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Determinants of GDP: A VECM Forecasting and Granger Causality Analysis for Eight European Countries

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Table of Contents

Abstract

This paper investigates the short-run and long-run causal relationships that may exist between a set of variables that are selected to proxy for components of expenditure based GDP for eight European countries, namely Cyprus, France, Germany, Greece, Ireland, Italy, Portugal, and Spain. Due to the identification of I(1) cointegrated variables, the analysis is performed within a VECM framework, that models each country individually as a closed economy, and then as an open economy. The estimated variables are then used to provide out-of-sample short horizon forecasts of GDP, which are compared to actual GDP data. The results indicate that the estimated open economy VECM outperforms the closed economy VECM, but only for open economies within the sample.

Keywords*:* Cointegration, VECM, Causality, GDP Forecasts

I. Introduction

It is well established that regression analysis on time-series non-stationary variables may yield spurious results. As suggested by Box and Jenkins (1976), transforming these non-stationary variables into first differences may make them stationary. However, Johansen (1988) demonstrates how differencing the variables can remove some long run information. Engle and Granger (1987) noted that, for cointegrated systems, the Vector Autoregressive (VAR) model in first differences will be miss-specified and the VAR in levels will ignore important constraints on the coefficient matrices. The authors further show that if a time-series system includes integrated variables of order 1 or greater and the variables satisfy conditions of cointegration, then such a system would be more appropriately specified as a Vector Error Correction model (VECM), which can be viewed as a restricted VAR, rather than an unrestricted VAR. Theoretically, the cointegration of two or more variables suggests the presence of a long-run relationship between them, and therefore even though the variables themselves are non-stationary, they will move closely together over time and their difference will be stationary. Their long-run relationship is the equilibrium to which the system will converge. A VECM captures this long-run information within an error correction mechanism that is used to model changes in the variables over time. The disturbance from the error correction mechanism can be interpreted as the disequilibrium error or the distance from which the system is away from equilibrium at a point in time. A lagged value of the disequilibrium error is used within the VECM as an additional variable that is used to model changes in each system. A VECM is also useful for determining short-run dynamics between variables by restricting long-run behaviour of variables. It restricts long-run relationships through their cointegrating relations and the error correction term represents the deviation from the long-run equilibrium.

Within a VECM framework, this paper examines the short-run and long-run causal relationships that exist between GDP and the chosen information set. In addition, the relative forecasting performance of two VECMs: a benchmark 'closed' economy VECM and an 'open' economy augmentation thereof is examined. The degree of openness in the augmented model is defined by the exports/GDP ratio. In this paper, economies for which this ratio is greater than 40% are considered to be open, and those economies for which the ratio is less than 40%, are considered closed. As a result of cointegrating relations in the variables of the model, Johansen's error correction estimation method is employed to estimate forecasts in GDP. The models are estimated country-by-country across eight European countries, namely, Cyprus, France, Germany, Greece, Ireland, Italy, Portugal, and Spain, for two time periods: 1997:1 - 2013:3 and 1997:1 - 2012:4. Out-of-sample forecasts are then generated for the remaining periods through to 2014:1. The models estimate (the logarithm of) real GDP on itself, and a number of lagged explanatory variables which proxy for the components of expenditure based GDP. The benchmark model treats each country as being defined as a 'closed' economy and makes use of the full sample period from 1997:1-2013:3. For this purpose, the model is estimated individually for each country using quarterly data on (the logarithm of) seasonally adjusted real GDP, (the logarithm of) inflation measured by the GDP deflator (2005=100), harmonised unemployment rates, and the 10yr interest rate on government bonds.

The benchmark model performs relatively well for the countries in the sample. The model is then augmented to include (the logarithm of) the ratio of exports/GDP to account for the relative openness of each economy. The forecasting performance of the 'open' economy model is improved for open economies in the sample, as indicated for by a reduced root mean square error (RMSE). This result suggests a strong case for a country specific approach to designing policies that are inherently reliant on growth forecasts.

The necessity to account for differences across countries is further supported by economic theory. There is a large part of economic theory that analyses the causal relationship between exports and economic growth. Since the seminal work of Ricardo (1817), the growth literature has described how increases in exports contribute to economic growth.

No previous study that examines this particular information set for the sample of countries within the presented framework could be identified at the time of writing. Furthermore, researchers often focus their attention on forecasting GDP for a particular individual country. The research presented here forecasts GDP across eight European countries by employing the same methodology for each. In addition, the countries under examination fall both within the core and periphery of Europe. Although each economy is developed, they are individually unique in terms of their business cycle and relative position within the single currency union. Although the benchmark model performs relatively well in light of these differences, improvements to forecasting accuracy can be attained by including a variable into the model that takes into account an attribute of an economy that makes it different to other countries in the sample. This paper therefore provides advancement in the literature on growth forecasting that employs autoregressive forecasting techniques within a European context. The implication of adding a measure of openness into the model with the view to determine an improvement in the predictive ability for 'open' economies versus 'closed' economies is also assessed.

This paper proceeds as follows, Section II reviews the literature, section III motivates the choice of variables and explains the methodology, section IV describes the research approach, model specification, and empirical findings that conclude with the necessary diagnostic checks, section V discusses the impulse response analysis, section VI presents the forecast results, and section VII concludes.

II. The Literature

Large macroeconomic forecasting models such as Dynamic Stochastic General Equilibrium (DSGE) models, Bridge models, Markov-switching models, and Structural models are used by financial institutions, central banks, governments and similar. DSGE models aim to describe the economy as a whole by considering the non-linear interaction of economic decisions that are founded on economic theory and structural changes within an economy. A well-known example is Smets and Wouters (2003) who develop a DSGE model for the Eurozone economy. Zimmerman (2001) also provides a detailed review of the literature on DSGE models used for forecasting. Bridge Models, which were first introduced into the literature by Klein and Sojo (1989), are based on a single equation or small scale system of equations, the specification of which relies entirely on a thorough knowledge of the properties of the series involved. They have been used extensively by researchers in policy institutions because of the advantage they offer by taking into account information published at monthly intervals and relate it to quarterly national account data (See Baffigi et al. (2004), Diron (2008), Golinelli and Parigi (2007)). Markov Switching models which allow for the inclusion of regime shifts in macro econometric systems are also widely used, however, there is no established theory suggesting a unique approach for specifying models that capture regime shifts (See Clements and Krozlig (1998), Clements et al. (2004) and DeJong et al. (2005)). And finally, Structural models allow researchers insight into the properties of model-based predictions in the presence of structural change experienced within an economy (See Harvey (1990) for seminal work on structural models).

By their nature, the models described above are complex and require expert knowledge to use them effectively. That very complexity and the fact they often depend on artificially strong assumptions about the homogeneity of countries and society may leave these models vulnerable. Wallis (1989) was one of the first studies to find that large macro

models were often beaten by simple autoregressive time series models, and concluded that economic theory in large models was being outperformed by models which made use of the time series properties contained within the data. Edge et al. (2006) find that simple reduced form time series models can produce more accurate forecasts some of the time for some variables. Elliott and Timmerman (2008) discuss the ubiquitous nature of VAR forecasting models that are used as the workhorse model by many institutions. Hendry and Clements (2003) argue that the main problem with forecasts from large models is that the future is not always the same as the past.

The overriding conclusion of the literature on forecasting is that there is no definitive answer to the question of how to construct the best forecast. The 'real' effect of this unanswered question is that millions of people's lives are impacted on by macroeconomic policy decisions, which are often based on predictive models, and therefore those models must be robust. A case in point is the austerity policies that were imposed on the US and many European economies following the global financial crisis of 2007/8. While many argued against the harsh austerity measures being imposed, advocates of austerity, of which many were policy makers, often referred to the findings of Reinhart and Rogoff (2010) to support their position. Reinhart and Rogoff (2010) suggest that countries with debt in excess of 90% of GDP rarely grow their way out of debt. In a New York Review of Books article, Paul Krugman (2013) acknowledges the significance of the Reinhart and Rogoff paper suggesting it may have had "*more immediate influence on public debate than any previous paper in the history of economics"*. More recently, Herndon et al. (2013) have re-examined Reinhart and Rogoff's (2010) findings and provide evidence that the 90% threshold was established as a result of data omissions and programming errors. Once accounted for, they find that average growth in countries with a debt/GDP ratio of ninety percent is 2.2% and not the -0.1% reported in Reinhart and Rogoff (2010). This rate of growth is lower than the

average growth rate of 3.2% in countries with a debt/GDP ratio of between sixty and ninety percent, but certainly casts doubt on the support for austerity based on Reinhart and Rogoff's (2010) findings. Both Basu (2013) and Dube (2013) examine the issue of causality and find that slow growth causes high debt, which also contradicts the findings of Reinhart and Rogoff (2010).

Berg and Hartley (2013) raise a further challenge to Reinhart and Rogoff (2010) arguing that their findings cannot be applied uniformly across countries and make the point that different countries respond differently to austerity measures not least because of political and cultural differences. Kimball and Wang (2013) also question Reinhart and Rogoff and state *"Based on economic theory, it would be surprising indeed if high levels of national debt didn't have at least some slow, corrosive negative effect on economic growth. And we still worry about the effects of debt. But the two of us could not find even a shred of evidence in the Reinhart and Rogoff data for a negative effect of government debt on growth."*

The controversy that has raged over Reinhart and Rogoff has raised serious questions regarding macroeconomic modelling in general and poses a real dilemma for empirical economics. The GDP estimate is probably the most important element when it comes to economic policy design. In the literature, it has been shown that well specified autoregressive models provide fairly accurate forecasts of GDP over short horizons.

Shahini and Haderi (2013), find VAR models outperform bridge and ARIMA models when forecasting real GDP growth rates in the short term.

In particular, their findings hold for a real GDP forecast model that uses time-varying quarterly and monthly indicators, which are related to real economic activity. The choice of variables they use include quarterly indicators such as foreign trade, retail trade, and industrial production statistics as well as monthly indicators such as price, survey and financial statistics. The authors compare the results from Bridge, ARIMA, and VAR models

using real-time data, and find the latter to outperform both Bridge, and ARIMA when forecasting a short-term view.

Advances in computational power have further led to an increase in the use of linear autoregressive models in predictive forecast modelling. Seminal work in the area is accredited to Sims (1980) who employs the use of a VAR model to forecast US GDP. Sims' (1980) findings demonstrate how VAR models offer an effective alternative to large complex simultaneous equation models for forecasting GDP.

Extending the work of Sims (1980), Litterman (1986) introduces Bayesian prior information within a VAR framework, which also introduces a substantial computational burden when applied to real data. In addition, Litterman (1986) makes a distinction between prior conditional variances on lags of the dependent variable versus lags of the independent variables within a VAR system. Sims and Zha (1998) follow Litterman (1986) in choosing prior information as the standard deviations of residuals from univariate autoregressive models that are fit to the individual series within their sample, however they differ from Litterman (1986) in that they pursue a model of simultaneous equations, implying the non-existence of a dependent variable and therefore, unlike Litterman (1986), offer no distinction between lags of dependent and independent variables. The body of literature that has emerged from Sims (1980) and Litterman (1986) is that VAR processes are a suitable model class for describing the data generating process (DGP) of small to moderate set of time series variables.

More recently, a tranche of literature has emerged in which sophisticated linear econometric models are applied to real macroeconomic data with the view to establish gains in macroeconomic dynamics' modelling. Models such as these incorporate structural shifts and allow for changes in model parameters.

Often cited within this body of the literature is work by Cogley and Sargent (2002), Cogley and Sargent (2005) and Cogley, Primiceri and Sargent (2010) in which time-varying parameter VARs are used to explore the possible existence of shifts in inflation dynamics. Benati (2008) extends this methodology to model temporal shifts in UK macroeconomic dynamics. Conversely, Sims and Zha (2006), and Groen and Mumtaz (2008) apply regime-switching VAR methods to model shifts in macroeconomic dynamics for the US and UK respectively.

With the use of a threshold VAR model, Balke (2000) points to the existence of non-linear dynamics in output and inflation. Batini, Callegari and Melina (2012) follow the approach proposed by Balke (2000) and employ a regime switching VAR to analyse the structural dynamics of a fiscal consolidation during both expansionary and recessionary times. Their findings reveal some important clues as to when contractionary policies should be favoured over expansionary policies. In particular the authors find the probability of a fiscal contraction started during a downturn to deepen or extend the downturn to be twice as large as the probability a consolidation started during an upturn will trigger a downturn.

The authors also find fiscal consolidations that rely entirely on cuts in public spending have a far more enduring and negative effect on the debt ratio than a more evenly distributed consolidation strategy. Similar approaches have been adopted by Calza and Sousa (2006), Baum and Koester (2011).

However, what is apparent from this body of work is an emphasis on macroeconomic dynamics. There has been far less emphasis in the literature as to the efficacy of these models in forecasting. D'Agostino, Gambetti and Giannone (2013) focus on time-varying parameter VARs and show they produce more accurate forecasts of US inflation when compared to fixed coefficient VARs. Eickmeier, Lemke and Marcellino (2011) indicate gains in

forecasting accuracy of time varying parameter VARs when compared to fixed coefficient VARs, in particular, when large information sets are exploited within the model.

The literature also argues for the use of Bridge Equations in short-term forecasting of GDP (See for example Baffigi, Golinelli and Parigi (2004), Diron (2008)). Bridge Equation models combine linearity with aggregation and focus on correlation between some of the indicators and the estimated variable(s) of interest. Alternatively, Barhoumi et al. (2008) find that for European countries within the Eurozone, factor models containing large information sets that exploit short term monthly indicator variables perform better than models that contain quarterly data.

Structural VAR models (SVAR) have also faced their critics in the literature (See Koopmans (1947) and Brännström (1995)). The authors point out how no distinction can be made between short-run and long-run dynamics, and that results concerning dynamics are based on estimates of the variance-covariance matrix which in itself is an average of the entire sample period. These are valid concerns for short-term projections as such analysis is based on assumptions about the stability and the state of the entire system. They also point out that even a good fit could be determined by either model choice or data regularity. These criticisms imply valid concerns for SVARs that aim to forecast into the future.

Probably the most frequently used forecasting models in practice, and therefore the models from which outcomes have the greatest implications for policy decisions are DSGE models. DSGE models contain a relatively large number of model-defined variables, some of which are not observed, and also a large number of observed variables. The difficulty in making comparisons between DSGE and VAR models is that the large information set required for DSGE models cannot be included in a VAR model due to parameterisation limits imposed by VAR systems. A frequently used DSGE model is the Smets and Wouters (2003) model that uses seven observables in estimation. By comparison a VAR model containing the

same information set would require 105 parameters to estimate in a second order, seven variable reduced form VAR. The problem with over-parameterised VAR models that are used as comparative benchmark models in the literature is overcome by using Bayesian VARs as the forecast benchmark. The Bayesian VAR method deals with the problem of over parameterisation by treating the model parameters as random variables, and prior probabilities are assigned to them, helping to provide shrinkage over unrestricted least squares estimates. First proposed by Litterman (1979) and further developed at the University of Minnesota by Doan, Litterman and Sims (1984) and Sims (1989) is known as the shrinkage prior or more commonly as the 'Minnesota prior'. More recently Banbura, Giannone and Reichlin (2010) show how Bayesian shrinkage VAR methods are well suited to modelling large-scale dynamic systems. Gürkaynak, Kisacikoglu and Rossi (2013) show that moving to smaller VAR models reduces the mean squared forecast error of the macroeconomic variables they forecast when compared with larger Bayesian VAR models for short term forecasts. [1] The authors find that simple autoregression performs best at short horizons up to 2 quarters, and that DSGE models perform well at forecasting longer horizons of up to 2 years (8 steps-ahead) when they forecast output growth out-of sample.

Most recently, Dymski (2013) opens the debate about why complex models, such as DSGE's, provide "flawed and even illogical" guidance to policymakers. He makes the argument that models assuming stability in the macroeconomy should not be used as a reference point for policymaking.

In all these models, variables are treated as being *a priori* endogenous and statistical restrictions are imposed, rather than restrictions based on uncertain theoretical considerations. For example, special features of macroeconomic time series data need to be taken into

[1] Gürkaynak et al (2013) move from a large BVAR to a smaller 3 variable VAR system and find the latter to outperform the BVAR in forecasting Output growth, inflation, and short term interest rates in the short term.

account when modelling the data generating process, such as trends, seasonality, and structural shifts. Of these special features, trend has greatest implications from an economic point of view. If several variables in a system are driven by a common stochastic trend, this is known as cointegration. Seminal work on the topic of cointegration by Granger (1981), Engle and Granger (1987), shows that if cointegrating relations are present in a system of variables, the VAR form is not the most convenient model setup. In cases such as these it is useful to consider parameterisations that support analysing cointegrated structures. Models such as these are known as VECMs and are fundamentally restricted VARs that place an emphasis on the long-run properties of a time series. The main feature of a VECM is its capability to correct for any disequilibrium that may shock a system. The error correction term detects the shock induced disequilibrium and guides the variables within the system back to equilibrium. Engle and Granger (1987) use a VECM to forecast US data, an approach used years later by Gupta (2006) to forecast South African GDP. It is worth noting the mechanics of forecasting in a VECM are the same as forecasting with a VAR.

