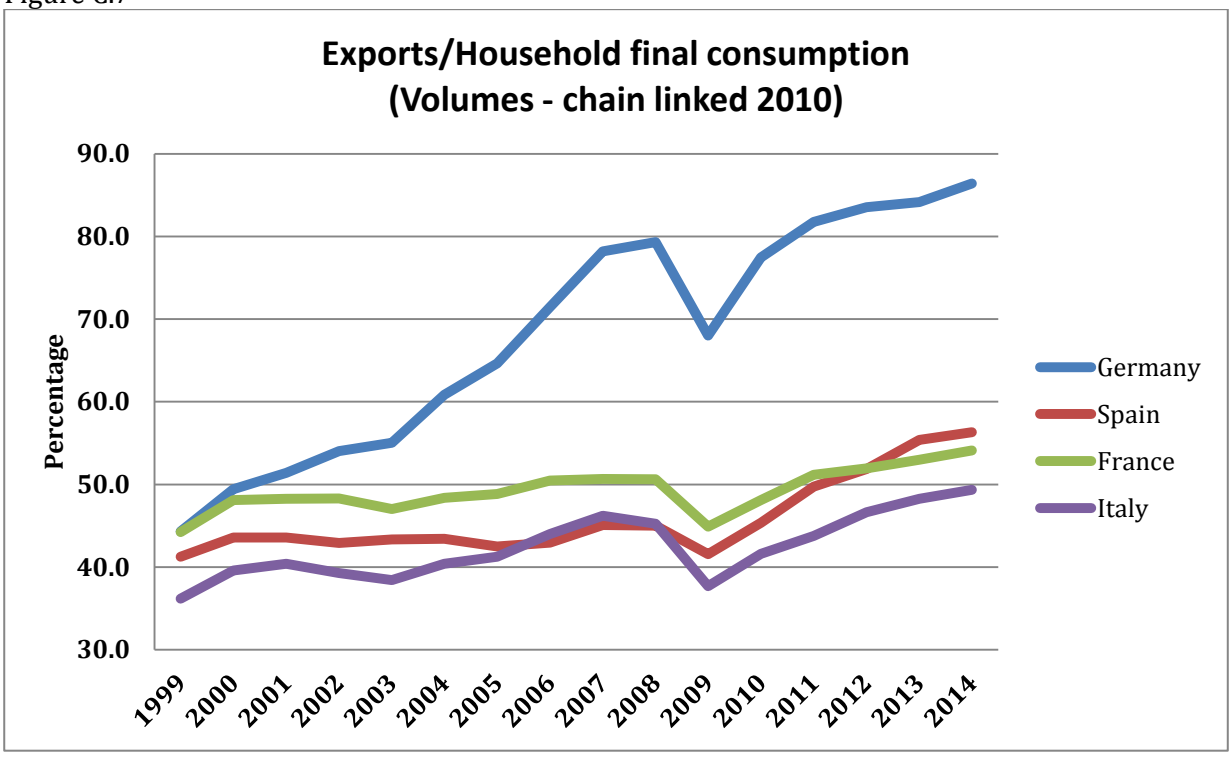
Source: our calculation on Eurostat database

