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The PIGS, does the Group Exist? An empirical macroeconomic analysis based on the Okun Law

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The PIGS, does the Group Exist?
An empirical macroeconomic analysis based on the Okun Law[1]

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Abstract

Will the current crisis accelerate the PIGS collapse? We approach the subject by comparing the responses of the unemployment rate to an output shock on those economies (Portugal, Italy, Greece and Spain) with those of a benchmark economy – the USA. Our methodological strategy relies on one of the pillars of empirical macroeconomics the Okun Law (OL) which we incorporated in a VAR model. We addressed two drawbacks usually present in OL, the interdependency problem and the non-stationarity problem. We have included in our models the participation rate as a way to overcome the former problem and for the later one we have analysed the time series properties of the variables used on our models. We propose stable VAR models for each of the economies involved and also a fixed-effects panel-VAR for the PIGS. The time for the absorption of shocks and the disequilibrium levels are much more favourable to USA, but we conclude also that in terms of unemployment we are not allowed to consider the PIGS as a homogenous group.

Key words: Okun Law, C-I, VAR, Participation rate, Stability and Impulses.
JEL codes: C32, C51, J21 and E24.

[1] I thank Adelaide Duarte for the comments and suggestions. But only the author is responsible for the omissions or inaccuracies, which may still exist.

Introduction

The acronym PIGS is used to define a group of countries within the Eurozone, that share similar macroeconomic imbalances. They have large current account deficits and high unemployment as compared to the average of the European Monetary Union. These countries suffered a loss of competitiveness, registered high values of public deficits and in the last years the unit labour costs gap with Germany has not been reduced.

According to Evans-Pritchard (2009), quoting a BNP Paribas report and senior executive Hans Redeker's declaration "the 'PIGS' quartet was now facing "collapse"", not only direct foreigner investment but also portfolio investment had abruptly declined in UEM as a result of the bad economic performance of PIGS.

The inspection of such a disastrous situation, as mentioned above, will be accomplished through the study of the results of an output shock in the PIGS area, measured by the levels of unemployment. We represent the current crisis by an output shock and compare the "bad" performances of those countries and the area with a benchmark economy, not an European one but the United Sates. As Knotek (2007) has suggested in a pre-crisis context we can answer to our question with the application of the Okun Law (OL) with a special emphasis to the stability problem of the estimated relation. As the statistical supply of labour is not independent of the conjuncture we included in our study the interdependence created by the participation rate.

Besides the introduction and conclusion the paper is organized in two parts. In the first one, "The Okun Law: presentation and meaning", we present and comment the OL, which is central to our methodological strategy, and we discuss the interdependencies that crucial for OL but which are usually excluded from its formulation. In the second part, "An application to the PIGS area", we build a model for each one of the PIGS, for all the group, and for the USA economy.

I. The Okun Law: presentation and meaning

1. The Okun Law

From equation (1.1) that expresses the relation between actual output (Y_t) and the unemployment rate gap (U_t-U_t*), Okun (1962) has suggested to measure the potential output.

$$Y_t^P = Y_t\left[1+0,032\cdot\left(U_t - U_t *\right)\right] \qquad (1.1)$$

The value of U_t* in (1.1) has been taken by Okun as constant and equal to 4%[2]. This value can be associated to the NAIRU concept, the natural rate of unemployment, or simply to a "Benchmark Unemployment Rate" (Lovell (2004), p.351). The original central idea was to obtain a measure of potential output[3]. But very early the OL was known by the relation 3/1, which represents the idea that a reduction of the unemployment rate of 1% requires a growth rate of 3%, and the idea was very appealing to economists and politicians[4]. Based on this interpretation the door was opened to be known, later on, as the OL: a stable relationship between the unemployment rate and the output growth rate. Based on the effects of employment on production, *mutatis mutandis*, it was proposed a link between a reduction on unemployment and an increase on output[5]. OL is no more than an empirical regularity and it was classified by Blinder (1997) as one of the features of the nuclear model of the economy[6]. As was described on a well-known handbook, this robust empirical generalization[7] "is one of the most reliable generalizations that macroeconomists have found" (Hall and Taylor (1988), p. 136).