III. Data and Methodology

This section has two aims. It first looks at the data selection and explains the rationale behind their selection. The second aim is to discuss the theoretical methodology in the application of VECMs and to describe the applied methodology used in this research to generate GDP forecasts and examine causality among the variables.

III.i. Data and Choice Selection

The first step in constructing a model to forecast GDP is to decide on the variables to include in the model. The benchmark VECM presented in this paper consists of four variables; (the logarithm of) GDP at market prices (LnY), long-term government bond yields

(Bi), the harmonised unemployment rate (Un), and inflation as measured by the (logarithm of) GDP deflator $(Ln\pi)$. The (logarithm of) total exports/GDP (LnX^{*}) is used to proxy for a measure of 'openness' in the augmented 'open' economy model. All data are seasonally adjusted and are I(1) variables. The GDP, export/GDP and GDP price deflator data are expressed in logarithms to account for the proliferative effect of these time-series. They are symbolised by (Ln) preceding each of the variables notation. All data are sourced from the Eurostat database in quarterly format.

Two sample periods are used; the first sample period is from 1997:1 – 2013:3. The second sample period is from 1997:1 – 2012:4. [2] In both cases four-quarter out-of-sample forecasts are generated. These forecasts are then compared to actual observed GDP data that is available up to 2014:1.

It is also important to provide some intuition and literature based motivation behind the choice of variables that are used to forecast GDP. It has been empirically shown that each of the variables used have a statistical relationship with GDP, details of which are described below.

The lagged dependent variable (LnY_{t-1}) is included in the model because the previous periods GDP levels must have a direct influence on the current period's levels.

In addition, because the model presented aims to forecast GDP, the model needs to contain predictors that influence GDP. An important consideration in this context is the cost to a country of borrowing money. The 10yr rate on government bonds Bi is used to capture this cost. Bond yields are a good leading indicator providing a sign post to / warning of future events. In the case of Bi, bond market traders anticipate and speculate on economic trends.

[2] Data vintage for Cyprus and for Greece make these two countries the exception. Their sample periods are; for Greece, the full sample period is 2000:1 – 2011:1 and the reduced sample period is 2000:1 – 2010:4, and for Cyprus, the full sample period is 2001:1 – 2013:3 and the reduced sample period is 2011:4.

Furthermore, because bond yields capture the cost of borrowing money, they are correlated with a governments spending on investment.

It is also important to consider lagging indicators. Lagging indicators follow economic events, and are important because they have the ability to confirm whether or not an economic pattern is occurring, or is about to occur. Unemployment is a popular lagging indicator. When Un is rising, the economy is performing poorly: when it is falling, the opposite is the case. Slowdowns in GDP growth typically coincide with increasing unemployment; an empirically observed statistical relationship first described in the literature by Arthur Okun (1962) and become known as Okun's Law. For further examples see Smets and Wouters (2003), Abel and Bernanke (2005), Blanchard and Galí (2008) to name just a few. In addition, not only does Un have strong theoretical underpinnings with growth, but also gives a tangible measure of one of the worst social costs of the financial crisis - soaring unemployment. There are also important considerations related to consumption, which is directly correlated with unemployment.

The GDP deflator $Ln\pi$ is used to capture inflation as it measures the price of all goods and services that would be calculated into GDP from a base year (2005=100). The attraction of using the GDP deflator is that it is a key expectations forming indicator. Economic theory suggests that if producers of goods are forced to pay more to produce their goods, then some portion of the increase in cost is passed on to consumers in the form of price increases, thereby representing a cost in terms of future spending power and in terms of fundamentals by directly influencing both consumption by economic agents, as well as investment. Fischer (1993) and Sala-i-Martin (1997) provide evidence that inflation is negatively related to growth.

Finally, exports/GDP LnX^* is used to capture how 'open' an economy is. Since the ratio of exports/GDP denotes an 'open' economy index, a higher ratio indicates a relatively more 'open' economy.

Further support for the variable choice is gained from Marcellino, Stock, and Watson (2000), in which the authors investigate several time-series methods used to estimate short-horizon forecasts of real GDP, industrial production, price inflation, and unemployment. The authors conclude that conventional small-scale macroeconomic VAR models, and associated policy analysis, could miss important information contained in a large number of variables excluded from the VAR.

Of course, many other economic variables are related to GDP growth other than those considered for this analysis and hence could be included in a model that aims to capture the dynamics of GDP. Sala-i-Martin (1997) identifies a substantial number of variables that are statistically related to growth, but in the confines of autoregressive analysis, parsimony is important. Increasing the number of variables and equations does not generally lead to a better forecasting model, as doing so makes it more difficult to capture dynamic, inter-temporal relations between them.[3]

III.ii. Open and Closed Economy GDP

In addition, the variables used in the models are chosen for their ability to proxy for the components of expenditure based GDP.

The GDP of a 'closed' economy is defined as:

$$Y = C + I + G \tag{1}$$

[3] Sims (1980) was first to suggest empirical research should use small-scale models identified via a small number of constraints. He made the assumption that if a system was recursively identified, it would imply a causal ordering on how the system works, and would mean it would be hard to identify contemporaneous recursive structural models (e.g. Cooley and Leroy 1985).

The GDP of an 'open' economy is defined as:

$$Y = C + I + G + (X - M) \tag{2}$$

where C is a measure of consumption, I is a measure of investment, G is a measure of government spending, and $(X - M)$ is the trade balance.

Un is selected to proxy for both C and I which are both correlated with unemployment because increases in unemployment lead to lower disposable income, which in turn leads to lower consumption and private investment.

Bi proxies for both G and I. The interest rate on bond yields determines the cost to governments to finance their debt. When the bond yield exceeds a certain threshold, widely accepted to be seven percent (see Corsetti et al. (2012)), it becomes too expensive for governments to finance debt by further borrowing, directly impacting on the level of government spending and public investment.

$Ln\pi$ is included as it has a direct influence on all components of GDP by lowering consumption and investment and promoting unemployment. It also reduces levels of imports and exports.

Finally, LnX^* is used as a proxy measure of openness, which in turn is used to proxy for $(X - M)$. There is a large part of economic theory that examines the relationship between exports and economic growth. The *a priori* argument is that exports contribute to economic growth by increasing the percentage of fixed capital formation and total factor productivity. Ricardo (1817) notes that trade facilitates increases in productive output by enabling country's to specialise in producing goods for which they have a comparative advantage, and importing goods for which they do not. Solow (1956) suggests that high levels of investment and saving rates lead to increased cumulative capital per worker. Theoretically, increases in capital formation enhance economic growth through two channels; either by directly increasing the physical capital stock as demonstrated by Plosser (1992), or by indirectly

promoting technological progress as in Levine and Renelt (1992). Sala-i-Martin (1997) provides evidence of a relationship between openness and growth in an economy. Collectively, these publications form the basis on which a 'proxy openness measure' is included in the 'open' economy model. Further, Ireland, Cyprus and Germany are the only three countries in the sample with an average of exports/GDP that exceeds 40%. Ireland is by far the highest with an average of 90%, Cyprus is 48%, and Germany 41%. The rest of the countries have averages ranging between 23% and 30% of GDP (Source Eurostat). These figures suggest exports should have more predictive influence in the 'open' economy models for Ireland, Cyprus, and Germany, than for any of the other countries in the sample.

III.iii. Methodology

This section presents the 'closed' economy VECM used to explain the relationship between GDP, inflation, 10yr bond rates, and unemployment, and the 'open' economy VECM used to explain the relationship between GDP, inflation, 10yr bond rates, unemployment, and the ratio of exports/GDP. The starting point of the analysis considers the issue of cointegration.

A series of variables are defined as cointegrated if a linear combination between the series is stationary. In order to proceed to this stage, all the variables within the series should be integrated of the same order, preferably I(1). Indeed, if the series are stationary in levels, then standard regression and statistical inference can be carried out as there would be no issue of a spurious regression. On the other hand, Harris (1995) shows that in the presence of *a priori* theoretical support for the variables to be included, then it is not necessary for all the variables to be integrated of the same order.

Unit roots were tested for in the sample data using the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Zivot-Andrews (ZA) unit root tests. Collectively, all three

models do not uniformly reject the unit root null in the sample set of variables of all the countries examined in this paper. Section IV.ii discusses in detail the methods and results from the unit root analysis.

It is also important to consider the existence of two main categories of cointegration, namely, those that are residual based, as in the Engle and Granger (1987) approach, and those that are based on the maximum likelihood VAR system estimation, as in the Johansen (1995) method. According to Harris (1995), the Engle-Granger approach is not without its problems when applied to multivariate models. These problems include issues of finite-sample bias in the unit root and cointegration tests, as well as the inability to detect more than one cointegrating relationship that may exist in the model. According to Harris (1995), the Johansen method has several advantages over other cointegration detection techniques and forms the basis of selecting the Johansen method in this paper. A likelihood ratio test of hypotheses procedure is used to identify the number of cointegrated relations in the Johansen method. The procedure involves setting the optimal lag-order, identifying the presence of unit roots, testing for the presence of cointegration, and finally estimating the VECM.

The VAR model underlying the 'closed' economy VECM is a multivariate model of time-series quarterly data of real GDP, inflation, 10yr bond rates, and the unemployment rate., and the VAR model underlying the 'open' economy VECM is a multivariate model of time-series quarterly data of real GDP, inflation, 10yr bond rates, the unemployment rate, and the ratio of exports/GDP.

In both cases, Johansen's (1995) Granger Representation Theorem framework[4] is employed. The theorem states that before the VECM can be formed there first has to be evidence of cointegration and given that cointegration implies a significant error correction term, cointegration can be viewed as an indirect test of long-run causality. However, it is also

[4] See Johansen and Juselius (1990) and Johansen (1995).

possible to have evidence of long-run causality, but not short-run causality and vice-versa. In the case of multivariate causality tests, the testing of long-run causality between two variables is problematic as it is not possible to determine which variable is responsible for the causality through to the error correction term. In the case of k variables, there may be r cointegrating relationships, such that $0 \leq r \leq k-1$. This yields a k-dimensional VAR:

$$y_t = A_p y_{t-1} + \ldots + A_p y_{t-p} + \delta + v_t \tag{3}$$

where p denotes lag-length, δ deterministic terms and v_t a white noise error term. In general y_t may contain I(0) variables, in the presence of non-stationary variables, the model is restricted to I(1) variables and leads to a reparameterisation of the VAR into a VECM specification:

$$\Delta y_t = \Psi y_{t-1} + \sum_{i=1}^{k-1} \Pi_i \Delta y_{t-i} + \delta_t + v_t \tag{4}$$

where y_i is a $k \times 1$ vector, Δ is a symbol for the difference operator, v_t is a $k \times 1$ vector of residuals. The VECM contains information about the short- and long adjustment to changes in y_t via the estimated parameters Π_i and Ψ respectively. Here, Ψy_{t-1} is the error correction term and Ψ can be factored in two separate matrices α and β, such as $\Psi = \alpha\beta'$ where β' denotes the vector of cointegrating parameters while α is the vector of error correction coefficients measuring the speed of convergence to the long-run steady-state. An example of a four variable system containing two cointegrating relations such that $(r = 2)$, is represented below:

$$\Psi y_{t-1} = \alpha\beta' y_{t-1} = \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \\ \alpha_{31} & \alpha_{32} \\ \alpha_{41} & \alpha_{42} \end{bmatrix} \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \\ y_{3,t-1} \\ y_{4,t-1} \end{bmatrix} = \begin{bmatrix} \alpha_{11} ec_{1,t-1} + \alpha_{12} ec_{2,t-1} \\ \alpha_{21} ec_{1,t-1} + \alpha_{22} ec_{2,t-1} \\ \alpha_{31} ec_{1,t-1} + \alpha_{32} ec_{2,t-1} \\ \alpha_{41} ec_{1,t-1} + \alpha_{42} ec_{2,t-1} \end{bmatrix} \tag{5}$$

where

$$ec_{1,t-1} = \beta_{11} y_{1,t-1} + \beta_{21} y_{2,t-1} + \beta_{31} y_{3,t-1} + \beta_{41} y_{4,t-1} \quad (6)$$

and

$$ec_{2,t-1} = \beta_{12} y_{1,t-1} + \beta_{22} y_{2,t-1} + \beta_{32} y_{3,t-1} + \beta_{42} y_{4,t-1} \quad (7)$$

The α matrix contains the weights attached to the cointegrating relations in the individual equations of the model. Importantly, the α and β matrices are not unique, and therefore there are many possible α and β matrices, or linear transformations of them that contain the cointegrating relations. This implies that if any non-singular $(r \times r)$ matrix (for example) B is used, then a new αB would be attained, resulting in cointegration matrix $\beta B'^{-1}$ that would satisfy $\Psi = \alpha B(\beta B'^{-1})'$. The existence of r cointegrating relationships yields a hypothesis that amounts to:

$$H_1(r) : \Psi = \alpha\beta' \quad (8)$$

where Ψ is $p \times p$, and α, β are full rank $p \times r$ matrices. Therefore $H_1(r)$ is the hypothesis of the reduced rank Ψ. Where $r > 1$, issues of identification arise which require the use of economic restrictions on the loading matrix α, the matrix representing the short-run dynamics, Π, and/or the cointegrating space, β allows for the forecast of time series and the analysis of dynamic impacts of random disturbances on the system of variables.

IV. Research Approach, Model Specification and Empirical Findings

This section is divided into five parts. The first presents the results from the optimal lag-order selection criteria; The second presents the results from the unit-root tests; Results from Johansen's trace and maximum eigenvalue cointegration tests are presented third; Fourth, Grangers representation theorem is addressed in order to determine short- and long-run Granger causality. In the case of identified causal relationships, the direction of causality

is presented and discussed; The fifth section provides results from the post-estimation diagnostic checks of normality and serial autocorrelation of the residual which are required to validate model inference. Stata 11.2 is used for all the econometric analysis presented here.

IV.i. Lag Order Selection

The optimal lag length of the VAR underlying the VECM is selected using a combination of final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC), and the Hannan and Quinn information criterion (HQIC) lag-order selection statistics. For each country, and under each sample period, the optimal lag length that is detected by two or more lag-order selection criteria is used as the optimal lag structure for the particular system. In cases when the same lag structure is identified by two selection criteria, and a different lag structure is detected by the remaining two selection criteria, the lag detected by the FPE and/or AIC is used based on Liew (2004) who finds FPE and AIC to be superior to other commonly reported criteria; BIC, SIC, HQIC and LR[5] is small sample sizes. Liew's (2004) findings show that AIC and FPE outperform the other criteria in the manner by which they minimise the likelihood of under-estimating and maximise the likelihood of identifying the true lag length. Specific details of the criteria can be found in Liew (2004) and Brockwell and Davis (2002). Results from the lag-order-selection criteria are shown in Tables 1.1.(A) and 1.1.(B) of Appendix A, for the benchmark 'closed' economy and the 'open' economy VECMs respectively.

[5] See Taylor and Peel (2000) and Guerra (2003) for details on these criteria and discussions about their inconsistencies.

IV.ii. Unit Root Tests

To begin, the presence of a unit root in each of the macroeconomic series is tested for using the Phillips-Perron (PP) test, and the Augmented Dickey-Fuller (ADF) test. The unit root tests were conducted to identify the order of integration of the variables prior to specification and estimation of the models. The presence of a unit root was tested for in both levels and first differences of the variables.

The ADF test regression equation can be expressed as:

$$\Delta y_t = c + a y_{t-1} + \sum_{j-1}^{k} \delta_j \Delta y_{t-j} + \varepsilon_t \qquad (9)$$

The ADF test assumes the series follows an AR(k) process. It then adds lagged difference terms of the left hand side variable to the right hand side of the test regression equation, which amounts to:

$$\Delta y_t = c + a y_{t-1} + \beta t + \sum_{j-1}^{k} \delta_j \Delta y_{t-j} + \varepsilon_t \qquad (10)$$

Equation (9) tests the null hypothesis of the presence of a unit root against an alternative stationary mean in y_t, where y_t represents GDP, inflation, 10yr bond rates, the unemployment rate, and exports/GDP respectively. Equation (10) tests the null of a unit root against a trend-stationary alternative. The term Δy_{t-j} is the lagged first difference of the variable in the series, accommodating for serial correlation in the errors. The optimal lag is selected as described in section IV.i.

Equations (9) and (10) both allow for the inclusion of a constant, or a constant and a linear trend. In the case of testing for a unit root in the levels data, both a constant and a linear trend are included, and in the case of the first difference series, a constant term is included.