Figure C.6



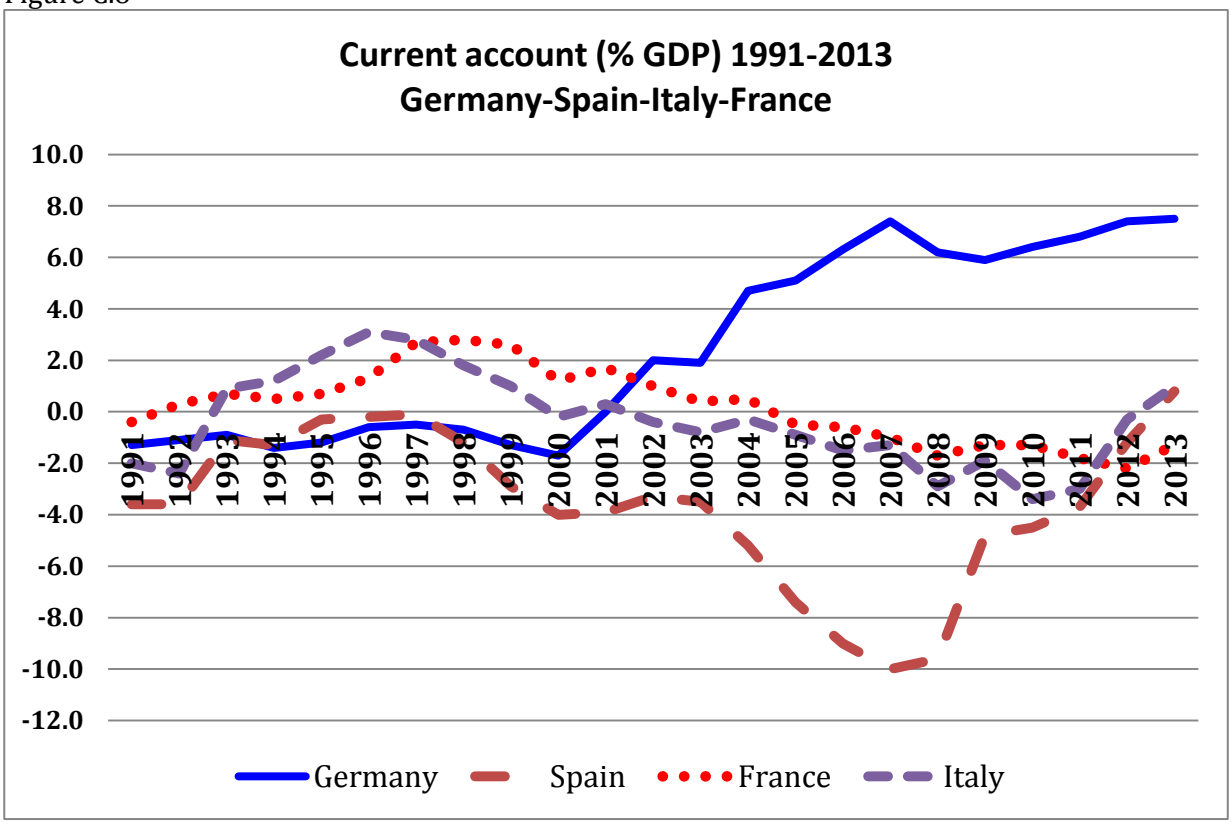
Source: our calculation on Eurostat database

Figure C.7



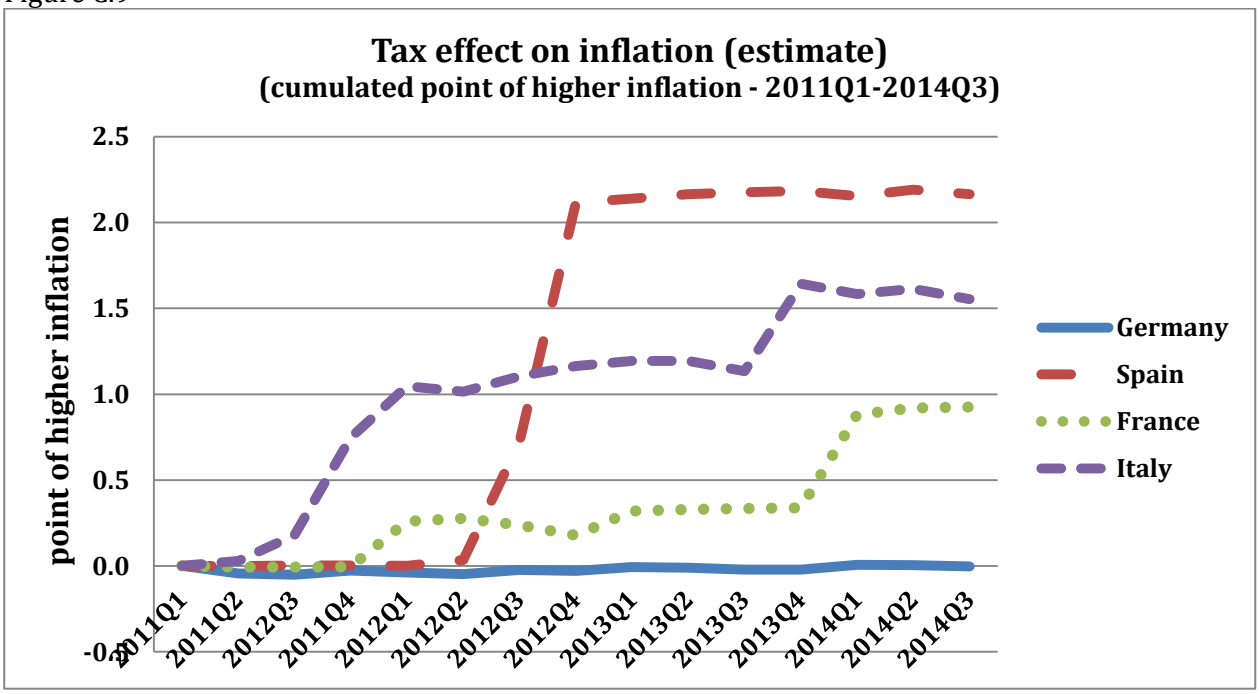
Source: our calculation on Eurostat database