2. The OL specification

Following the criticism of Plosser and Schwert (1979) the OL has one of the following formulations[8], U_t^c and y^c represent deviations from trend:

$$U_t - U_t^* = \alpha - \beta \cdot y_t^c + \varepsilon_t \qquad (1.2)$$

$$U_t^c = \alpha - \beta \cdot y_t^c + \varepsilon_t \qquad (1.3)$$

$$dU_t = \alpha - \beta \cdot dy_t + \varepsilon_t \qquad (1.4)$$

Equation (1.2) is derived directly from Okun's formulation; (1.3) is adapted to cyclical fluctuations; and (1.4) overcomes some of the drawbacks of (1.3). Obviously, in terms of estimation, every equation has to be adapted to the dynamic aspects of the data generating process under study. The β coefficient is very sensitive to model specification, to the dynamic structure, to the method of estimation and to the estimation of cyclical values,

[2] In Okun (1962) words: "that four percent unemployment is a reasonable target under existing labor market conditions", p.98 cited in Attfield and Silverstone (1998). When Okun has developed his relation the Council of Economic Advisers of Kennedy had proposed a target of 4% for unemployment (Lovell (2004)). It's also interesting to remember that William Vickrey in his presidential address to the AEA, in 1993, has made the reference to a value of 1.5%.

[3] Okun (1962), pp. 136-7 and Kahn (1996).

[4] Gordon (1984) has proposed a relation of 2/1, that he use in his well known manual, Gordon (1990) .

[5] As had insisted Prachowny (1993).

[6] See also Silvapulle, Moosa and Silvapulle (2004).

[7] Hoover (2001).

[8] Where β is designated by "Okun coefficient".

when it is the case[9]. The first two formulations of the OL, (1.2) and (1.3), introduce an extra element of uncertainty: the presence of cyclical values of the output and the value of the natural rate of unemployment[10]. Equation (1.4) is the most well-known formulation of OL. But it suffers from a problem of efficiency in the case of co-integration between U and y. In addition to these problems another one should be considered, all the three equations ignore what happens to the unemployment rate as a result of the evolution of the participation rate.

3. The OL interdependency and stability

The application of the *mutatis mutandis* principle raises problems of interdependency between variables that affect the stability of the relation. Let us analyse some of these relations, sometimes omitted, which affect the value of β: relations between employment, labor force and unemployment, in a dynamic context, characterizing the supply and demand of labour - Weber (1995) and Sögner and Stiassny (2002); variations of the use of productive capacity - Watts and Mitchell (1991) and You (1979); variations in productivity - Altig, Fitzgerald and Rupert (1997) and Kahn (1996) and his cyclical fluctuations - Hultgren (1960); changes of human capital and working time - Farsio and Quade (2003) and You (1979); the cyclical evolution in the participation rate - Thirlwall (1969)[11]; the labour hoarding phenomenon - Thirlwall and Ireland (1970) and Sögner and Stiassny (2002); different protection policies of employees Sögner and Stiassny (2002), Blanchard (1999), Moosa (1997), Kaufman (1988), Weber (1995) and Apergis and Rezitis (2003) - which ultimately may be the result of increased international competition or the attempt to reduce the gap between *insiders* and *outsiders* in the labour market; and the evolution of unemployment rate *hysteresis* - Sögner and Stiassny (2002).

Another problem concerns the behaviour of OL during the cycle. The idea that the contraction phase of the cycle could be more abrupt that the expansion was raised by Keynes (1936). Neftci (1984), Rothman (1991) and Brunner (1997) have confirmed this idea for output and unemployment.

While empirical research in terms of dynamic processes can solve some problems[12], we can not expect that all of them are miraculously solved. When a relevant interdependence

[9] See Moosa (1997). But You (1979) arrives to the conclusion that the method used to obtain the potential output is not relevant for model results.
[10] Or a benchmark value, as we saw above. See the long paper of Franke (2006).
[11] See the reply and the counter-reply about the proposal of this author, Monhollon and Cullison (1970) and Thirlwall and Ireland (1970).
[12] See Kahn (1996) about the question of productivity evolution.

is not explicitly considered we can have a serious problem of instability of our estimations because there is no reason for a stable relation over time[13]. The instability argument is a matter for empirical refutation. If instability is rejected we can conclude either the omission of those relations does not affect the value of the OL parameters; or they are not important; or their effects are offset.