The PP test estimates the non-augmented version of the ADF, which is equivalent to:

$$y_t = c + ay_{t-1} + \varepsilon_t \quad (11)$$

The PP test then modifies the t-ratio of the a coefficient such that the presence of serial correlation in the error term will not affect the asymptotic distribution of the test statistic.

The null hypothesis in the unit root test requires that $a_1 = 1$ in the PP test, and $a_1 = 0$ in the ADF test. Results from the ADF and PP tests are presented in Table 1.2 (A and B). The results from the ADF test indicate the failure to reject the unit root null for the following first difference variables:

- Cyprus (Full Sample) - GDP, unemployment, and 10yr bond rates
- Cyprus (Reduced Sample) - GDP, unemployment
- France (Full Sample) - inflation, unemployment
- Greece (Full Sample) - GDP, unemployment
- Ireland (Full Sample) - unemployment
- Ireland (Reduced Sample) – unemployment

Similarly, the results from the PP test indicate the failure to reject the unit root null for:

- Spain (Full Sample) - GDP, unemployment
- Spain (Reduced Sample) - GDP, inflation, unemployment

These results would appear to suggest the presence of a structural break, which, as argued by Perron (1989) would bias the ADF and PP tests toward the non-rejection of the null hypothesis. Under the assumption that the break in the series is due to an exogenous event, Perron (1989) shows that a break in the deterministic time trend can reduce the power of standard unit root tests to reject the unit root because the possibility of a break changes the asymptotic distribution of the test. Thereby implying that failure to account for a structural break might mistakenly lead to spurious rejections of the unit root null. Perron's (1989) original test assumes the potential break is known *a priori* and test statistics are constructed with the use of dummy variables that represent different level and trend shifts.

Zivot and Andrews (1992) propose a variation to Perron's (1989) original test in which they assume the time of the structural break is unknown. Thus, in contrast to Perron's (1989) subjective approach in determining the structural break of the series, Zivot and Andrews (1992) apply a data dependent approach to estimate the breakpoint. The null hypothesis in all tests proposed by Zivot and Andrews (1992) is:

$$y_t = c + y_{t-1} + \varepsilon_t \tag{12}$$

where y_t is integrated with no structural break.

Following Perron (1989), Zivot and Andrews (1992) develop three models to test for a unit root. The first (model A), allows for a level shift in the series; the second (model B), allows for a trend shift in the series; the third (model C), allows for both a level shift and a trend shift in the series. Therefore, in order to reject for a unit root against the alternative of a single structural break, Zivot and Andrews (1992) use the following three regression equations:

Model A: $$\Delta y_t = c + a y_{t-1} + \beta t + \gamma DL_t + \sum_{j-1}^{k} \delta_j \Delta y_{t-j} + \varepsilon_t \tag{13}$$

Model B: $$\Delta y_t = c + a y_{t-1} + \beta t + \theta DT_t + \sum_{j-1}^{k} \delta_j \Delta y_{t-j} + \varepsilon_t \tag{14}$$

Model C: $$\Delta y_t = c + a y_{t-1} + \beta t + \gamma DL_t + \theta DT_t + \sum_{j-1}^{k} \delta_j \Delta y_{t-j} + \varepsilon_t \tag{15}$$

where DL_t is a dummy indicator for a level shift at each possible breakpoint date (TB), and DT_t is a corresponding dummy indicator for a trend shift.

In all three cases, the Zivot and Andrews (1992) tests (hereafter ZA) are analogous to ADF in that they seek to reject the null of a unit root in the process. Therefore, in order to reject the null of I(1) the *t*-statistic needs to be negative and larger than the critical value.

Following the identification of potential structural breaks, the series used in this analysis are subjected to the ZA test. The results from the ZA tests are reported in Table 1.3 (A-B) of appendix A, for both sample periods, along with the estimated breakpoint date (TB). In order to facilitate the reader, the first difference variables that are determined to be non-stationary around a broken trend, a shift in the mean, or both, as defined by the ZA models (A,B,C), are summarised in Table 1.4 below.

Table 1.4. Non-rejected Unit Root Null from ZA Test

Period	Full Sample			Reduced Sample		
ZA Model	A	B	C	A	B	C
Cyprus	10 yr bond rates	10 yr bond rates	10 yr bond rates	10 yr bond rates		
France	unemployment	unemployment	unemployment	unemployment	unemployment	unemployment
Germany		unemployment			unemployment	
Greece	GDP unemployment 10 yr bond rates		unemployment 10 yr bond rates	GDP		GDP
Ireland	unemployment 10 yr bond rates	unemployment	10 yr bond rates	unemployment	unemployment	
Italy	unemployment	unemployment	unemployment	unemployment 10 yr bond rates	unemployment 10 yr bond rates	GDP unemployment 10 yr bond rates
Portugal	unemployment 10 yr bond rates	10 yr bond rates	unemployment 10 yr bond rates	10 yr bond rates	10 yr bond rates	10 yr bond rates
Spain	unemployment inflation	GDP unemployment inflation	unemployment inflation	unemployment inflation	GDP unemployment inflation	unemployment inflation

Interestingly, the rejected unit root nulls from the ADF and PP test that are presented in Table 1.2 (A-B) are not uniformly rejected within the ZA framework, suggesting the ADF and PP tests spuriously reject the unit root null due to the presence of structural breaks in the series. Collectively, the results from the three unit root tests satisfy the condition that at least one unit root test determines each variable to be I(1), and thereby, for the purposes of this paper, suitable for use within the VECM framework.

IV.iii. Cointegration and Long Run Equilibrium

Before the VECM can be formed there first has to be evidence of cointegration. If the variables are found to be cointegrated, a VECM can be specified and estimated using standard methods and diagnostic tests. Given that cointegration implies a significant error correction term, cointegration can be viewed as an indirect test of long-run causality. To test whether the variables in the system are cointegrated or not, Johansen's trace test and maximum eigenvalue test statistics are used. The Johansen test is based on the estimation of the error correction mechanism by maximum likelihood, under various assumptions about the trend or intercepting parameters, and the number of k cointegrating vectors, followed by conducting the likelihood ratio tests. The tests require that the log-likelihood of the unconstrained model that includes the cointegrating equations be significantly different from the log likelihood of the constrained model that does not include the cointegrating equations – a condition necessary in order to meet criteria required to reject the null hypothesis of no cointegration. Table 2 (A-D) reports the results from Johansen's trace and maximum eigenvalue cointegration tests for each country, under each sample period and model selection. The results indicate a special case in which no cointegrating relation is uncovered for Germany. Despite this limitation, the analysis is conducted and the rank is set $r = 1$. In all other cases, the Johansen and maximum eigenvalue tests provide evidence of at least one cointegrating relationship.

Furthermore, Johansen's test assumes the variables are non-stationary in levels, but stationary in first difference i.e., I(1). The results in Tables 3.1 (A-H), and 3.2 (A-H) of appendix A provide the estimated coefficients for the α and β' matrix along with the standard errors for each estimated coefficient. The significance of the parameters in the β matrix is tested with the adjusted t-test. In most cases (exceptions being the full sample 'closed' economy model for Greece, and the reduced sample 'open' economy model for

Italy) at least one of the estimated parameters are found to be significant. For interpretation, the results are presented for each of the eight countries in the sample as well as the summary statistics of the error correction mechanisms in Tables 3.1 (A-H) and 3.2 (A-H) of appendix A.

In each case, the β's are exactly identified. The estimates define the estimated long-run and short-run equilibrium relationships between the variables of each system. Important to note is that the long-run equilibrium relationships are only deemed stable and valid if the error correction terms are negative and statistically significant (see Burke and Hunter (2005)). The reason for the requirement of a negative error correction term is because by its design, Johansen's method measures the speed of adjustment to the steady-state, hence the sign should be negative (implying convergence) and the magnitude should be less than unity. In other words, when the error correction term in the GDP equation is significant and negative it suggests strong support for the existence of a valid long-run equilibrium relationship. Intuitively, I(1) time series with a long-run relationship cannot drift too far apart from the equilibrium because economic forces will act to restore the equilibrium relationship.

For illustrative purposes, the estimated cointegrating equilibrium equation normalised on GDP that has been generated by the full sample 'closed' economy model of Cyprus has a long-run stationary series of the following form (refer to table 3.2 (A.i.)):

$$LnGDP - 1.126436Ln\pi + 0.0116174Un - 0.004299Bi - 2.991334 \qquad (16)$$

It is important however to note that the error correction term (-0.01051) is not statistically significant but is negative[6]. This term represents the speed of convergence to the long-run steady-state. The result implies there is no statistical support for the existence of a

[6] The representation of all the cointegrating equations can be inferred directly from Table 3.1, and 3.2 (A-H).

long-run equilibrium among the identified cointegrated variables for Cyprus in the 'closed' economy full sample specification.

The statistically significant and negative (therefore valid) estimated cointegrating equilibrium long-run stationary series, and the coefficient that determines the rate of convergence (with the t-stat in parentheses), are presented below for each country.[7] If the VECM does not detect a valid long-run stationary series, it is presented as N/A. Coupled with this, the only cointegrating equations presented are those that are estimated from the GDP equation. The results which determine each system are presented in Tables 3.1 and 3.2 (A-H) of Appendix A.

Cyprus:

Model i.) N/A

Model ii.) N/A

Model iii.) N/A

Model iv.) N/A

France:

Model i.)

$$ec_1 = LnGDP + 0.0547Un + 0.0721Bi - 13.9085$$

where (17)

$$\hat{\alpha} = -0.127\ [-2.83]$$

Convergence rate of 13% per quarter.

[7] Model i. is the full sample closed economy VECM, Model ii. is the full sample open economy VECM, Model iii. Is the reduced sample closed economy VECM, and Model iv. Is the reduced sample open economy VECM.

$$ec_2 = Ln\pi + 0.0447Bi - 4.828$$

Model ii.) *where*

$$\hat{\alpha} = -0.137\ [-2.62] \tag{18}$$

Convergence rate of 14% per quarter.

$$ec_3 = LnX^* + 0.0691Bi - 3.546$$

where

$$\hat{\alpha} = -0.047\ [-3.65] \tag{19}$$

Convergence rate of 5% per quarter.

$$ec_1 = LnGDP + 0.050Un + 0.075Bi - 13.871$$

Model iii.) *where*

$$\hat{\alpha} = -0.126\ [-3.07] \tag{20}$$

Convergence rate of 13% per quarter.

$$ec_2 = Ln\pi + 0.045Un + 0.085Bi - 5.367$$

Model iv.) *where*

$$\hat{\alpha} = -0.127\ [-2.43] \tag{21}$$

Convergence rate of 13% per quarter.

$$ec_3 = LnX^* + 0.116Un - 0.022Bi - 2.159$$

where

$$\hat{\alpha} = -0.038\ [-3.81] \tag{22}$$

Convergence rate of 4% per quarter.

Germany:

Model i.) N/A

Model ii.)

$$ec_1 = LnGDP + 3.609Ln\pi - 0.5802LnX^* + 0.0123Un + 0.1107Bi - 28.2525$$

where

$$\hat{\alpha} = -0.037\ [-1.92] \tag{23}$$

Convergence rate of 4% per quarter.

Model iii.) N/A

Model iv.)

$$ec_1 = LnGDP + 1.383Ln\pi - 0.392LnX^* + 0.0083Un + 0.0371Bi - 18.379$$

where

$$\hat{\alpha} = -0.123\ [-2.24] \tag{24}$$

Convergence rate of 12% per quarter.

Greece:

Model i.) N/A

Model ii.) N/A

Model iii.) N/A

Model iv.) N/A

Ireland:

Model i.) N/A

Model ii.)

$$ec_1 = LnGDP - 3.577LnX^* + 0.0109Un + 0.535Bi + 2.213$$

where

$$\hat{\alpha} = -0.144\ [-2.72] \tag{25}$$

Convergence rate of 14% per quarter.

Model iii.) N/A

Model iv.)

$$ec_1 = LnGDP - 4.372LnX^* - 0.0736Un + 0.619Bi + 6.681$$

where

$\hat{\alpha} = -0.286\ [-3.44]$

(26)

Convergence rate of 29% per quarter.

Italy:

Model i.) N/A

Model ii.)

$$ec_1 = LnGDP - 0.1167LnX^* + 0.0119Un + 0.0362Bi - 12.651$$

where

$\hat{\alpha} = -0.091\ [-2.34]$

(27)

Convergence rate of 9% per quarter.

Model iii.) N/A

Model iv.) N/A

Portugal:

Model i.) N/A

Model ii.) N/A

Model iii.) N/A

Model iv.)

$$ec_1 = LnGDP - 0.564LnX^* + 0.135Un + 0.289Bi - 8.851$$

where

$\hat{\alpha} = -0.206\ [-2.38]$

(28)

Convergence rate of 20% per quarter.

Spain:

Model i.)

$$ec_1 = LnGDP - 0.821Ln\pi + 0.003Un - 0.0047Bi - 8.540$$

where

$\hat{\alpha} = -0.077$ [−2.03] (29)

Convergence rate of 8% per quarter.

Model ii.)

$$ec_1 = LnGDP - 1.273LnX^* + 0.0338Un + 0.1002Bi - 9.338$$

where

$\hat{\alpha} = -0.158$ [−4.43] (30)

Convergence rate of 16% per quarter.

Model iii.)

$$ec_1 = LnGDP + 0.123Bi - 12.97$$

where

$\hat{\alpha} = -0.137$ [−3.56] (31)

Convergence rate of 14% per quarter.

$$ec_3 = Un - 2.607Bi - 12.603$$

where

$\hat{\alpha} = -0.001$ [−3.28] (32)

Convergence rate of 0.1% per quarter.

Model iv.)

$$ec_1 = LnGDP - 0.0467Un + 0.2229Bi - 12.403$$

where

$\hat{\alpha} = -0.166$ [−4.43] (33)

Convergence rate of 17% per quarter.

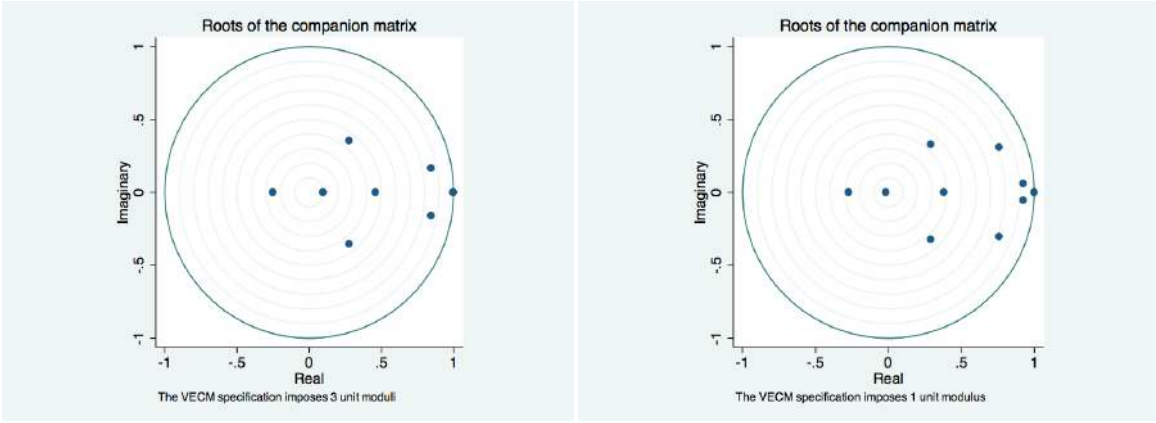
Following Hendry and Juselius (2001), when allowing for sample variation, it is important to not underestimate the number of cointegrating relationships. This is because

empirically relevant information will be omitted. Conversely, overestimating the number of cointegrating ranks will result in non-standard distributions in some of the test statistics that will lead to inaccurate inference. Within this context, the most notable set of results is in the case of France. In particular, when comparing the results between the 'closed' (Eq's. (17) and (20)) and 'open' (Eq's. (18) & (19), and (21) & (22)) economy specifications. In the case of the 'closed' economy, one valid (i.e., negative and statistically significant) cointegrating relationship is identified between GDP, unemployment, and bond rates (within both sample periods). The equilibrium equation is normalised on GDP and therefore the signs on the coefficients should be reversed for correct interpretation. The results suggest unemployment and bond rates both have relatively small, yet significant negative effects on GDP in the long run. Since the cointegrating coefficient estimated by the VECM indicates how the variables adjust over the sample period, the rate at which GDP converges to its steady-state when disequlibrium is caused by shocks to unemployment and bond rates, occurs at a rate of 13% per quarter.