Figure C.8



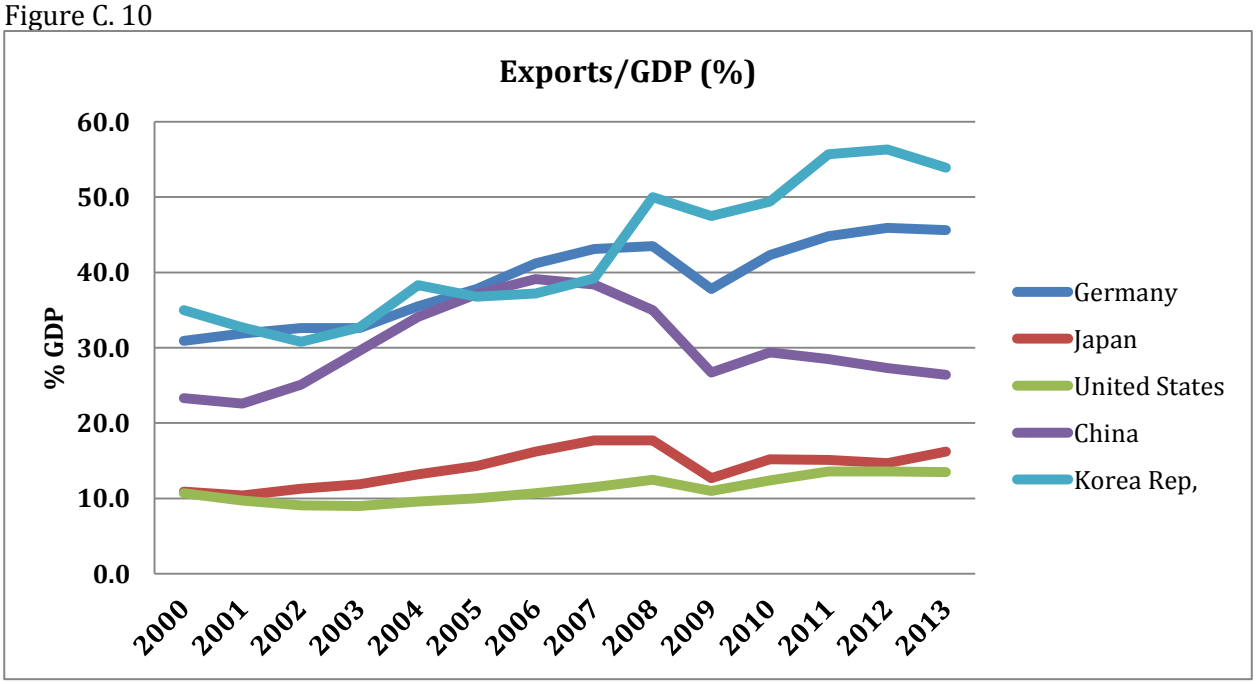
Source: our calculation on Eurostat database