4. Econometric estimation: non-stationary variables

Current econometric methodology allows the rejection of spurious regressions[14]. The first of the above relations, (1.2), is likely to be a regression of a variable with unit root, I (1), on a stationary variable, I (0). In this case the coefficient of Okun can not be stable or constant. The last equation, (1.4), should lead to include an error term, ECM, in the event of U and y being CI (1,1)[15] in levels. For Gordon (1984) one of the problems is that usually we search a value for β with inadequate models. If U and y are co-integrated, the interpretation of Okun coefficient is not obvious. Attfield and Silverstone (1998) propose to interpret the original β in terms of the error (ECM) coefficient. But this proposal ignores the interdependence between the variables of a VECM (vector auto-regressive error-correction mechanism) model as Johansen (1995) advocates it. That is, in these cases we should study the effects of shocks on the variables involved in order to be able to take into account short and long term interdependence.

II. An application to the PIGS Area

1. The evolution of unemployment and production

Data was obtained from AMECO, European Commission data base, on 23rd October 2009. U is the rate of unemployment in percentage; YR, the output, is the log of GDP, at 2000 prices in Mrd Euros; and LPR is the log of the participation rate in percentage. We identify the variables with the suffix of the countries name, POR for Portugal, ITA for Italy, GRC for Greece, SPA for Spain and USA for USA.

[13] Several authors identified different forms of the instability of β coefficient: temporal, long term and cross-country. See Okun (1980), Davenport (1982), Thurow (1983), Gordon (1984), Nguyen and Siriwardana (1988), Adams and Coe (1989), Lee (2000) and Farsio and Quade (2003).
[14] For a list of empirical studies see Apergis and Rezitis (2003) and also Silvapulle, Moosa and Silvapulle (2004).
[15] With a unit root and being co-integrated. See Watts and Mitchell (1991).

2. Stationarity analysis of the variables

We have applied the ADF type tests proposed by Elliott, Rothenberg and Stock (1996), DFGLS, and Elliott (1999), DFGLSu. The search for the deterministic variables and for the lags was made by previous estimation of an ADF equation with rejection of errors auto-correlation of order 1. Taking into account the Cochrane precaution, Cochrane (1991), and the variance ratio test he has proposed, Cochrane (1988) and Hamilton (1994), we present also the values of V(k) and A1 for k=10. We have chosen k=10 because we have only 49 observations for each variable. Our results are in Table 1 to 3. In what follows we interpret the results for Spain. In the case of LPR for Spain, for the first two tests, we observe that for the variable and its first difference, the presence of a constant and a trend are justified and for the case without transformation a lag of 1 is included and in first differences no lag is necessary. By DFGLS and also DFGLSu the unit root are not rejected for SPA_LPR but are rejected for the first difference, SPA_d_PR. The variance ratio is obviously above 1 for SPA_LPR and less than unity, with a tendency to zero, for SPA_d_LPR. For this variable a shock of 1% will persist 10 years after at a level of 0.52 (for SPA_LPR the shock was multiplied by more than 3).

Table 1

Countries	**Det**	**Lags**	**DFGLS**	**DFGLSu**	**V(10)**	**S.D.**	**A1(10)**
ITA_LPR	C, T	1	-1.77	-2.38	3.08	1.7	2.14
ITA_d_LPR	C	0	-3.15***	-3.55***	0.21	0.47	0.12
GRC_LPR	C, T	0	-0.91	-1.63	2.97	1.64	1.77
GRC_d_LPR	C, T	0	-6.58***	-6.65***	0.14	0.08	0.43
SPA_LPR	C, T	1	-0.43	-0.71	6.61	3.65	3.24
SPA_d_LPR	C, T	0	-4.76***	-4.75***	0.23	0.13	0.52
POR_LPR	C	1	-1.61	-1.61	2.83	1.57	1.79
POR_d_LPR	C	0	-4.73***	-4.71***	0.19	0.11	0.49
USA_LPR	C	1	-0.28	-1.4	3.61	1.99	2.16
USA_d_LPR	C	0	-3.43***	-4.04***	0.22	0.12	0.49