In contrast to the 'closed' economy specification, this dynamic relationship does not translate into the 'open' economy model. Instead, two long-run equlibrium equations are estimated for each sample period, normalised on inflation and exports/GDP resepectively, but neither on GDP. In the full sample period, the variables that bear the burden of adjustment to the equilibrium are bond rates and inflation in equation (18), and bond rates and exports/GDP in equation (19). Similarly, within the reduced sample period 'open' economy model for France, the same variables determine the burden of adjustment, with the addition of unemployment in both equations, as in equations (21) and (22). In order to determine if the inclusion of the additional cointegrating relationship makes sense in this context, an approach proposed by Hendry and Juselius (2001) is adopted, in which the authors consider removing the cointegrating rank for which the characteristic root is close to the unit circle. Figure A

below shows the unit root circles for the 'open' economy full sample specification for France for which the cointegrating relationships, as per the results from the trace test statistics reported in Tables 2 (A and C), are equal to two and four respectively.

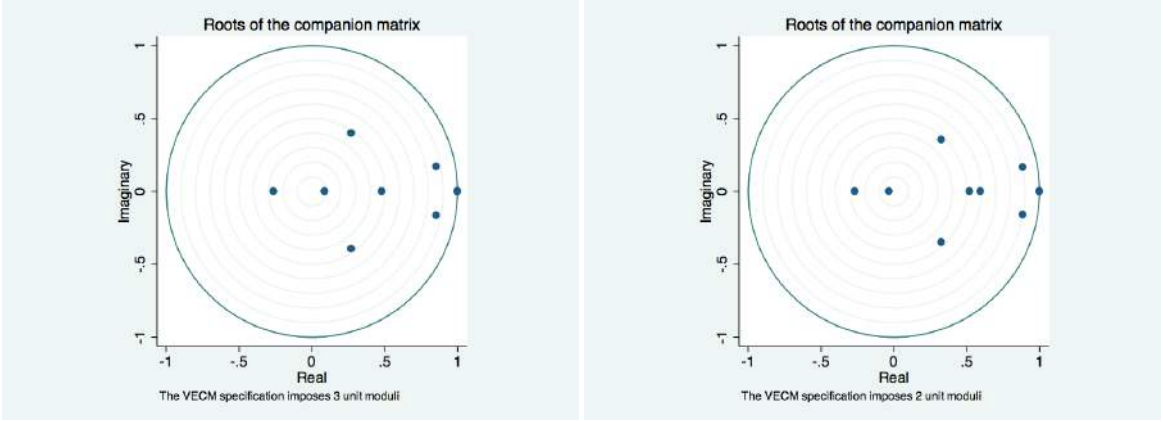
Figure A: France 'Open' economy - Full Sample Unit Root Circle: *r=2* & *r=4*



In both cases, the characteristic root is close to unity, but, by adopting the rank value determined by the trace statistic, i.e, *r=4*, the highest characteristic root is significantly nearer to unity than when *r=2*.

In the reduced sample 'open' economy specification, the trace statistics reported in Table 2 (A and C) indicate that by including exports/GDP the number of cointegrating relationships increase from *r=2*, to *r=3*. The unit root circles are presented in Figure B below, and indicate the additional rank does not move the highest characteristic root closer to unity by the same magnitude as in the full sample case represented Figure A.

Figure B : France 'Open' Economy - Reduced Sample Unit Root Circle: *r=2* & *r=3*



Following the approach of Hendry and Juselius (2001), the unit root circles presented above seem to suggest the inclusion of exports/GDP could have an implication on the robustness of any inference drawn from the 'open' economy full sample model, and that inference could benefit from approximating near unit root values by a unit root, even when found to be statistically different from unity. Following this approach leads to the selection of *r=2* which generates equation (34) when France is modelled 'open' over the full period[8]:

$$ec_2 = LnX^* + 0.924 Ln\pi - 0.066 Un + 0.059 Bi - 6.927$$
$$where$$
$$\hat{\alpha} = -0.026\ [-3.37] \qquad (34)$$

Equation (34) is normalised on exports/GDP and states the burden of adjustment to the equilibrium will rely on exports/GDP, inflation, unemployment and bond rates over the long-run, with a convergence rate of 3% per quarter, or almost eight years. However, the sign of the effect of unemployment indicates an increase in unemployment, will have a positive effect on GDP. In contrast to the above result, when the rank determined by the trace statistic

[8] The 'open' economy dotted line in Figure 2 (B.iii) of appendix A represents the reduced sample GDP forecast under *r=2*, and Figure 2(B.iv) compares actual GDP to GDP Forecasts using *r=2* vs *r=4*.

is used, as presented in Tables 2 (A) and (C), the equlibrium equations state the burden of adjustment relies on bond rates and inflation, and on bond rates and exports/GDP within the full sample period, and on bond rates, inflation, and unemployment, and, bond rates, exports/GDP, and unemployment within the reduced sample period. In all cases, the signs of the burden bearing variables are as expected. Because of the differences detected, it would be worth treating the results with some degree of caution. Despite this, in both rank selection methods for the French economy, unemployment, bond rate, exports/GDP, and inflation, are all deemed to be valid long-run convergence factors, and as such, should be the focus of policymakers focused on stabilising GDP.

IV.iv. Granger Representation Theorem and Causality

It is also possible to have evidence of long-run causality, but not short-run causality and vice-versa. Cointegration further indicates that causality exists between the series of identified variables but it fails to reveal the direction of the causal relationship. In the case of multivariate causality tests, the testing of long-run causality between two variables is problematic as it is not possible to determine which explanatory variable is causing the causality through the error correction term.

Engle and Granger (1987) suggest that if cointegration exists between two variables in the long-run, then, there must be either uni- or bi-directional Granger-causality between these variables. Engle and Granger illustrate that the cointegrating variables be represented by the error correction mechanism representation described earlier. In other words, according to Granger, if there is evidence of cointegration between two or more variables, then a valid error correction should exist between the two variables.

Following Engle and Granger (1987), this paper employs a joint significance hypothesis *F*-test as a testing criterion of short-run causality for each separate system of

equations. The null hypothesis states the estimated coefficients are jointly equal to zero. For the purpose of this paper, which is to examine the causality of the chosen explanatory variables on GDP, only the results of the estimated parameters in the cointegrating equilibrium equation for GDP are reported in Tables 3.2 (A-H)[9]. However, in order to understand the causal relationships that may exist between the variables within the four VECM specifications, namely full sample 'closed' and 'open', and reduced sample 'closed' and 'open', all short-run parameter estimates are reported in Tables 3.1(A-H) of Appendix A. In addition to the parameter estimates, the standard errors and confidence intervals are also reported. With the view to facilitate the reader, the identified short-run Granger causal relationships between each system of equations, the direction of Granger causality between the variables, and the confidence intervals are presented in Tables 3.3 (A-H) within this section and not in Appendix A., along with a brief discussion on the notable results following each table. Finally, to support the Granger causality findings of the GDP equations, results from the linear hypothesis tests for causality between the significant estimated parameters and the variable GDP appear in Table 4 (A-B) in Appendix A.[10] The causality between variables within each equation is now presented and briefly discussed.

[9] Represented as D_lnrgdp in Table 3.2.

[10] Due to this paper focusing on the ability of the chosen variables to provide short horizon forecasts of GDP, and to provide a causality analysis of the chosen variables, only the results from the GDP equation within each system are reported in Table 4 (A-B).

V.iv.i. Cyprus

Model i.) Closed (full sample): $r = 1$

Table 3.3 (A.i): Cyprus Causality Results - 2001Q3-2013Q3 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Price Deflator	Bi-Directional	99%
	LD.Unemployment	Bi-Directional	95%
D.Price Deflator	LD.GDP	Bi-Directional	95%
	LD.Price Deflator	Uni-Directional	90%
	LD.10 Yr Bond	Uni-Directional	99%
D.Unemployment	LD.Price Deflator	Uni-Directional	99%
	LD.Unemployment	Uni-Directional	95%
	LD.10 Yr Bond	Uni-Directional	90%
D.10 Yr Bond	LD.10 Yr Bond	Uni-Directional	99%

There is evidence of a bi-directional short-run Granger causal relationship between the price deflator and GDP, and unemployment and GDP. In addition there is a uni-directional causal relationship running from both the first lag value of the price peflator and the lag value of the bond rate on the price deflator. In the case of the unemployment equation, there is evidence of a causal relationship running from the price deflator, GDP, and 10yr bond rates to unemployment. In the 10yr bond rate equation; there is a uni-directional short-run causal relationship between the 10yr bond rate and its first lag.

Model ii.) Open (full sample): $r = 2$

Table 3.3 (A.ii): Cyprus Causality Results - 2001Q1-2013Q3 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Price Deflator	Bi-Directional	95%
	LD.Exports/GDP	Uni-Directional	99%
D.Price Deflator	LD.GDP	Bi-Directional	95%
	LD.Price Deflator	Uni-Directional	90%
	LD.10 Yr Bond	Uni-Directional	99%
D.Unemployment	N/A	No Casuality	
D.10 Yr Bond	LD.Price Deflator	Bi-Directional	99%
	LD.10 Yr Bond	Uni-Directional	99%
D.Exports/GDP	LD.10 Yr Bond	Uni-Directional	99%

The short run causality between the variables on GDP presents a different result. Table 3.1 (A.ii) in Appendix A. reports the coefficient estimates from the VECM. The estimates indicate short-run positive causal relationships running between the first lag of the price deflator on GDP, and the first lag of exports/GDP on GDP. This result is supported by the joint short-run causality tests presented in Table 4 (A.ii) which indicate a jointly significant causal relationship between the statistically significant variables and GDP.

Model iii.) Closed (reduced sample): $r = 1$

Table 3.3 (A.iii): Cyprus Causality Results - 2001Q3-2011Q4 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Price Deflator	Bi-Directional	99%
	LD.Unemployment	Bi-Directional	95%
D.Price Deflator	LD.GDP	Bi-Directional	99%
	LD.Price Deflator	Uni-Directional	90%
	LD.Unemployment	Bi-Directional	95%
	LD.10 Yr Bond	Uni-Directional	99%
D.Unemployment	LD.GDP	Bi-Directional	90%
	LD.Price Deflator	Bi-Directional	99%
	LD.10 Yr Bond	Uni-Directional	90%
D.10 Yr Bond	LD.10 Yr Bond	Uni-Directional	99%

The estimated coefficients of the lagged price deflator and lagged unemployment variables are both significant. As expected, the sign on the price deflator coefficient is positive, and the sign on the unemployment coefficient is negative. The joint short-run causality test results provide strong support for the existence of this short-run causal relationship between the price deflator and unemployment on GDP. Grangers causality theorem indicates the relationships are both bi-directional. Other relationships that are worth noting are the uni-directional causality running from both the lagged price deflator and the lagged 10yr bond rate to the price deflator, and the short-run uni-directional causality running from 10yr bond rates to unemployment. The uni-directional causality running from lagged 10yr bond rates to 10yr bond rates is expected.

Model iv.) Open (reduced sample): $r = 1$

Table 3.3 (A.iv): Cyprus Causality Results - 2001Q3-2011Q4 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Price Deflator	Bi-Directional	99%
	LD.Export/GDP	Uni-Directional	95%
D.Price Deflator	LD.GDP	Bi-Directional	95%
	LD.10 Yr Bond	Uni-Directional	99%
D.Unemployment	LD.Exports/GDP	Uni-Directional	95%
D.10 Yr Bond	LD.GDP	Uni-Directional	90%
	LD.Price Deflator	Bi-Directional	99%
	LD.10 Yr Bond	Uni-Directional	90%
D.Exports/GDP	LD.10 Yr Bond	Uni-Directional	99%

The short-run Granger causal results are similar to those of the full sample VECM. Lagged price deflator and lagged exports/GDP are both significant and positively influence GDP. The relationship between the price deflator and GDP is bi-directional, however, it appears exports/GDP uni-directionally Granger cause GDP. Other notable results from the model are the uni-directional causal relationships running from 10yr bond rates to the price deflator, exports/GDP to unemployment, GDP to 10yr bond rates, and finally 10yr bond rates to exports/GDP.

V.iv.ii. France

Model i.) Closed (full sample): $r = 2$

Table 3.3 (B.i): France Causality Results - 1997Q1-2013Q3 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	99%
	LD.Unemployment	Bi-Directional	90%
	LD.10 Yr Bond	Uni-Directional	90%
D.Price Deflator	LD.GDP	Uni-Directional	99%
	LD.10 Yr Bond	Uni-Directional	99%
D.Unemployment	LD.GDP	Bi-Directional	95%
	LD.Unemployment	Uni-Directional	95%
D.10 Yr Bond	LD.Unemployment	Uni-Directional	90%
	LD.10 Yr Bond	Uni-Directional	95%

Unemployment is shown to bi-directionally cause GDP, whereas 10yr bond rates are shown to have a uni-directional causality running to GDP. The joint short-run causality test supports the existence of these relationships. The price deflator is uni-directionally determined by GDP and 10yr bond rates. Unemployment has a negative and bi-directional causal effect on GDP, and a negative and uni-directional causal effect on 10yr bond rates.

ii). Open (full sample): $r = 4$

Table 3.3 (B.ii): France Causality Results - 1997Q1-2013Q3 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Exports/GDP	Uni-Directional	90%
D.Price Deflator	LD.10 Yr Bond	Uni-Directional	99%
D.Unemployment	LD.Exports/GDP	Bi-Directional	95%
	LD.10 Yr Bond	Bi-Directional	90%
D.10 Yr Bond	LD.Unemployment	Bi-Directional	90%
D.Exports/GDP	LD.Unemployment	Bi-Directional	90%
	LD.10 Yr Bond	Uni-Directional	90%

The results in Table 3.3 (B.ii) indicate there are uni-directional causal relationships running from exports/GDP to GDP, from 10yr bond rates to the price deflator, and from 10yr bond rates to exports/GDP. There are also bi-directional relationships detected between exports/GDP and unemployment, and 10yr bond rates and unemployment.

iii). Closed (reduced sample): $r = 2$

Table 3.3 (B.iii): France Causality Results - 1997Q1-2012Q4 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	99%
	LD.Unemployment	Bi-Directional	95%
	LD.10 Yr Bond	Uni-Directional	90%
D.Price Deflator	LD.GDP	Uni-Directional	99%
	LD.10 Yr Bond	Uni-Directional	99%
D.Unemployment	LD.GDP	Bi-Directional	95%
	LD.Unemployment	Uni-Directional	95%
D.10 Yr Bond	LD.Unemployment	Uni-Directional	90%
	LD.10 Yr Bond	Uni-Directional	95%

The results in Table 3.3 (B.iii) are robust to the full sample 'closed' economy VECM, indicating a relationship running from unemployment on GDP that is bi-directional. Furthermore, the estimated parameter coefficients show that lagged GDP uni-directionally and positively Granger causes GDP. Coupled with the results from the joint-causality linear hypothesis test results in Table 4, it is inferred that lagged GDP and 10yr bond rates both have a positive and uni-directional causal relationship running to GDP. Finally, a uni-directional causality running from GDP and 10yr bond rates to the price deflator, and running from unemployment to10yr bond rates.

iv). Open (reduced sample): $r = 3$

Table 3.3 (B.iv): France Causality Results - 1997Q4-2012Q4 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Export/GDP	Uni-Directional	95%
D.Price Deflator	LD.GDP	Uni-Directional	90%
	LD.10 Yr Bond	Uni-Directional	99%
D.Unemployment	LD.Exports/GDP	Uni-Directional	95%
D.10 Yr Bond	N/A		
D.Exports/GDP	LD.10 Yr Bond	Uni-Directional	95%

The results in the reduced sample 'open' economy model are robust to the full sample period model, with the exception of no causality detected in the 10yr Bond Rate equation.