Figure C.9



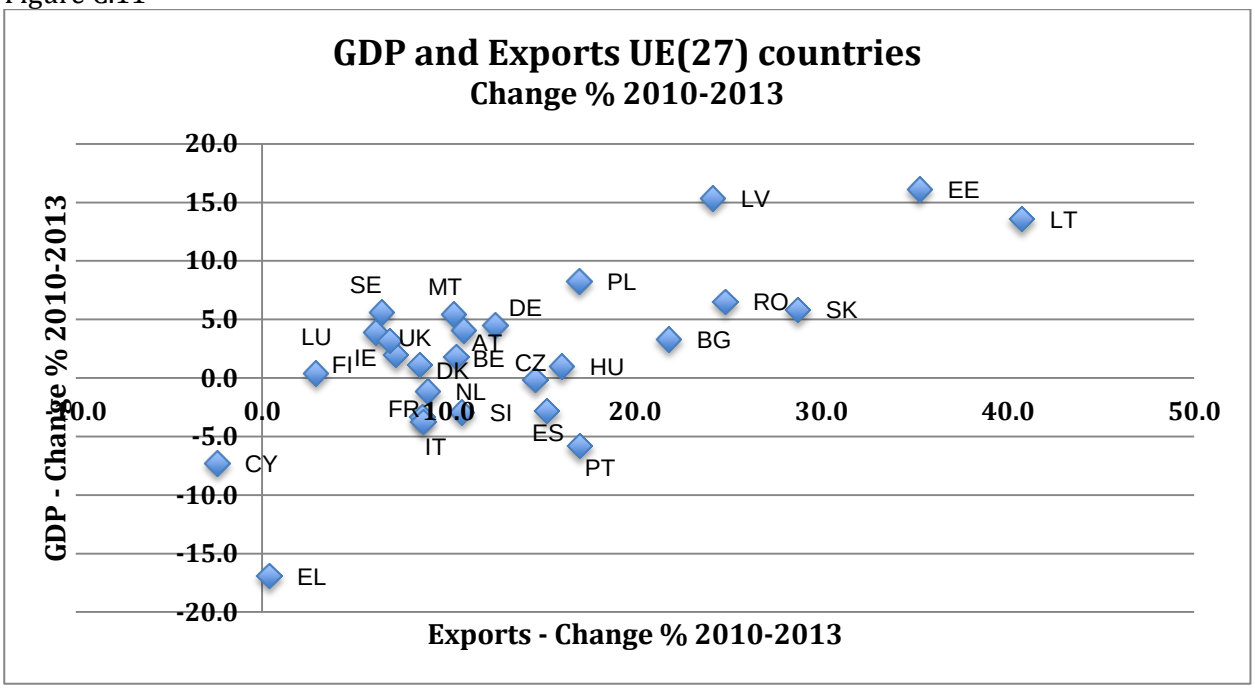
Source: our calculation on Eurostat database. Tax covered are: VAT, other consumption taxes, car registration, insurance premiums, other taxes on hotels and restaurants