Table 2

Countries	**Det**	**Lags**	**DFGLS**	**DFGLSu**	**V(10)**	**S.D.**	**A1(10)**
ITA_U	C	1	-1.36	-1.65	1.94	1.07	1.52
ITA_d_U	C	0	-4***	-4.41***	0.21	0.12	0.46
GRC_U	C, T	1	-2.27	-2.42	2.77	1.53	1.99
GRC_d_U	C	0	-3.56***	-3.58***	0.3	0.17	0.55
SPA_U	C	1	-1.13	-1.63	2.92	1.62	1.97
SPA_d_U	C	0	-3.68***	-3.67***	0.28	0.16	0.54
POR_U	C	1	-1.72*	-2.35	1.63	0.9	1.47
POR_d_U	C	0	-3.86***	-3.9***	0.26	0.14	0.52
USA_U	C	1	-2.98***	2.99**	0.6	0.33	0.79
USA_d_U	C	0	-4.21***	5.45***	0.11	0.06	0.35

Table 3

Countries	Det	Lags	DFGLS	DFGLSu	V(10)	S.D.	A1(10)
ITA_YR	C	0	1.37	-2.92	3.9	2.15	2.18
ITA_d_YR	C, T	0	-6.05***	-6.42***	0.11	0.06	0.35
GRC_YR	C, T	0	-1.21	-1.85	5.05	2.79	2.4
GRC_d_YR	C	0	-3.07***	-4.95***	0.2	0.11	0.51
SPA_YR	C	1	0.81	-0.06	4.48	2.48	3.18
SPA_d_YR	C	0	-1.43	-3.3***	0.42	0.23	0.65
POR_YR	C	1	0.21	-1.13	2.73	1.51	1.88
POR_d_YR	C, T	0	-4.93***	-4.96***	0.21	0.12	0.46
USA_YR	C, T	1	-2.55	-3.27**	0.58	0.32	0.79
USA_d_YR	C	0	-4.98***	-5.2***	0.12	0.07	0.36

With these results we are in conditions to retaining our variables as having a unit root, with its first differentiation being stationary, so they are I(1).

3. The presence of co-integration and the development of a VAR model

We have not found any interesting C-I relations between unemployment, output and the participation rate, U, YR and LPR, for all of the countries of the area and for the USA. The last variable was taken as endogenous and also as exogenous. So, we decided to study the OL with a VAR model. We know from Sims (1980) and Sims, Stock and Watson (1990) that it is not correct to differentiate unit roots variables for the estimation of a VAR. Differentiation means that we lost information about co-movements in the data. But using levels doesn't allow the application of exogeneity tests because we might have a non-standard F distribution. Another problem is that the impulse responses for long time horizons are inconsistent estimates of the true process (Enders (2004)). So the stability of the VAR model has to be addressed and we have to confirm if the responses decay to zero. Nevertheless we propose to simulate only 20 periods of responses.

We will use the Choleski decomposition so for the understanding of different shocks it is important the order of the variables. The unemployment rate is a lagging variable in terms of the output evolution, so our first variable will be unemployment rate and the second output. A shock on U will affect immediately U and YR and a shock on YR will affect immediately YR but only a period later will affect U. The reason why we prefer this kind of impulse relations and not the Blanchard and Quah (1989) decomposition was well expressed by Thurow and Taylor (1966), more than 3 decades ago, "Whatever the chosen unemployment target, potential GNP after a period of business cycles will not necessarily be the same as if the economy had been continually operating at full employment. This occurs since the growth of the capital stock would presumably differ under these two conditions. Thus, above potential output, there is additional output that would have existed had the capital stock grown continually at full-employment rates. " (p.359).