V.iv.iii. <u>Germany</u>

i). Closed (full sample): $r = 1$

Table 3.3 (C.i): Germany Causality Results - 1997Q1-2013Q3 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	99%
	LD.10 Yr Bond	Uni-Directional	99%
D.Price Deflator	N/A		
D.Unemployment	LD.GDP	Uni-Directional	90%
	LD.Unemplyment	Uni-Directional	99%
D.10 Yr Bond	LD.10 Yr Bond	Uni-Directional	99%

The table above reports uni-directional causality running from lagged GDP and 10yr bond rates to GDP, lagged GDP and unemployment to unemployment, and lagged 10yr bond rates to 10yr bond rates.

ii). Open (full sample): $r = 1$

Table 3.3 (C.ii): Germany Causality Results - 1997Q1-2013Q3 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.10 Yr Bond	Uni-Directional	99%
D.Price Deflator	N/A		
D.Unemployment	LD.GDP	Uni-Directional	99%
	LD.Unemployment	Uni-Directional	90%
D.10 Yr Bond	LD.Unemployment	Uni-Directional	99%
D.Exports/GDP	LD.10 Yr Bond	Uni-Directional	99%

Again, under an 'open' economy treatment of Germany, the detected relationships are all uni-directional. Interestingly, the inclusion of exports/GDP appears to remove both the uni-directional causality running from lagged GDP to GDP and from lagged 10yr bond rates to 10yr bond rates. The remaining causalities are as in the full sample 'closed' economy model.

iii). Closed (reduced sample): $r = 1$

Table 3.3 (C.iii): Germany Causality Results - 1997Q1-2012Q4 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	95%
	LD.10 Yr Bond	Uni-Directional	99%
D.Price Deflator	N/A		
D.Unemployment	LD.GDP	Uni-Directional	90%
	LD.Unemployment	Uni-Directional	99%
D.10 Yr Bond	LD.10 Yr Bond	Uni-Directional	99%

When the sample period is reduced, there is no change to the causal relationships as described in Table 3.3 (C.i). This indicates the closed economy model is robust for Germany, and that the causal relationships identified are valid.

iv). Open (reduced sample): $r = 1$

Table 3.3 (C.iv): Germany Causality Results - 1997Q1-2012Q4 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.10 Yr Bond	Bi-Directional	99%
D.Price Deflator	N/A		
D.Unemployment	LD.GDP	Uni-Directional	99%
	LD.Unemployment	Uni-Directional	90%
D.10 Yr Bond	LD.Unemployment	Uni-Directional	99%
D.Exports/GDP	LD.10 Yr Bond	Uni-Directional	99%

Again, the causal results are robust for Germany in the 'open' economy reduced sample model. All causal relationships are the same as those presented in Table 3.3 (C.ii).

V.iv.iv. Greece

i). Closed (full sample): $r = 1$

Table 3.3 (D.i): Greece Causality Results - 2000Q1-2011Q1 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	N/A	No Casuality	
D.Price Deflator	N/A	No Casuality	
D.Unemployment	N/A	No Casuality	
D.10 Yr Bond	N/A	No Casuality	

No causal relationships are detected in the 'closed' economy full sample model for Greece.

ii). Open (full sample): $r = 1$

Table 3.3 (D.ii): Greece Causality Results - 2000Q1-2011Q1 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Unemployment	Uni-Directional	95%
	LD.10 Yr Bond	Uni-Directional	95%
D.Price Deflator	N/A	No Casuality	
D.Unemployment	LD.10 Yr Bond	Bi-Directional	99%
D.10 Yr Bond	LD.Unemployment	Bi-Directional	95%
D.Exports/GDP	LD.GDP	Uni-Directional	95%
	LD.Price Deflator	Uni-Directional	95%
	LD.Exports/GDP	Uni-Directional	90%
	LD.Unemployment	Uni-Directional	99%
	LD.10 Yr Bond	Uni-Directional	95%

The inclusion of exports/GDP into the full sample model for Greece introduces causal relationships that were not detected in the 'closed' economy model. There are numerous uni-directional causal relationships now detected. As the results above indicate, lagged 10yr bond rates and unemployment both Granger cause GDP, and lagged GDP, price deflator, exports/GDP, unemployment, and 10yr bond rates all have a uni-directional causality running to exports/GDP. In addition, there is also a bi-directional causality detected running between 10yr bond rates and unemployment. This relationship is positive, indicating that increases to the cost of borrowing for the Greek government increase the unemployment rate.

iii). Closed (reduced sample): $r = 1$

Table 3.3 (D.iii): Greece Causality Results - 2000Q1-2010Q4 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Unemployment	Bi-Directional	99%
D.Price Deflator	N/A	No Casuality	
D.Unemployment	LD.GDP	Bi-Directional	90%
	LD.Unemployment	Uni-Directional	90%
D.10 Yr Bond	LD.Unemployment	Uni-Directional	95%
	LD.10 Yr Bond	Uni-Directional	95%

Unlike in the full sample 'closed' economy model, when the sample period is reduced numerous casual relationships are detected. Unemployment and GDP are shown to possess a bi-directional causal relationship with each other. Lagged unemployment has a uni-directional causality running to unemployment, and lagged unemployment and 10yr bond rates both have a uni-directional causal relationship running to 10yr bond rates, both of which are positive.

iv). Open (reduced sample): $r = 2$

Table 3.3 (D.iv): Greece Causality Results - 2000Q1-2010Q4 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	N/A	No Causality	
D.Price Deflator	N/A	No Causality	
D.Unemployment	LD.Price Deflator	Uni-Directional	90%
D.10 Yr Bond	N/A	No Causality	
D.Exports/GDP	LD.GDP	Uni-Directional	90%
	LD.Exports/GDP	Uni-Directional	95%
	LD.Unemployment	Uni-Directional	99%
	LD.10 Yr Bond	Uni-Directional	99%

The 'open' economy full sample period model identifies 10yr bond rates as having a negative causal relationship to growth, but this result is not replicated in the reduced sample version of the 'open' economy VECM. Further, the bi-directional causality between 10yr bond rates and unemployment is also not detected in this model. For the first time within the four-model environment for Greece, the price deflator equation is shown to uni-directionally Granger cause unemployment. Within the exports/GDP equation, all the previously detected uni-directional relationships, with the exception of the price deflator, are detected. Overall, the inconsistency of the results implies the models are not robust in the case of Greece.

V.iv.v. Ireland

i). Closed (full sample): $r = 2$

Table 3.3 (E.i): Ireland Causality Results - 1997Q1-2013Q3 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	99%
	LD.Unemployment	Bi-Directional	99%
	LD.10 Yr Bond	Bi-Directional	90%
D.Price Deflator	LD.Price Deflator	Uni-Directional	95%
	LD.Unemployment	Uni-Directional	95%
D.Unemployment	LD.GDP	Bi-Directional	95%
	LD.10 Yr Bond	Uni-Directional	99%
D.10 Yr Bond	LD.GDP	Bi-Directional	90%
	LD.10 Yr Bond	Uni-Directional	99%

The Granger causality results indicate bi-directional relationships between GDP and unemployment and between GDP and 10yr Bond Rates. The uni-directional relationships detected by Granger causality are lagged GDP on GDP, lagged price deflator and unemployment on the price deflator, 10yr bond rates on unemployment, and lagged 10yr bond rates on 10 yr Bond rates.

ii). Open (full sample): $r = 2$

Table 3.3 (E.ii): Ireland Causality Results - 1997Q1-2013Q3 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	90%
	LD.Unemployment	Uni-Directional	99%
	LD.10 Yr Bond	Bi-Directional	95%
D.Price Deflator	LD.Price Deflator	Uni-Directional	95%
	LD.Unemployment	Bi-Directional	95%
D.Unemployment	LD.Price Deflator	Bi-Directional	90%
D.10 Yr Bond	LD.GDP	Bi-Directional	95%
	LD.Unemployment	Uni-Directional	99%
D.Exports/GDP	LD.10 Yr Bond	Uni-Directional	99%

Including exports/GDP into the VECM does produce slightly different results in terms of Granger causality among some of the variables and equations. For example, lagged unemployment now has a uni-directional causality running to GDP, whereas previously this

relationship was bi-directional. Lagged GDP still Granger causes GDP, as does the 10yr Bond rate. The direction of causality between lagged unemployment and the price deflator changes from being uni-directional to bi-directional under the 'open' economy specification. The remaining causality relationships are as they were in the 'closed' economy framework. Finally, exports/GDP are shown to be uni-directionally Granger caused by 10yr bond rates.

iii). Closed (reduced sample): $r = 1$

Table 3.3 (E.iii): Ireland Causality Results - 1997Q3-2011Q4 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	95%
	LD.Unemployment	Bi-Directional	99%
D.Price Deflator	LD.Price Deflator	Uni-Directional	95%
	LD.Unemployment	Uni-Directional	95%
D.Unemployment	LD.GDP	Bi-Directional	95%
	LD.Unemployment	Uni-Directional	99%
D.10 Yr Bond	LD.Unemployment	Uni-Directional	90%
	LD.10 Yr Bond	Uni-Directional	99%

In the reduced sample 'closed' economy VECM, many of the relationships detected in the full sample VECM are still detected. There are a few different results in the reduced sample specification; for example, 10yr bond rates no longer Granger causes unemployment, however, lagged unemployment does. In addition to this difference, there is also the case whereby GDP and 10yr bond rates are no longer bi-directional, or even uni-directional for that matter.

iv). Open (reduced sample): $r = 2$

Table 3.3 (E.iv): Ireland Causality Results - 1997Q4-2011Q4 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	95%
	LD.Unemployment	Bi-Directional	99%
	L2D.Unemployment	Bi-Directional	95%
	L2D.10 Yr Bond	Uni-Directional	90%
	LD.10 Yr Bond	Bi-Directional	95%
D.Price Deflator	LD.GDP	Uni-Directional	90%
	LD.Price Deflator	Uni-Directional	99%
	L2D.Price Deflator	Uni-Directional	95%
	L2D.Unemployment	Uni-Directional	95%
	LD.10 Yr Bond	Bi-Directional	95%
	L2D.Exports/GDP	Bi-Directional	90%
D.Unemployment	LD.GDP	Bi-Directional	90%
	LD.Unemployment	Uni-Directional	90%
	L2D.Unemployment	Uni-Directional	95%
D.10 Yr Bond	L2D.Price Deflator	Bi-Directional	95%
	LD.10 Yr Bond	Uni-Directional	99%
	LD.Exports/GDP	Bi-Directional	90%
D.Exports/GDP	LD.GDP	Uni-Directional	90%
	L2D.GDP	Uni-Directional	90%
	LD.Price Deflator	Bi-Directional	99%
	L2D.Price Deflator	Bi-Directional	95%
	L2D.10 Yr Bond	Bi-Directional	99%
	LD.Exports/GDP	Uni-Directional	95%
	L2D.Exports/GDP	Uni-Directional	90%

Under the reduced sample 'open' economy VECM for Ireland, the optimal lag selected was three. The additional lag variable in the system does have some minor implication for Granger causality, in particular the addition of a bi-directional causality between both 10yr bond rates and the price deflator, and exports/GDP and the price deflator. There is also no longer bi-directional causal relationships identified between unemployment and the price deflator, and GDP and 10yr Bonds. The most notable of the results however are the newly identified causal relationships in the exports/GDP equation. As mentioned above, the price deflator has a bi-directional causality with exports/GDP, the previously detected uni-directional causality running from 10yr bond rates to exports/GDP, is now detected as bi-

directional, and the intuitively expected result of the lagged values of exports/GDP, now Granger causes exports/GDP.

V.iv.vi. Italy

i). Closed (full sample): $r = 2$

Table 3.3 (F.i): Italy Causality Results - 1997Q1-2013Q3 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	99%
	LD.Unemployment	Bi-Directional	95%
D.Price Deflator	LD.GDP	Uni-Directional	99%
	LD.Price Deflator	Uni-Directional	95%
D.Unemployment	LD.GDP	Bi-Directional	95%
D.10 Yr Bond	LD.10 Yr Bond	Uni-Directional	99%

The results for Italy under the full sample 'open' economy VECM indicate bi-directional causality between unemployment and GDP. Lagged GDP is shown to have a running causality to GDP, lagged GDP and lagged price deflator are shown to have a uni-directional causality running to the price deflator, and lagged 10yr bond rates Granger cause 10yr bond rates.

ii.) Open (full sample): $r = 2$

Table 3.3 (F.ii): Italy Causality Results - 1997Q1-2013Q3 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	95%
D.Price Deflator	LD.Price Deflator	Uni-Directional	99%
D.Unemployment	LD.GDP	Uni-Directional	99%
D.10 Yr Bond	LD.GDP	Uni-Directional	90%
D.Exports/GDP	LD.10 Yr Bond	Uni-Directional	99%

Within the full sample 'open' economy VECM framework, only uni-directional Granger causality is detected. Lagged GDP Granger causes GDP, lagged price deflator Granger causes the price deflator, lagged GDP Granger causes both unemployment and 10yr bond rates, and the 10yr Bond rate Granger causes exports/GDP.

iii.) Closed (reduced sample): $r = 2$

Table 3.3 (F.iii): Italy Causality Results - 1997Q1-2012Q4 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	99%
	LD.Unemployment	Bi-Directional	95%
D.Price Deflator	LD.GDP	Uni-Directional	95%
	LD.Price Deflator	Uni-Directional	99%
D.Unemployment	LD.GDP	Bi-Directional	95%
D.10 Yr Bond	LD.10 Yr Bond	Uni-Directional	95%

The results from the reduced sample 'closed' economy VECM are robust to those of the full sample VECM. All identified Granger causal relationships are presented identically in both models.

v.) Open (reduced sample): $r = 1$

Table 3.3 (F.iv): Italy Causality Results - 1997Q4-2012Q4 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	N/A	No Casuality	
D.Price Deflator	N/A	No Casuality	
D.Unemployment	N/A	No Casuality	
D.10 Yr Bond	N/A	No Casuality	
D.Exports/GDP	N/A	No Casuality	

Interestingly, no short-run causality relationships are detected in the reduced sample 'open' economy VECM. This result indicates that including exports/GDP into the 'open' economy model for Italy does not benefit the model in any way. The results are not robust under the 'open' economy specification.

V.iv.vii. Portugal

i.) Closed (full sample): $r = 3$

Table 3.3 (G.i): Portugal Causality Results - 1997Q1-2013Q3 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	N/A	No Causality	
D.Price Deflator	LD.GDP	Uni-Directional	95%
	LD.Price Deflator	Uni-Directional	99%
D.Unemployment	LD.Unemployment	Uni-Directional	90%
D.10 Yr Bond	LD.GDP	Uni-Directional	95%
	LD.Unemployment	Uni-Directional	95%
	LD.10 Yr Bond	Uni-Directional	99%

All identified Granger causal relationships are uni-directional. There is no causality detected in the GDP equation, however, lagged price deflator and GDP do Granger cause the price deflator. Lagged unemployment Granger causes unemployment, and lagged GDP, unemployment, and 10yr bond rates all possess a short-run Granger causal relationship with 10yr bond rates.

ii.) Open (full sample): $r = 1$

Table 3.3 (G.ii): Portugal VEC Results - 1997Q1-2013Q3 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	N/A	No Causality	
D.Price Deflator	LD.Price Deflator	Uni-Directional	90%
D.Unemployment	LD.Exports/GDP	Uni-Directional	95%
D.10 Yr Bond	N/A	No Causality	
D.Exports/GDP	LD.GDP	Uni-Directional	95%
	LD.10 Yr Bond	Uni-Directional	99%

In the 'open' economy full sample VECM for Portugal, the results causality is determined entirely by uni-directional Granger causality. Lagged price deflator Granger cause the price deflator, lagged exports/GDP Granger cause unemployment, and lagged GDP and 10yr bond rates Granger cause 10yr bond rates.

iii.) Closed (reduced sample): $r = 2$

Table 3.3 (G.iii): Portugal VEC Results - 1997Q1-2012Q4 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	N/A	No Causality	
D.Price Deflator	LD.GDP	Uni-Directional	90%
	LD.Price Deflator	Uni-Directional	99%
D.Unemployment	N/A	No Causality	
D.10 Yr Bond	LD.GDP	Uni-Directional	95%
	LD.10 Yr Bond	Uni-Directional	99%

Under the 'closed' economy reduced sample VECM, the results of Granger causality are mostly robust when compared to the full sample VECM. The only two differences under the reduced sample model is that a uni-directional causality from lagged unemployment to unemployment is no longer detected, and unemployment no longer Granger causes 10yr bond rates. All other results are as they were in the full sample specification.

iv.) Open (reduced sample): $r = 2$

Table 3.3 (G.iv): Portugal VEC Results - 1997Q4-2012Q4 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	N/A	No Causality	
D.Price Deflator	N/A	No Causality	
D.Unemployment	N/A	No Causality	
D.10 Yr Bond	N/A	No Causality	
D.Exports/GDP	N/A	No Causality	

No causality is detected in the reduced sample 'open' economy VECM for Portugal. This result is identical to that of Italy under the same specification. The failure to detect Granger causality implies the 'open' economy model is not robust for Portugal, thereby implying that inclusion of exports/GDP has no significant impact on the model.