Figure C. 10



Source: Source: our calculation on World Bank database

Figure C.11



Source: our calculation on Eurostat database

LEGEND

Inflation (infl)	Quarterly (three months average) data, annual rate of change (yoy) Eurostat, Extracted 01.07.14
Private Consumption (cind)	Individual Consumption Expenditures (millions euro), Households, European Sector Accounts, Quarterly data, Not seasonally adjusted, Eurostat, Extracted 07.14
Oil Price	Crude Oil Prices: Brent-Europe, Euro per barrel, Not seasonally adjusted, Fred St. Louis, Extracted 10.09.14
Unemployment Rate (un)	Unemployment Rate by sex and age groups, Quarterly average, %, Seasonally adjusted data, Eurostat, Extracted 07.14
Savings Rate (savrat)	Saving Rate in %, Households, European Sector Accounts, Quarterly data, Not seasonally adjusted, Eurostat, Extracted 07.14
Total Investment (SA) (invtot)	Gross Fixed Capital Formation by 6 asset type, Volumes, Total fixed assets, Million Euro, chain-linked volumes reference year 2005, Seasonally adjusted and adjusted data by working days, Quarterly data, Eurostat, Extracted 05.09.14
Construction Investment (ctr)	Gross Fixed Capital Formation by 6 asset type, Volumes, Dwellings + Other buildings and structures, Million Euro, chain-linked volumes reference year 2005, Seasonally adjusted and adjusted data by working days, Quarterly data, Eurostat, Extracted 05.09.14
Industrial Investment (ind)	Gross Fixed Capital Formation by 6 asset type, Volumes, Total fixed assets - construction investment, Million Euro, chain-linked volumes reference year 2005, Seasonally adjusted and adjusted data by working days, Quarterly data, Eurostat, Extracted 05.09.14
Export (ex)	GDP and main components, Volumes, Exports of goods and services, Million Euro, chain-linked volumes reference year 2005, Seasonally adjusted and adjusted data by working days, Quarterly data, Eurostat, Extracted 08.09.14
Total Investment (NOT SA) (invtns)	Gross Fixed Capital Formation by 6 asset type, Volumes, Total fixed assets, Million Euro, chain-linked volumes reference year 2005, Not seasonally adjusted, Quarterly data, Eurostat, Extracted 05.09.14
Total Investment (Germany/France/Spain/Italy)	GDP and main components, Current Price, Gross fixed capital formation, Million Euro, not seasonally adjusted data, Eurostat, ESA2005
Public Investment (publ)	Quarterly non-financial accounts for general government, Gross Capital Formation, Million Euro, not seasonally adjusted data, Eurostat, Extracted 14.10.14

Private Investment (priv)	Total Investment - Public Investment
Pil	GDP and main components, Volumes, Gross Domestic Product at market prices, Million Euro, chain-linked volumes reference year 2005, Seasonally adjusted and adjusted data by working days, Quarterly data, Eurostat, Extracted 09.11.14
Current Account (ca)	Main Balance of Payments and International Investment position items as share of GDP, Quarterly data, Percentage of GDP, Eurostat, Extracted 08.09.14
Total Employment (em_tot)	Employment by sex, age and economic activity, Total activities, Quarterly data, Eurostat, Extracted 22.10.14
Industrial Employment (em_ind)	Employment by sex, age and economic activity, Manufacturing, electricity, gas, water, Quarterly data, Eurostat, Extracted 22.10.14
Dwellings Employment (em_dwe)	Employment by sex, age and economic activity, Construction activities, Quarterly data, Eurostat, Extracted 22.10.14
Disposable Income (gdi)	Gross Disposable Income (adj. D8) (millions euro), Households, European Sector Accounts, Quarterly data, Eurostat, Extracted 07.14
Financial Assets (finass)	Net Financial Assets (Million Euro), Households, European Sector Accounts, Quarterly data, Eurostat, Extracted 07.14
Bond 10 years	Bonds 10 years, Quarterly data, percent, Not Seasonally adjusted, OECD, Extracted 10.14
Bond 3 months	Bonds 3 months, Quarterly data, percent, Not Seasonally adjusted, OECD, Extracted 10.14
Profit (prof)	Gross Operating Surplus + Gross Mixed Income (Million Euro), Non-financial corporations key ratios and components, European Sector Accounts, Quarterly data, Not Seasonally adjusted, Eurostat, Extracted 07.14 NB Profits of non-financial corporation are missing for Germany: as a proxy we use Gross operating surplus and gross mixed income as defined by National Account (S_ADJ)
Consumption (cind2)	GDP and main components, Volumes, Final Consumption expenditure of households, Million Euro, chain-linked volumes reference year 2005, Seasonally adjusted and adjusted data by working days, Quarterly data, Eurostat, Extracted 09.11.14