3.1. Variables and the order of the VAR models

We have chosen the variables of our models by the exclusion of the null hypothesis. In the case of endogenous variables by an F test, even knowing that its distribution in presence of unit roots is not the conventional one. The exogenous variables were chosen by the usual t tests. We briefly review as an example the case of Portugal. We have important information on Tables 4 and 5. For Portugal we have a VAR of order 2 with deterministic variables a constant and two lags of LPR, POR(U,YR;C,LPR). We retain 2 lags because the ratio test[16], with a chi-square distribution of order 4 the nullity of the coefficients of order 3 is not rejected but the null is rejected in the case of 2 lags against 1 lag, at the level of 1% of probability. At the same time the Akaike information criteria is better for 2 lags than for 1, and better for 2 than for 3. The observations retained have changed accordingly when we change the maximum lag presented in the estimations. The maximum modulus of the eigenvalues of the matrix associated to the VAR is less than 1, what is required for the stability of the model. We cannot reject at the level of 10% the presence of auto-correlation on the unemployment equation. We have no problem of auto-correlation for the output regression and we cannot reject the normality of errors of the two equations as well as the absence of an ARCH process also for the two equations.

Table 4[17].

	POR(U,YR;C,LPR)		ITA(U,YR;C)		GRC(U,YR;C)		SPA(U,YR, LPR;C)		
Order	3/2	2/1	3/2	2/1	3/2	2/1	3/2	2/1	
LR(4&9)	6.58	24.7***	1.5	21.8***	2.4	23.9***	12.2	36.8***	
AIC	-2.7/-2.8	-2.8/-2.4	-3.7/-3.9	-3.9/-3.6	-2.4/-2.6	-2.3/-2.0	-9.4/-9.6	-9.7/-9.2	
MxMod	0.96		0.96		0.97		0.99		
	U	YR	U	YR	U	YR	U	YR	LPR
AR(1)	3.7*	0.01	0.34	0.35	1.8	0.03	0.002	1.6	0.07
N	1.5	2.5	2.5	2	0.16	12***	0.22	1.5	17.3***
ARCH(1)	0.23	1.2	0.005	3.3*	2	0.21	0.07	1.4	0.0009

16 With the corrections suggested by Sims (1980) for small data samples.

17 The AR test is an LM test with F values; the normality is a chi-squared of order 2; and the ARCH is also an LM test with F values. The auto-correlation tests as the ARCH test are of order 1.

Table 5.

USA(U,YR,LPR;C)			
Order	3/2	2/1	
LR(9)	13.1	42.7***	
AIC	-10.9/-11.2	-11/-10.4	
MxMod	0.99		
	U	YR	LPR
AR(1)	0.02	0.39	13.9***
N	9.6***	10.6***	11.0***
ARCH(1)	0.18	0.23	0.05

Table 6.

PIGS(U,YR,LPR;...)			
Order	3/2	2/1	
LR(9)	10.5	104.6***	
AIC	-10.2/-10.24	-10.2/-9.7	
MxMod			
	U	YR	LPR
AR(1)	2.3	2.5	4.2**

In general we have no serious problems in all the VAR's estimated. But some problems remain and are worth mention. The auto-regressive nature of the errors in the case of the USA, for LPR, at the level of 1%. For Spain we have imposed an order of 4 and not 2 as was given by the ratio test and the Akaike information criteria. The reason is simple, with 2 lags, even with 3, but not with 4 lags, the model was instable. The modulus of the eigenvalue of the matrix associated was greater than 1 in those cases. The VAR estimated for the group of PIGS is a fixed-effects panel VAR, PIGS(U,YR,LPR;…). The deterministic parts of this last model are dummies, one for each country. A LR test, with a $\chi^2_{(12)}$=53.3***, rejects the null of these deterministic variables. For this model only the LPR equation has a problem of auto-correlation of order 1 on the errors.

3.2. Stability of models and parameters

On Table 4 and 5 MxMod values indicate that all models are stable. Following the suggestion of Doornik and Hendry (2001), pp. 222-3, we have applied to our models single equation Chow tests and system Chow tests[18]. In both cases, 1 step F test, break-point F test and forecast F test. The figures are on the Appendix for a significance level of 1%. We have no problems concerning the stability of the parameters in terms of single equation and system for Portugal and Spain. In the case of Italy we have one problem of instability in one of the three tests for the system. For Greece we have problems of instability in one of the equation tests for two equations and one problem in one test for the system. For Greece the problems existed at the end of the 90's. For the USA we have, at the end of the 80's, a problem with one of the test for the system.