V.iv.viii. Spain

i.) Closed (full sample): $r = 1$

Table 3.3 (H.i): Spain Causality Results - 1997Q1-2013Q3 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.GDP	Uni-Directional	99%
	LD.Unemployment	Uni-Directional	99%
D.Price Deflator	LD.Price Deflator	Uni-Directional	90%
	LD.10 Yr Bond	Bi-Directional	95%
D.Unemployment	LD.Price Deflator	Uni-Directional	99%
	LD.Unemployment	Uni-Directional	99%
D.10 Yr Bond	LD.Price Deflator	Bi-Directional	99%
	LD.Unemployment	Uni-Directional	90%
	LD.10 Yr Bond	Uni-Directional	90%

The Granger causality results indicate a bi-directional causality between 10yr bond rates and price deflator. The sign of the coefficient is negative which indicates increases in the cost of Government borrowing lead to deflationary pressure in Spain. The remaining Granger causal relationships are all uni-directional. Lagged GDP and lagged unemployment Granger Cause GDP, the lagged price deflator has a Granger causality with itself, lagged price deflator and unemployment Granger cause unemployment, and lagged unemployment and 10yr bond rates Granger cause 10yr bond rates.

ii.) Open (full sample): $r = 2$

Table 3.3 (H.ii): Spain Causality Results - 1997Q1-2013Q3 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Price Deflator	Uni-Directional	90%
	LD.Unemployment	Uni-Directional	99%
	LD.10 Yr Bond	Uni-Directional	90%
D.Price Deflator	N/A	No Causality	
D.Unemployment	LD.Unemployment	Uni-Directional	95%
	LD.10 Yr Bond	Bi-Directional	95%
D.10 Yr Bond	LD.Price Deflator	Uni-Directional	99%
	LD.Exports/GDP	Bi-Directional	90%
	LD.Unemployment	Bi-Directional	99%
D.Exports/GDP	LD.Price Deflator	Uni-Directional	99%
	LD.10 Yr Bond	Bi-Directional	90%
	LD.Exports/GDP	Uni-Directional	99%

The 'open' economy full sample VECM for Spain detects different relationships to those that are detected in the 'closed' economy framework. Four out of the nine relationships in the 'closed' economy VECM are detected, however, two of the relationships change their causal direction, namely the price deflator on 10yr bond rates is now detected as uni-directional, and unemployment on Bonds is detected as being bi-directional. The uni-directional Granger causality from unemployment to GDP and lagged unemployment to unemployment is consistently detected in both. Two new bi-directional causal relationships are detected, one between 10yr bond rates and unemployment, and the other between 10yr bond rates and exports/GDP. The remaining causal relationships are all uni-directional, and include both the lagged price deflator and lagged 10yr Bond rate on GDP, and both the lagged exports/GDP and the lagged price deflator on exports/GDP.

iii.) Closed (reduced sample): $r = 3$

Table 3.3 (H.iii): Spain Causality Results - 1997Q1-2012Q4 - Closed Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Price Deflator	Uni-Directional	90%
	LD.Unemployment	Uni-Directional	99%
	LD.10 Yr Bond	Uni-Directional	95%
D.Price Deflator	N/A	No Causality	
D.Unemployment	LD.Price Deflator	Uni-Directional	99%
	LD.Unemployment	Uni-Directional	99%
D.10 Yr Bond	LD.Price Deflator	Bi-Directional	99%
	LD.10 Yr Bond	Uni-Directional	95%

The reduced sample 'closed' economy VECM contains most of the same causal relationships detected in the full sample framework, namely uni-directional causality running from lagged unemployment to GDP, lagged price deflator to unemployment, lagged unemployment to unemployment, and lagged 10yr bond rates to 10yr bond rates implying the closed model VECM is fairly robust.

iv.) Open (reduced sample): $r = 1$

Table 3.3 (H.iv): Spain Causality Results - 1997Q4-2012Q4 - Open Economy

Equation	Variable	Causal Direction	CI
D.GDP	LD.Price Deflator	Uni-Directional	95%
	LD.Unemployment	Uni-Directional	99%
D.Price Deflator	N/A	No Causality	
D.Unemployment	LD.Unemployment	Uni-Directional	95%
	LD.10 Yr Bond	Bi-Directional	95%
D.10 Yr Bond	LD.Price Deflator	Uni-Directional	99%
	LD.Exports/GDP	Bi-Directional	95%
	LD.Unemployment	Bi-Directional	99%
D.Exports/GDP	LD.Price Deflator	Uni-Directional	99%
	LD.10 Yr Bond	Bi-Directional	99%

The Granger relationships detected in the full sample 'open' economy VECM are identically detected in the reduced sample framework. The only differences being that the uni-directional causalities running from lagged 10yr bond rates to GDP, and lagged

exports/GDP to exports/GDP are no longer detected. Overall the results are robust under the two ‘open’ frameworks.

IV.v.) Diagnostic Checking - Lagrange Multiplier and Jarque-Bera Normality Tests

In order to validate the model specification and results, the residuals were tested for the presence of serial auto-correlation using the Lagrange multiplier (LM) method. As discussed in Johansen (1995, 21–22), estimation, inference, and post estimation analysis of VECMs is predicated on the residuals not being auto correlated. The null hypothesis of the test is that there is no autocorrelation in the residuals. The results of the LM test for the ‘closed’ and ‘open’ economy frameworks are presented in Table 5A and 5B respectively.

The results indicate that no residual autocorrelation exists in all the ‘closed’ economy models, for all countries in both the full and reduced sample periods. The ‘open’ economy results are similar, however, there are a few exceptions, namely the second lag in the German ‘open’ economy model within both sample periods, the first lag in the Irish ’open’ economy full sample model, the first lag in the Portuguese full sample ‘open’ economy model, and the second lags in both the full and reduced sample period models for Spain. Despite these results, there are models for each of these countries for which no autocorrelation is detected by the LM test, namely the ‘closed’ economy models for Germany and Spain, and the reduced sample ‘open’ economy for Ireland, and the full sample ‘open’ economy model for Portugal.

A further requirement for the models to be valid, and therefore inference deemed acceptable, is for the residuals to conform to asymptotic normality restrictions. Jarque-Bera (JB) test for normality in the residual was used for this purpose. The result of both the Lagrange multiplier and Jarque-Bera tests are presented in Appendix A. Tables 5 and 6 respectively. The JB test does detect the presence of non-normal residuals for France,

Germany and Italy, regardless of the model or sample period used. This result is somewhat worrying, however, as in Chapter 4 of Burke and Hunter (2005), it is described how even though the Likelihood basis of the Johansen method does depend on normality, there is some evidence that this may be less of a problem than one might anticipate, and except for extreme distributions, there should be convergence with a reasonable sample. In light of this evidence, the models are not re-specified for these three countries, as all other diagnostic checks imply correct model specification.

V. Impulse Response Analysis

In order to assess the robustness of the benchmark model, an extra variable is included (exports/GDP) into the system, and as a second assessment of robustness, the sample period is varied. The orthogonalised impulse response functions (OIRFs) are then examined to determine if there are any significant differences. OIRFs provide evidence of what happens to one variable in response to a short-run shock on another variable within the system. It is conceivable to use the OIRF as opposed to general impulse response functions (IRF) as the underlying shocks are less likely to occur in isolation. There are also contemporaneous correlations between the components of the error process. Because the models presented in this paper have been shown to be generally well-specified, the estimated OIRFs can be interpreted with some degree of certainty. An important feature of OIRFs from a cointegrating VECM is that the response to shocks on the variables does not necessarily die out. In the case of a stationary VAR system, in which the mean is time invariant and finite, and the variance is time invariant, then a shock to any of the variables within the VAR structure must eventually taper and die out in order for the system to revert to a zero mean. This is known as a transitory shock. In contrast, the I(1) variables within a VECM are not mean-reverting, and by implication, may not necessarily die out over time. Shocks such as

these are considered to be permanent. The OIRFs are presented in Figures 1 (A-H) in Appendix A. Because the main focus in this paper is to test the effects of the chosen variables on GDP, with the view to establish causality, and present forecasts of GDP, the only graphs presented are those that capture the dynamic effects from a positive standard deviation shock to either, the price deflator, unemployment, 10yr Bond Rates, or exports/GDP, on GDP. The effects of a shock to GDP on GDP are not presented either.

In all cases, the inclusion of exports/GDP into the system of equations does not appear to significantly affect the response of GDP from a positive one standard deviation from any of the other variables within the system. Similarly, by reducing the sample period in each VECM, the results from a shock to any of the variables does not affect the overall dynamic on the variable of interest, within that specific system. This implies the models are robust to variation in the variables of the system, and also to variation in the sample period.

Another reason for interpreting the OIRFs is to ensure the results are consistent with the estimated cointegrating vectors. It is expected that the results from the IRF will be consistent with the results expressed in the cointegrating vectors. Therefore, if the estimated cointegrating vector suggests a negative relationship between two variables, the corresponding OIRF should contain that same negative relationship. In all cases the effects as described by the estimated cointegrating vectors are replicated in the OIRFs.

The most notable of the results are in the case of the economies described as being ‘open’ in this paper, namely Cyprus, Germany, and Ireland. In each case, a positive one standard deviation shock to exports/GDP has a permanent positive impact on GDP. This is not the same result for the ‘closed’ economies that are defined by having an export /GDP ratio less than 40%. In each of the closed economies, a positive shock to exports/GDP has a far less positive impact on GDP, and in some cases, even a negative impact on GDP. Interestingly, the response of GDP to export shocks in the closed economies is not consistent

across the two sample periods either. GDP in Greece appears to have a one-quarter positive response, and then a permanent negative response to a positive export shock when the full sample period is used, but a slightly positive permanent response when the reduced sample period is used. Italy demonstrates a similar inconsistency between the full sample model and the reduced sample model.

The GDP of Portugal on the other hand experiences a predominantly negative yet fluctuating transitory response to a positive shock to exports/GDP shock. The first quarter response appears to be negative, but becomes positive in the second period. In the reduced sample the effect on GDP returns to zero over the four-year horizon, however, in the full sample model, the response becomes negative after the second year. In both cases however, the magnitude of the response is small.

Finally, GDP in Spain appears to have slight positive response to an export shock. The response appears to be permanent in the full sample model, but transitory in the reduced sample model.

VI. Forecast Results

The VECMs are used to produce short-horizon four-quarter forecasts of GDP. Estimation is exercised in two stages. During the first stage the countries are all treated as closed economies, for which their GDP (in expenditure) is characterised by equation (1). The variables described in the data section above are used to proxy for the components of GDP. The second stage treats the economies as open economies characterised by equation (2). The information set is therefore updated to include a proxy measure of 'openness'. The variable used for this proxy is exports/GDP.

The 'closed' and 'open' economy VECMs are estimated twice for each country. The first estimation of each model employs the sample period from 1997:1 through to 2013:3,

which allows for comparisons to be made to actual data for the periods 2013:4 and 2014:1, plus an additional two quarter forecast to 2014:3. The second estimation of each model employs a reduced sample period from 1997:1 through to 2012:4, which allows for comparisons be made to actual GDP data for the periods 2013:1 to 2013:4. In each case, out-of-sample four-quarter horizon forecasts are generated, which are then compared to actual published GDP figures.

Figures 2 (A.i-H.i) plot actual GDP and the GDP forecasts from both the 'closed' economy and 'open' economy models that utilise the full sample period 1997:1 to 2013:3[11]. Figures 2 (A.ii-H.ii) plot actual GDP and GDP forecasts from the 'closed' and 'open' economy models that utilize the reduced sample periods.

A comparison made between the forecast results from the 'closed' and 'open' economy models with the view to assess whether or not the inclusion of 'openness' affects the performance of the models. The results indicate that countries, for which total exports/GDP is less than 40%, inclusion of a proxy for 'openness' does not improve the forecasting performance.

However, in the case of the countries for which the average ratio of exports/GDP is greater than 40%, the inclusion of the 'openness' proxy does improve forecasting performance. Of the three 'open' economies in the sample, namely Cyprus, Germany, and Ireland, the most 'open' is Ireland. Interestingly, the greatest improvement of forecasting performance is to Irish GDP data.

Despite being able to visually identify improvements to forecasting accuracy, a standard procedure for evaluating how well a model fits the data is to solve the model by performing a dynamic, deterministic simulation and then to compare the predicted values of the endogenous variables with the actual values using the RMSE criterion. When two models

[11] With the exception of Greece and Cyprus who have smaller sample periods due to data availability.

are being compared, the model that has the lowest RMSE is favoured over the other. The RMSE of *h*-step ahead forecasts made over the period t_1 to t_2 is represented by:

$$RMSE_{t_1,t_2} = \sqrt{\frac{1}{t_2 - t_1 + 1}\sum_{t-t_1}^{t_2}(y_{t+h}^{h} - y_{t+h|t}^{h})^2} \qquad (35)$$

where $y_{t+h|t}^{h}$ is the out-of-sample forecast of y_{t+h}^{h} that is generated using data through to date t.

It is important to mention that along with the RMSE, there are a number of other error measures by which to comapre the performance of models in absolute or relative terms. Although not applied within this paper, the mean absolute error (MAE), the mean absolute percentage error (MAPE), the mean percentage error (MPE) and the mean error (ME) may be used. The MAE is measured in the same unit of measure as the data being examined, and usually is similar in magnitude, but slightly smaller than the RMSE. The MAPE can be useful in terms of reporting as it is expressed in percentage terms, but is limited to strictly positive data. The ME and MPE are usually signed measures of error which indicate potential bias in forecasts in such a manner that they indicate whether or not forecasts tend to be disproportionately positive or negative.

Furthermore, this paper does not employ a paired *t*-test, as in Snedecor and Cochran (1967), to test if the difference in RMSE between the 'closed' and 'open' economy model specifications is significantly different from zero. In the absence of such a test, caution should be exercised in making a definitive choice between forecasting models.

For the models presented in this paper, the forecast horizon is four quarters ($h = 4$). The GDP equation RMSE criteria for each country are represented below in Table 8. The results indicate that the 'open' economy model does improve the forecasting accuracy over the 'closed' economy model for the most open economies in the sample. The improvements, expressed in terms of the RMSE, are shown in table 8 below.

Table 8. Forecast RMSEs of 'Closed' versus 'Open' Economy Models (*h*=4)

Country	Sample Period	D.Log Real GDP		Reduction in RMSE
		Closed	Open	
Cyprus	2001Q1 - 2013Q3	0.00755	0.00640	-0.00115
	2001Q1 - 2011Q4	0.00756	0.00709	-0.00047
France	1997Q1 - 2013Q3	0.00418	0.00367	-0.00051
	1997Q1 - 2012Q4	0.00416	0.00369	-0.00047
Germany	1997Q3 - 2013Q3	0.00763	0.00742	-0.00021
	2001Q1 - 2012Q4	0.00776	0.00749	-0.00027
Greece	2000Q1 - 2011Q1	0.01032	0.01050	0.00018
	2000Q1 - 2010Q4	0.01019	0.00969	-0.00050
Ireland	1997Q3 - 2013Q3	0.01896	0.01769	-0.00127
	1997Q3 - 2011Q4	0.01832	0.01656	-0.00176
Italy	1997Q3 - 2013Q3	0.00612	0.00596	-0.00017
	1997Q1 - 2012Q4	0.00634	0.00710	0.00075
Spain	1997Q3 - 2013Q3	0.00306	0.00277	-0.00029
	1997Q1 - 2012Q4	0.00274	0.00278	0.00005
Portugal	1997Q3 - 2013Q3	0.00769	0.00871	0.00102
	1997Q1 - 2012Q4	0.00753	0.00803	0.00049

Not surprising, the forecasting accuracy improves for countries with open economies when a proxy for 'openness' is included, in both sample periods.

In the isolated case of France, which has a ratio of exports/GDP less than the model threshold of 40%, the 'open' economy model does improve the forecasting accuracy when compared to the 'closed' economy by approximately the same magnitude when both sample periods are used for the forecast estimation.[12] However, the reduction in RMSE when modelled as an 'open' economy versus a 'closed' economy is far less pronounced than for the countries in the sample with export to GDP ratios greater than 40%.

In the case of Cyprus, the sample period is reduced due to data limits, and the results should be treated accordingly with caution. For the full sample period of 2001:1 – 2013:3 the

[12] As per Arfa (2010), this result is not surprising as the author describes the French economy as a small-'open' economy within a DSGE framework. Despite this, within the context of this paper, the French economy is classified as 'open'.

RMSE reduces by 0.00115. In the reduced sample period, the RMSE is reduced by only 0.00047. The improvement in the model accuracy is more evident in the larger sample period.

In the case of Germany, both sample periods see a reduction in RMSE by a similar magnitude, 0.00021 and 0.00027 respectively. The reduction is very small in magnitude, and is similar to the reduction felt by some of the 'closed' economies, but unlike the 'closed' economies, the reduction in RMSE occurs when either of the two sample periods are used for estimation.

When compared to all the countries in the sample, the other 'open' economy, Ireland, sees the greatest reduction in RMSE when either of the two periods is used for estimation. Reductions of 0.00127 for the full sample period, and 0.00176 for the reduced sample period. This result is expected considering Ireland is the most 'open' economy in the sample, with an export to GDP ratio greater than 90%. Despite this result, in the case of the reduced sample period, the 'open' model performs very well for one-quarter ahead $h = 1$, but fails to detect the turning point at 2012:1, resulting in a significant gap between the actual GDP data and the forecast at the end of the forecast horizon. In this particular case, any policy that would have relied on the four quarter ahead forecast would have been considerably miss-informed, however, any decision based on the one-quarter ahead forecast, would have been very well informed. This particular result demonstrates the necessity to always tread with caution when informing decisions that are based on forecasts, and that longer forecast horizons are more difficult to predict accurately, under any model specification.