We considerer our models are reasonably good in terms of stability for the simulation we proposed.

[18] For Spain the system was initialized with 32 observations, the USA with 20, Italy and Greece with 14, Portugal with 18, the PIGS with 26.

3.3. Simulation of the responses on employment to a shock on output

On the Appendix we include the figures of the responses from shocks (orthogonal impulses) with the plus and minus the equivalent to the standard deviation measured by the 16% and 84% fractiles (see Sims and Zha (1999)). The responses must be seen in the column associated with YR. For Portugal, Italy and Greece the effects on U vanish at the end of 5 years, for the USA 3 years and for Spain and the PIGS 9 years.

We simulate the current crisis through the existence of an output shock, by assumption of 10%. We must bear in mind that this is only a simulation exercise. To be more realistic it would be necessary to suppose not only an isolated shock but a succession of shocks. But this could be seen as an addition of lagged responses. We are interested in a comparison between the countries of the PIGS area and the PIGS and a benchmark economy, the USA, so we can compare a single output shock on the output and measure the real consequences in terms of unemployment.

The first result is already known; the persistence of a shock on the output is greater for the PIGS than for the USA, the persistence for the first is three times that of the second. In the PIGS area we must distinguish Portugal, Italy and Greece from Spain where the persistence is almost the double.

Table 7.

	Output Shock -10%			
	POR	ITA	GRC	SPA
2	1.23	0.87	0.76	3.04
3	**1.54**	**1.15**	0.98	4.26
4	1.21	1.02	**1.01**	**5.78**
5	0.75	0.77	0.9	5.09
6				3.71
7				3.1
8				2.91
9				2.32

Table 7 and 8 is a summary of our results. Bold values represent the maximum effects in terms of the unemployment rate. The effects are more important in Portugal than in Italy or Greece. The most relevant fact is the high level of unemployment created in Spain. The higher value in Spain is nothing more than five times that of Italy and Greece and more than three and half the value in Portugal. At the end of the adjustment, year 9, the value is still the double of the maximum registered for the other PIGS economies, 5 and 6 years before. The PIGS are not homogeneous in this aspect of real functioning of their economies.

Table 8.

Output Shock -10%		
	USA	PIGS
2	**3.89**	2.13
3	2.61	3.17
4		**3.44**
5		3.24
6		2.77
7		2.19
8		1.6
9		1.04

The response on unemployment in the USA is strong but disappears rapidly. In the case of the PIGS, as an area, the effects continue 6 years after they have disappeared in the USA. The consequences in terms of loss of output and welfare are much more important in the PIGS area. But as we have mentioned this area is not homogeneous and this results must be interpreted carefully.

Conclusion

We consider that the idea behind the OL continues to be useful in empirical macroeconomics even if its deduction is limited to a *mutatis mutandis* application. We have to handle very carefully stability problems caused by interdependencies excluded explicitly of the relation and also about the ignored problems of non-stationarity of the variables involved. We addressed those drawbacks in our paper. We have included the participation rate in order to take into account the interdependence between the labour supply and the macro conditions of the economy. And we have analysed the time series characteristics of the data used. Our research in terms of co-integration and the associated VECM has not produced interesting results from a statistical and economic point of views, so we have developed VAR models. We have inspected the issue of parameter instability due to interdependency problems beyond the imposition that the eigenvalues of the VAR companion matrix are in the unit circle. We have obtained a VAR model for each of the economies under study using a ratio test and also the Akaike information criteria for the determination of the model's order. For the case of Spain we have used the first number of lags, after the optimal number, conducting to the maximum modulus of the eigenvalue of he matrix lower than 1. Using those VAR models we simulated an output shock of -10% and we studied the responses in terms of the rate unemployment. The PIGS countries can be separated in two groups: Portugal, Italy and Greece, on the first group, where the consequences in terms of unemployment are not very serious and the adjustment can be accomplished in 5 years; and Spain in the other group where the consequences are very severe and the adjustment is slow and it is accomplished in 9 years. Our benchmark economy has a serious impact on unemployment but the adjustment is fast. The PIGS area, as an entity, has a serious impact on unemployment and a slowly adjustment process like the Spanish case. Nevertheless in terms of the results measured by the unemployment rate there is a reason to identify an economic area like the PIGS.

This paper is part of a wider research that we intend to develop in a near future. In order to ascertain PIGS existence we have to study saving imbalances in the area, within each country, and in a benchmark economy.

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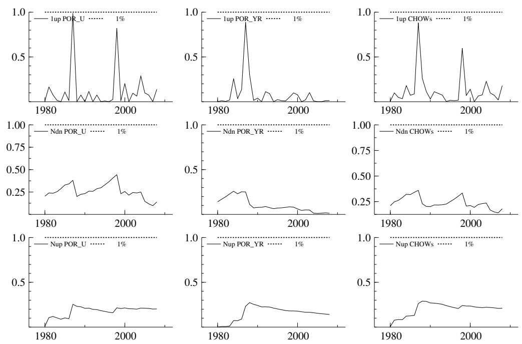
A.1 Parameters stability – Portugal



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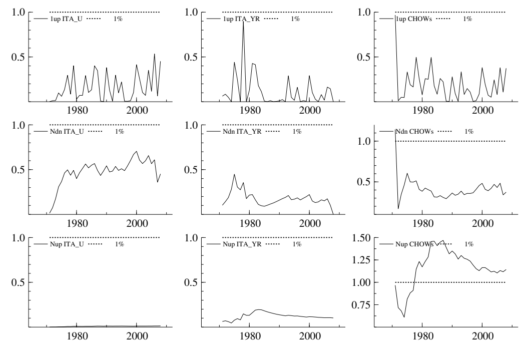

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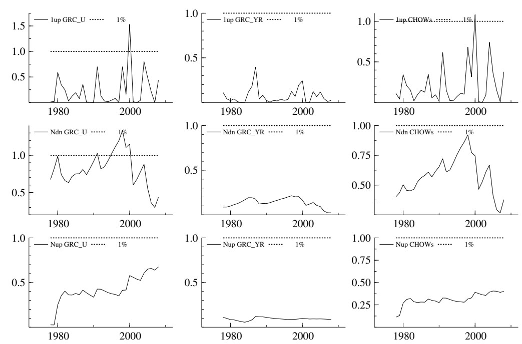

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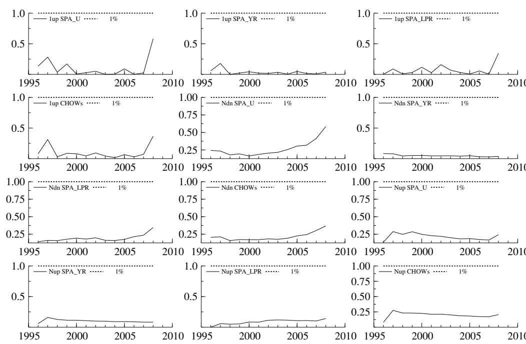

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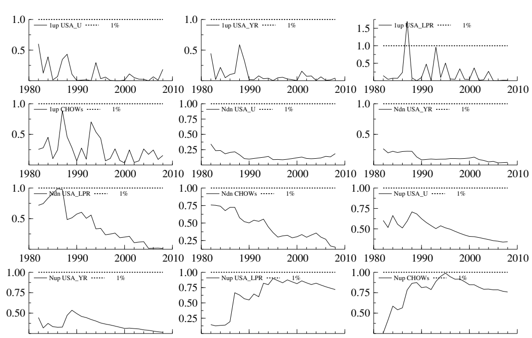
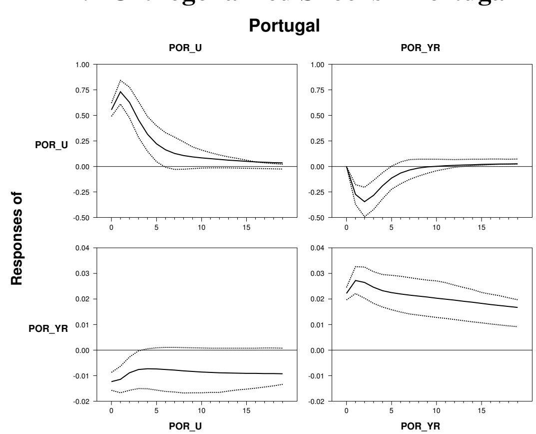