There is no obvious improvement to the model for the remaining countries in the sample. In the case of Greece, the full sample period results in an increase to RMSE of 0.00018 when the 'open' model is compared the 'closed' model. In comparison, the reduced sample period estimation results in a very small reduction to RMSE of 0.00050. This inconsistency indicates a non-robust result of model improvement for Greece.

In the case of Italy, the full sample estimation leads to a reduction in RMSE, but the reduced sample period estimation, indicates an increase in RMSE of 0.00075.

Similarly, the results for Spain indicate a reduction in RMSE for the full sample estimation, but an increase to RMSE for the reduced sample estimation.

When forecasts of Portuguese GDP are estimated, both sample periods yield an increase to RMSE when the 'open' economy model is compared to the 'closed' economy model.

The results from the RMSE forecasts provide some evidence that in the case of 'closed' economy countries there is no robust improvement to the model when the 'open' economy VECM is compared to the 'closed' economy' VECM. This is in contrast to the results of the 'open' economies in the sample, for which the model improves, regardless of the sample period used to estimate the forecasts.

VII. Conclusion

This paper has performed a relatively large-scale forecasting exercise involving eight time-series datasets for eight European countries, namely Cyprus, France, Germany, Greece, Ireland, Italy, Portugal, and Spain. Due to the identification of cointegrating relationships in the variables, short-term forecasts of GDP are estimated using Johansen's VECM estimation method using an information set that proxies for the components of expenditure based GDP within a 'closed' economy framework and then in an 'open' economy framework across two sample periods. For this purpose, the models are estimated using quarterly data on GDP, the GDP price deflator, unemployment rates, 10yr government bond rates, and the ratio of exports/GDP, over the sample periods, namely 1997:1 to 2013:3, and 1997:1 to 2012:4 (these periods are adjusted in the case of Cyprus and Greece due to data availability). Four quarter out-of-sample forecasts are then generated under each model framework for each sample

period. The out-of-sample GDP forecast is then compared to actual GDP data. In addition to the forecasts, an effort is made to examine the relationships among the variables. The results indicate the 'open' economy framework improves the forecasting accuracy for those economies for which the exports/GDP ratio is greater than 40%. The improvement is measured by a reduced RMSE. Four quarter out-of-sample forecasts are also presented graphically and are displayed versus actual data that further demonstrates the improvement in the forecasts. The effectiveness of including exports/GDP into the estimated model is highlighted by the significant and negative error correction term of the cointegrated equations that are not present in 'closed' economy. In the case of Germany and Ireland, when exports/GDP is excluded, none of the variables in the 'closed' economy VECM display a significant long-run convergence. The results indicate that the estimated VECMs specified in this paper perform differently for open economies than they do for closed economies. When a proxy for openness is included in the VECM, the forecasting performance, and causal detection ability of the VECM improves significantly, but only for open economies. This is an important result in the context of this paper because if the 'open' economy proxy is to improve the models forecasting ability, then it should surely have a direct causal relationship with GDP. Interestingly, when all the economies are treated as being closed, there are no differences in model performance between the open, and the closed economies examined.

Developing this research further could take into account the fact that the models presented here are linear by their nature, and therefore fail to take into account nonlinearities in the data. One of the responses to this problem within the literature has been the development of DSGE models, which are capable of handling both structural changes, as well as nonlinearities. The current trend in forecasting is dominated by the use of calibrated and estimated versions of DSGE models that have been shown to produce better forecasts relative to traditional forecasting methods in many cases (see Zimmerman (2001)). Following

the work presented in this paper, future research involving the use of DSGE models that make use of the identified causal relationships within the information set, could produce promising results. Another potential area to further develop the work presented here, could be to pool together the information set into a panel of European countries. Within a panel VECM framework, the predictive ability of a candidate variable within the information set could be explored for the entire panel of countries. Analysis such as this may reveal potential interdependencies within the European group of countries.

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Appendix A

Table 1.1: (A) Lag-Order-Selection Criteria - Full Sample Period Closed Economy VECM
VAR(4): Ln Real GDP, Ln GDP Deflator, 10 Yr Bond Rates, Unemployment

		Lags	FPE	AIC	HQIC	SBIC
Cyprus	2001Q1-2013Q3	0	2.40E-06	-1.57006	-1.51081	-1.4126
		1	8.2E-11	-11.8727	-11.57640	-11.0854
		2	2.9e-11*	-12.9358*	-12.4025*	-11.5187*
		3	3.6E-11	-12.7424	-11.97210	-10.6954
		4	5.3E-11	-12.4385	-11.43120	-9.76167
France	1997Q1 - 2013Q3	0	1.50E-07	-4.36317	-4.30966	-4.2271
		1	7.8E-14	-18.8376	-18.57010	-18.1573*
		2	6.3e-14*	-19.0561*	-18.5744*	-17.8315
		3	8.00E-14	-18.833	-18.13730	-17.0641
		4	9.90E-14	-18.6424	-17.73260	-16.3292
Germany	1997Q1 - 2013Q3	0	2.90E-07	-3.70143	-3.64792	-3.56536
		1	3.20E-12	-15.1168	-14.84920	-14.4364
		2	9.3e-13*	-16.3601*	-15.8785*	-15.1355*
		3	9.70E-13	-16.3384	-15.64270	-14.5695
		4	1.30E-12	-16.0983	-15.18840	-13.785
Greece	2000Q1-2011Q1	0	3.90E-06	-1.11449	-1.05361	-0.94731
		1	5.9e-11*	-12.1986*	-11.8942*	-11.3627*
		2	6.40E-11	-12.1533	-11.6054	-10.6487
		3	1.10E-10	-11.6731	-10.8817	-9.49984
		4	1.60E-10	-11.411	-10.3761	-8.569
Ireland	1997Q1 - 2013Q3	0	0.000179	2.72423	2.77775	2.8603
		1	7.00E-09	-7.43031	-7.16272	-6.74995
		2	2.9e-09*	-8.29932*	-7.81766*	-7.07467*
		3	3.40E-09	-8.1864	-7.49067	-6.41747
		4	3.10E-09	-8.28629	-7.37649	-5.97307
Italy	1997Q1 - 2013Q3	0	1.60E-06	-1.98448	-1.93096	-1.84841
		1	6.80E-12	-14.37	-14.10250	-13.6897*
		2	5.3e-12*	-14.6218*	-14.1401*	-13.3971
		3	6.90E-12	-14.3661	-13.67030	-12.5971
		4	6.50E-12	-14.4634	-13.55360	-12.1502
Portugal	1997Q1 - 2013Q3	0	0.000013	0.119542	0.17306	2.56E-01
		1	6.80E-11	-12.0604	-11.79280	-11.3801
		2	3.7e-11*	-12.6635	-12.1818*	-11.4388*
		3	4.00E-11	-12.6035	-11.90770	-10.8345
		4	3.80E-11	-12.7055*	-11.79570	-10.3923
Spain	1997Q1 - 2013Q3	0	2.70E-06	-1.48857	-1.43505	-1.3525
		1	1.40E-12	-15.9672	-15.69960	-15.2868
		2	4.4e-13*	-17.1*	-16.6183*	-15.8753*
		3	5.10E-13	-16.9749	-16.27920	-15.206
		4	7.00E-13	-16.6857	-15.77590	-14.3725

Table 1.1: (B) Lag-Order-Selection Criteria - Full Sample Open Economy VECM

VAR(5): Ln Real GDP, Ln GDP Deflator, Ln Exports to GDP, 10 Yr Bond Rates, Unemployment

	Sample Period	Lags	FPE	AIC	HQIC	SBIC
		0	4.7E-09	-4.99006	-4.91600	-4.79324
		1	3.1E-14	-16.9384	-16.49400	-15.7574*
Cyprus	2001Q1 - 2013Q3	2	1.2e-14*	-17.8805*	-17.0658*	-15.7155
		3	1.8E-14	-17.6097	-16.42460	-14.4605
		4	3.3E-14	-17.1954	-15.64000	-13.0621
		0	2.00E-10	-8.14768	-8.08078	-7.97759
		1	1.10E-17	-24.9071	-24.5057*	-23.8866*
France	1997Q1 - 2013Q3	2	9.8e-18*	-24.9913*	-24.25550	-23.1203
		3	1.40E-17	-24.6433	-23.57290	-21.9219
		4	2.10E-17	-24.3523	-22.94750	-20.7804
		0	1.90E-10	-8.1979	-8.13100	-8.02781
		1	1.40E-15	-20.033	-19.63160	-19.0125
Germany	1997Q1 - 2013Q3	2	4.4e-16*	-21.1865*	-20.4507*	-19.3156*
		3	4.80E-16	-21.1305	-20.06010	-18.409
		4	6.10E-16	-20.97	-19.56520	-17.3981
		0	1.70E-08	-3.70398	-3.62789	-3.50E+00
		1	1.60E-13	-15.3111	-14.8545	-14.0572*
Greece	2000Q1 - 2011Q1	2	8.5e-14*	-15.9697*	-15.1326*	-13.671
		3	1.90E-13	-15.311	-14.0934	-11.9674
		4	1.80E-13	-15.6793	-14.0813	-11.2909
		0	8.20E-07	0.175272	0.24217	0.345362
		1	5.00E-12	-11.834	-11.43260	-10.8134*
Ireland	1997Q1 - 2013Q3	2	2.20E-12	-12.6617	-11.9259*	-10.7908
		3	2.1e-12*	-12.7592*	-11.68880	-10.0377
		4	2.50E-12	-12.6738	-11.26900	-9.10194
		0	1.60E-09	-6.05906	-5.99216	-5.88897
		1	1.70E-15	-19.796	-19.3946*	-18.7754*
Italy	1997Q1 - 2013Q3	2	1.3e-15*	-20.0988	-19.36300	-18.2278
		3	1.50E-15	-20.0335	-18.96320	-17.3121
		4	1.40E-15	-20.1641*	-18.75930	-16.5922
		0	4.10E-08	-2.82468	-2.75778	-2.65459
		1	3.10E-14	-16.9266	-16.52520	-15.906*
Portugal	1997Q1 - 2013Q3	2	1.9e-14*	-17.4023*	-16.6664*	-15.5313
		3	2.60E-14	-17.1435	-16.07320	-14.4221
		4	2.50E-14	-17.2636	-15.85880	-13.6917
		0	8.00E-09	-4.45561	-4.38871	-4.29E+00
		1	5.00E-16	-21.0411	-20.63970	-20.0206
Spain	1997Q1 - 2013Q3	2	1.8e-16*	-22.0632*	-21.3273*	-20.1922*
		3	2.30E-16	-21.8576	-20.78720	-19.1361
		4	2.80E-16	-21.7443	-20.33940	-18.1724

Table 1.1: (C) Lag-Order-Selection Criteria - Reduced Sample Closed Economy VECM

VAR(4): Ln Real GDP, Ln GDP Deflator, 10 Yr Bond Rates, Unemployment

		Lags	FPE	AIC	HQIC	SBIC
Cyprus	1997Q1 - 2011Q4	0	3.70E-07	-3.4597	-3.39863	-3.29081
		1	1E-10	-11.6371	-11.33180	-10.7927
		2	3.3e-11*	-12.8283*	-12.2787*	-11.3083*
		3	4.3E-11	-12.6264	-11.83260	-10.4309
		4	7E-11	-12.2585	-11.22040	-9.38739
France	1997Q1 - 2014Q1	0	1.30E-07	-4.4984	-4.44379	-4.35878
		1	8.00E-14	-18.8123	-18.53920	-18.1142*
		2	6.4e-14*	-19.0378*	-18.5462*	-17.7812
		3	8.20E-14	-18.8048	-18.09480	-16.9897
		4	1.00E-13	-18.6026	-17.67420	-16.2291
Germany	1997Q1 - 2012Q4	0	2.60E-07	-3.82393	-3.76931	-3.6843
		1	3.50E-12	-15.017	-14.74400	-14.3189
		2	1.0e-12*	-16.25*	-15.7585*	-14.9934*
		3	1.10E-12	-16.2105	-15.50050	-14.3954
		4	1.50E-12	-15.9526	-15.02410	-13.579
Greece	2000Q1-2011Q1	0	2.40E-06	-1.5899	-1.52883	-1.42E+00
		1	5.20E-11	-12.3314	-12.0261*	-11.487*
		2	5.0e-11*	-12.4042*	-11.8546	-10.8842
		3	9.30E-11	-11.8446	-11.0507	-9.64902
		4	1.40E-10	-11.536	-10.4979	-8.66489
Ireland	1997Q1 - 2012Q4	0	1.34E-04	2.43346	2.48954	2.57812
		1	5.80E-09	-7.61159	-7.33115	-6.88825
		2	2.90E-09	-8.31691	-7.81212*	-7.0149*
		3	3.60E-09	-8.12991	-7.40078	-6.24923
		4	2.9e-09*	-8.402*	-7.44851	-5.94265
Italy	1997Q1 - 2012Q4	0	8.40E-07	-2.63941	-2.58479	-2.49978
		1	7.50E-12	-14.2694	-13.99630	-13.5713*
		2	6.0e-12*	-14.4914*	-13.9998*	-13.2348
		3	7.80E-12	-14.2554	-13.54540	-12.4403
		4	7.20E-12	-14.3692	-13.44080	-11.9956
Portugal	1997Q1 - 2012Q4	0	8.70E-06	-0.301916	-0.24730	-0.162294
		1	6.20E-11	-12.1582	-11.88520	-11.4601*
		2	3.70E-11	-12.674	-12.1825*	-11.4174
		3	4.20E-11	-12.5807	-11.87070	-1.08E+01
		4	3.5e-11*	-12.8015*	-11.87310	-1.04E+01
Spain	1997Q1 - 2012Q4	0	2.20E-06	-1.67758	-1.62297	-1.54E+00
		1	1.10E-12	-16.1776	-15.90450	-15.4795
		2	4.2e-13*	-17.1497*	-16.6582*	-15.8931*
		3	4.60E-13	-17.0783	-16.36830	-15.2632
		4	6.30E-13	-16.8104	-15.88190	-14.4368

Table 1.1: (D) Lag-Order-Selection Criteria - Reduced Sample Open Economy VECM

VAR(5): Ln Real GDP, Ln GDP Deflator, Ln Exports to GDP, 10 Yr Bond Rates, Unemployment

	Sample Period	Lags	FPE	AIC	HQIC	SBIC
		0	7.10E-10	-6.88087	-6.80454	-6.66976
		1	3.80E-14	-16.7123	-16.25430	-15.4456
Cyprus	2001Q1 - 2011Q4	2	1.6e-14*	-17.6425	-16.8029*	-15.3203
		3	2.00E-14	-17.6079	-16.38660	-14.2301
		4	2.70E-14	-17.6541*	-16.05120	-13.2208
		0	1.70E-10	-8.33473	-8.26646	-8.1602
		1	1.20E-17	-24.8172	-24.4076*	-23.7701*
France	1997Q1 - 2012Q4	2	1.0e-17*	-24.9564*	-24.20540	-23.0366
		3	1.50E-17	-24.6211	-23.52880	-21.8286
		4	2.20E-17	-24.305	-22.87130	-20.6399
		0	1.40E-10	-8.47524	-8.40697	-8.30071
		1	1.50E-15	-19.9581	-19.54850	-18.9109
Germany	1997Q1 - 2012Q4	2	4.9e-16*	-21.0789*	-20.3279*	-19.1591*
		3	5.50E-16	-21.0064	-19.91410	-18.2139
		4	7.00E-16	-20.8635	-19.42980	-17.1984
		0	1.10E-08	-4.15502	-4.07869	-3.94E+00
		1	1.10E-13	-15.6269	-15.1689	-14.3603*
Greece	2000Q1 - 2010Q4	2	6.8e-14*	-16.2079*	-15.3683*	-13.8857
		3	1.70E-13	-15.4625	-14.2412	-12.0847
		4	1.70E-13	-15.8174	-14.2144	-11.3841
		0	4.30E-07	-4.77E-01	-0.40707	-2.96E-01
		1	3.50E-12	-1.22E+01	-11.78070	-11.1163*
Ireland	1997Q1 - 2011Q4	2	1.80E-12	-1.29E+01	-12.11020	-1.09E+01
		3	1.1e-12*	-1.34E+01	-12.2681*	-1.05E+01
		4	1.20E-12	-13.4703*	-11.99800	-9.67E+00
		0	8.70E-10	-6.66985	-6.60158	-6.49532
		1	2.00E-15	-19.6812	-19.2716*	-18.634*
Italy	1997Q1 - 2012Q4	2	1.5e-15*	-19.9634	-19.21250	-18.0436
		3	1.70E-15	-19.9079	-18.81560	-17.1154
		4	1.70E-15	-19.998*	-18.56430	-16.3329
		0	2.10E-08	-3.51243	-3.44416	-3.3379
		1	3.10E-14	-16.9314	-16.5218	-15.8842*
Portugal	1997Q1 - 2012Q4	2	2.1e-14*	-17.3124*	-16.5615*	-15.3926
		3	2.90E-14	-17.0326	-15.9403	-14.2401
		4	2.90E-14	-17.1395	-15.7058	-13.4744
		0	4.10E-09	-5.13076	-5.06249	-4.95623
		1	3.60E-16	-21.3738	-20.96420	-20.3267
Spain	1997Q1 - 2012Q4	2	1.4e-16*	-22.3289*	-21.578*	-20.4091*
		3	2.00E-16	-22.0346	-20.94230	-19.2422
		4	2.40E-16	-21.9165	-20.48290	-18.2514