B.1 Orthogonalized Shocks – Portugal



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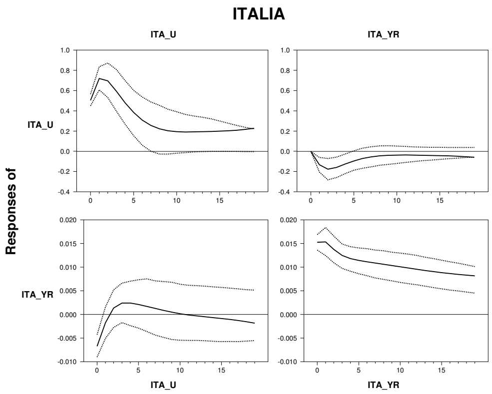

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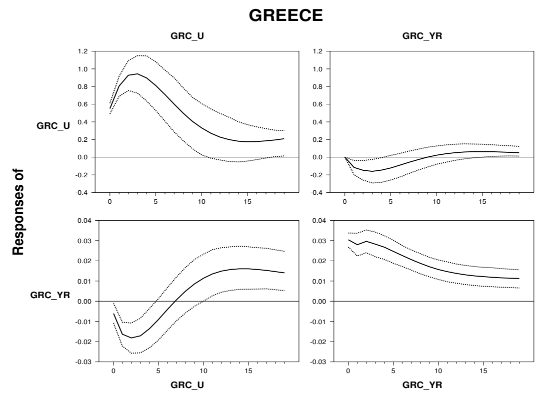

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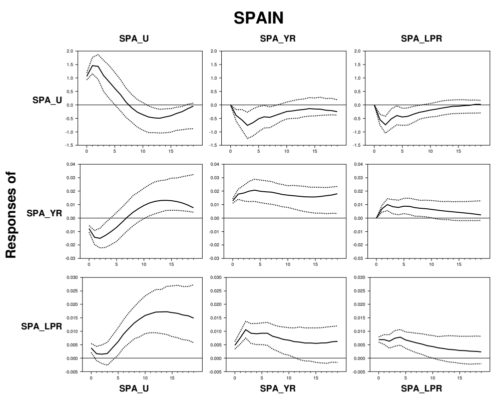

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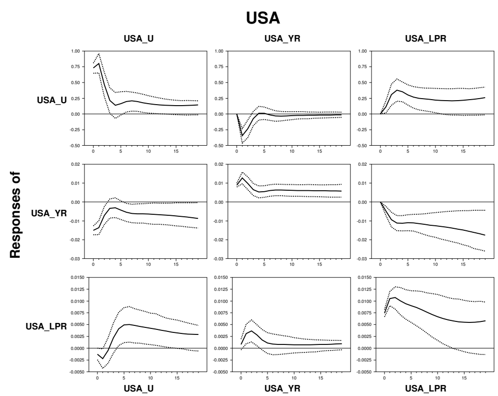
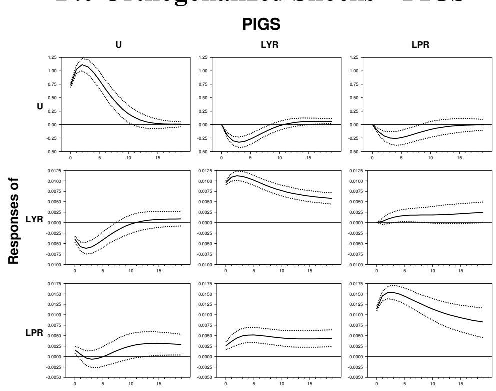


B.6 Orthogonalized Shocks – PIGS



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