Table 1.2: (A) Full Sample Period - Unit Root Test (Philips-Perron & Augmented Dickey-Fuller)

Variable	Sample Period	Deterministic terms	Lags	Test Stat	Critical values			Test Stat	Critical values		
				PP	1%	5%	10%	ADF	1%	5%	10%
Cyprus											
Log Real GDP	2001Q1 - 2013Q3	constant, trend	2	2.129	-4.15	-3.5	-3.18	0.843	-4.168	-3.508	-3.185
D.Log Real GDP		constant	2	-3.866	-3.587	-2.933	-2.601	-2.265	-4.178	-3.512	-3.187
Log GDP Deflator		constant, trend	2	-0.196	-4.15	-3.5	-3.18	0.265	-4.168	-3.508	-3.185
D.Log GDP Deflator		constant	2	-7.297	-3.587	-2.933	-2.601	-4.92	-4.178	-3.512	-3.187
Unemployment		constant, trend	2	1.549	-4.15	-3.5	-3.18	0.131	-4.168	-3.508	-3.185
D.Unemployment		constant	2	-3.387	-3.587	-2.933	-2.601	-2.593	-4.178	-3.512	-3.187
10 Yr Bond Rates		constant, trend	2	-2.197	-4.15	-3.5	-3.18	-2.884	-4.168	-3.508	-3.185
D.10 Yr Bond Rates		constant	2	-3.869	-3.587	-2.933	-2.601	-3.055	-4.178	-3.512	-3.187
Log Exports to GDP		constant, trend	2	-1.636	-4.15	-3.5	-3.18	-2.27	-4.168	-3.508	-3.185
D.Log Exports to GDP		constant	2	-4.664	-3.587	-2.933	-2.601	-3.706	-4.178	-3.512	-3.187
France											
Log Real GDP	1997Q1 - 2013Q3	constant, trend	2	-1.863	-4.115	-3.484	-3.17	-2.221	-4.119	-3.486	-3.172
D.Log Real GDP		constant	1	-4.146	-3.559	-2.918	-2.594	-3.013	-3.56	-2.919	-2.594
Log GDP Deflator		constant, trend	2	-0.504	-4.115	-3.484	-3.17	-0.276	-4.119	-3.486	-3.172
D.Log GDP Deflator		constant	1	-5.21	-3.559	-2.918	-2.594	-2.559	-3.56	-2.919	-2.594
Unemployment		constant, trend	2	-1.095	-4.115	-3.484	-3.17	-2.166	-4.119	-3.486	-3.172
D.Unemployment		constant	1	-3.664	-3.559	-2.918	-2.594	-2.641	-3.56	-2.919	-2.594
10 Yr Bond Rates		constant, trend	2	-2.771	-4.115	-3.484	-3.17	-2.903	-4.119	-3.486	-3.172
D.10 Yr Bond Rates		constant	1	-6.249	-3.559	-2.918	-2.594	-4.345	-3.56	-2.919	-2.594
Log Exports to GDP		constant, trend	2	-2.507	-4.115	-3.484	-3.17	-3.01	-4.119	-3.486	-3.172
D.Log Exports to GDP		constant	1	-4.981	-3.559	-2.918	-2.594	-4.025	-3.56	-2.919	-2.594
Germany											
Log Real GDP	1997Q1 - 2013Q3	constant, trend	2	-2.616	-4.115	-3.484	-3.17	-3.477	-4.119	-3.486	-3.172
D.Log Real GDP		constant	1	-5.224	-3.559	-2.918	-2.594	-4.127	-3.56	-2.919	-2.594
Log GDP Deflator		constant, trend	2	-2.454	-4.115	-3.484	-3.17	-1.203	-4.119	-3.486	-3.172
D.Log GDP Deflator		constant	1	-7.229	-3.559	-2.918	-2.594	-5.501	-3.56	-2.919	-2.594
Unemployment		constant, trend	2	-0.904	-4.115	-3.484	-3.17	-1.672	-4.119	-3.486	-3.172
D.Unemployment		constant	1	-2.78	-3.559	-2.918	-2.594	-3.085	-3.56	-2.919	-2.594
10 Yr Bond Rates		constant, trend	2	-2.552	-4.115	-3.484	-3.17	-2.527	-4.119	-3.486	-3.172
D.10 Yr Bond Rates		constant	1	-6.049	-3.559	-2.918	-2.594	-6.037	-3.56	-2.919	-2.594
Log Exports to GDP		constant, trend	2	-2.041	-4.115	-3.484	-3.17	-2.524	-4.119	-3.486	-3.172
D.Log Exports to GDP		constant	1	-5.922	-3.559	-2.918	-2.594	-4.26	-3.56	-2.919	-2.594
Greece											
Log Real GDP	2000Q1 - 2011Q1	constant, trend	2	2.129	-4.15	-3.5	-3.18	2.058	-4.224	-3.532	-3.199
D.Log Real GDP		constant	2	-3.866	-3.587	-2.933	-2.601	-2.391	-3.634	-2.952	-2.61
Log GDP Deflator		constant, trend	2	-0.196	-4.15	-3.5	-3.18	-0.482	-4.224	-3.532	-3.199
D.Log GDP Deflator		constant	2	-7.297	-3.587	-2.933	-2.601	-3.426	-3.634	-2.952	-2.61
Unemployment		constant, trend	2	1.549	-4.15	-3.5	-3.18	1.58	-4.224	-3.532	-3.199
D.Unemployment		constant	2	-3.387	-3.587	-2.933	-2.601	-1.662	-3.634	-2.952	-2.61
10 Yr Bond Rates		constant, trend	2	-2.197	-4.15	-3.5	-3.18	1.344	-4.224	-3.532	-3.199
D.10 Yr Bond Rates		constant	2	-3.869	-3.587	-2.933	-2.601	-3.045	-3.634	-2.952	-2.61
Log Exports to GDP		constant, trend	2	-1.636	-4.15	-3.5	-3.18	-2.765	-4.224	-3.532	-3.199
D.Log Exports to GDP		constant	2	-4.664	-3.587	-2.933	-2.601	-4.027	-3.634	-2.952	-2.61
Ireland											
Log Real GDP	1997Q1 - 2013Q3	constant, trend	3	-4.25	-3.558	-2.917	-2.594	-1.605	-4.121	-3.487	-3.172
D.Log Real GDP		constant	1	-8.991	-3.559	-2.918	-2.594	-4.538	-3.56	-2.919	-2.594
Log GDP Deflator		constant, trend	3	-2.8	-3.558	-2.917	-2.594	-0.518	-4.121	-3.487	-3.172
D.Log GDP Deflator		constant	1	-9.709	-3.559	-2.918	-2.594	-5.847	-3.56	-2.919	-2.594
Unemployment		constant, trend	3	-0.503	-3.558	-2.917	-2.594	-2.446	-4.121	-3.487	-3.172
D.Unemployment		constant	1	-3.445	-3.559	-2.918	-2.594	-2.308	-3.56	-2.919	-2.594
10 Yr Bond Rates		constant, trend	3	-2.257	-3.558	-2.917	-2.594	-2.931	-4.121	-3.487	-3.172
D.10 Yr Bond Rates		constant	1	-4.253	-3.559	-2.918	-2.594	-4.307	-3.56	-2.919	-2.594
Log Exports to GDP		constant, trend	3	-1.132	-3.558	-2.917	-2.594	-1.55	-4.121	-3.487	-3.172
D.Log Exports to GDP		constant	1	-8.244	-3.559	-2.918	-2.594	-4.452	-3.56	-2.919	-2.594
Italy											
Log Real GDP	1997Q1 - 2013Q3	constant, trend	2	-0.858	-4.115	-3.484	-3.17	-1.322	-4.119	-3.486	-3.172
D.Log Real GDP		constant	1	-4.238	-3.559	-2.918	-2.594	-3.39	-3.56	-2.919	-2.594
Log GDP Deflator		constant, trend	2	-0.357	-4.115	-3.484	-3.17	-0.072	-4.119	-3.486	-3.172
D.Log GDP Deflator		constant	1	-10.988	-3.559	-2.918	-2.594	-5.939	-3.56	-2.919	-2.594
Unemployment		constant, trend	2	1.462	-4.115	-3.484	-3.17	0.139	-4.119	-3.486	-3.172
D.Unemployment		constant	1	-4.815	-3.559	-2.918	-2.594	-2.739	-3.56	-2.919	-2.594
10 Yr Bond Rates		constant, trend	2	-3.282	-4.115	-3.484	-3.17	-3.25	-4.119	-3.486	-3.172
D.10 Yr Bond Rates		constant	1	-6.064	-3.559	-2.918	-2.594	-4.864	-3.56	-2.919	-2.594
Log Exports to GDP		constant, trend	2	-2.282	-4.115	-3.484	-3.17	-3.298	-4.119	-3.486	-3.172
D.Log Exports to GDP		constant	1	-4.925	-3.559	-2.918	-2.594	-4.132	-3.56	-2.919	-2.594
Portugal											
Log Real GDP	1997Q1 - 2013Q3	constant, trend	2	-1.962	-4.115	-3.484	-3.17	-1.718	-4.119	-3.486	-3.172
D.Log Real GDP		constant	2	-6.065	-3.559	-2.918	-2.594	-2.979	-3.56	-2.919	-2.594
Log GDP Deflator		constant, trend	2	0.199	-4.115	-3.484	-3.17	-0.089	-4.119	-3.486	-3.172
D.Log GDP Deflator		constant	2	-7.85	-3.559	-2.918	-2.594	-4.085	-3.56	-2.919	-2.594
Unemployment		constant, trend	2	-2.269	-4.115	-3.484	-3.17	-3.017	-4.119	-3.486	-3.172
D.Unemployment		constant	2	-4.293	-3.559	-2.918	-2.594	-3.187	-3.56	-2.919	-2.594
10 Yr Bond Rates		constant, trend	2	-2.242	-4.115	-3.484	-3.17	-3.111	-4.119	-3.486	-3.172
D.10 Yr Bond Rates		constant	2	-3.8	-3.559	-2.918	-2.594	-3.941	-3.56	-2.919	-2.594
Log Exports to GDP		constant, trend	2	-1.497	-4.115	-3.484	-3.17	-2.053	-4.119	-3.486	-3.172
D.Log Exports to GDP		constant	2	-5.836	-3.559	-2.918	-2.594	-4.112	-3.56	-2.919	-2.594
Spain											
Log Real GDP	1997Q1 - 2013Q3	constant, trend	2	0.473	-4.115	-3.484	-3.17	0.843	-4.119	-3.486	-3.172
D.Log Real GDP		constant	1	-2.023	-3.559	-2.918	-2.594	-2.748	-3.56	-2.919	-2.594
Log GDP Deflator		constant, trend	2	1.633	-4.115	-3.484	-3.17	0.265	-4.119	-3.486	-3.172
D.Log GDP Deflator		constant	1	-2.985	-3.559	-2.918	-2.594	-5.317	-3.56	-2.919	-2.594
Unemployment		constant, trend	2	-1.044	-4.115	-3.484	-3.17	0.131	-4.119	-3.486	-3.172
D.Unemployment		constant	1	-2.306	-3.559	-2.918	-2.594	-2.949	-3.56	-2.919	-2.594
10 Yr Bond Rates		constant, trend	2	-2.729	-4.115	-3.484	-3.17	-2.884	-4.119	-3.486	-3.172
D.10 Yr Bond Rates		constant	1	-5.944	-3.559	-2.918	-2.594	-3.944	-3.56	-2.919	-2.594
Log Exports to GDP		constant, trend	2	-1.042	-4.115	-3.484	-3.17	-2.27	-4.119	-3.486	-3.172
D.Log Exports to GDP		constant	1	-6.914	-3.559	-2.918	-2.594	-3.598	-3.56	-2.919	-2.594

Table 1.2: (B) Reduced Sample Period - Unit Root Test (Philips-Perron & Augmented Dickey-Fuller)

Variable	Sample Period	Deterministic terms	Lags	Test Stat	Critical values			Test Stat	Critical values		
				PP	1%	5%	10%	ADF	1%	5%	10%
Cyprus											
Log Real GDP	2001Q1 - 2011Q4	constant, trend	2	-0.021	-4.214	-3.528	-3.197	-0.484	-4.233	-3.536	-3.202
D.Log Real GDP		constant	1	-5.198	-3.634	-2.952	-2.61	-2.268	-4.242	-3.54	-3.204
Log GDP Deflator		constant, trend	2	-1.902	-4.214	-3.528	-3.197	-1.422	-4.233	-3.536	-3.202
D.Log GDP Deflator		constant	1	-7.289	-3.634	-2.952	-2.61	-4.913	-4.242	-3.54	-3.204
Unemployment		constant, trend	2	-0.209	-4.214	-3.528	-3.197	-0.574	-4.233	-3.536	-3.202
D.Unemployment		constant	1	-3.593	-3.634	-2.952	-2.61	-2.377	-4.242	-3.54	-3.204
10 Yr Bond Rates		constant, trend	2	-1.196	-4.214	-3.528	-3.197	-2.159	-4.233	-3.536	-3.202
D.10 Yr Bond Rates		constant	1	-3.756	-3.634	-2.952	-2.61	-3.236	-4.242	-3.54	-3.204
Log Exports to GDP		constant, trend	2	-1.999	-4.214	-3.528	-3.197	-2.89	-4.233	-3.536	-3.202
D.Log Exports to GDP		constant	1	-4.522	-3.634	-2.952	-2.61	-3.291	-4.242	-3.54	-3.204
France											
Log Real GDP	1997Q1 - 2012Q4	constant, trend	2	-3.227	-3.562	-2.92	-2.595	-2.122	-4.126	-3.489	-3.173
D.Log Real GDP		constant	2	-3.925	-3.563	-2.92	-2.595	-3.408	-3.562	-2.92	-2.595
Log GDP Deflator		constant, trend	2	-0.497	-3.562	-2.92	-2.595	-0.826	-4.126	-3.489	-3.173
D.Log GDP Deflator		constant	2	-5.358	-3.563	-2.92	-2.595	-2.789	-3.562	-2.92	-2.595
Unemployment		constant, trend	2	-2.27	-3.562	-2.92	-2.595	-1.737	-4.126	-3.489	-3.173
D.Unemployment		constant	2	-3.265	-3.563	-2.92	-2.595	-2.963	-3.562	-2.92	-2.595
10 Yr Bond Rates		constant, trend	2	-1.021	-3.562	-2.92	-2.595	-2.702	-4.126	-3.489	-3.173
D.10 Yr Bond Rates		constant	2	-6.118	-3.563	-2.92	-2.595	-4.244	-3.562	-2.92	-2.595
Log Exports to GDP		constant, trend	2	-2.504	-3.562	-2.92	-2.595	-3.07	-4.126	-3.489	-3.173
D.Log Exports to GDP		constant	2	-4.799	-3.563	-2.92	-2.595	-3.903	-3.562	-2.92	-2.595
Germany											
Log Real GDP	1997Q1 - 2012Q4	constant, trend	2	-1.278	-3.562	-2.92	-2.595	-3.409	-4.126	-3.489	-3.173
D.Log Real GDP		constant	1	-5.021	-3.563	-2.92	-2.595	-3.921	-3.562	-2.92	-2.595
Log GDP Deflator		constant, trend	2	1.691	-3.562	-2.92	-2.595	-1.915	-4.126	-3.489	-3.173
D.Log GDP Deflator		constant	1	-7.334	-3.563	-2.92	-2.595	-5.776	-3.562	-2.92	-2.595
Unemployment		constant, trend	2	-0.024	-3.562	-2.92	-2.595	-1.603	-4.126	-3.489	-3.173
D.Unemployment		constant	1	-2.704	-3.563	-2.92	-2.595	-3.057	-3.562	-2.92	-2.595
10 Yr Bond Rates		constant, trend	2	-0.653	-3.562	-2.92	-2.595	-2.146	-4.126	-3.489	-3.173
D.10 Yr Bond Rates		constant	1	-5.974	-3.563	-2.92	-2.595	-6.083	-3.562	-2.92	-2.595
Log Exports to GDP		constant, trend	2	-1.431	-3.562	-2.92	-2.595	-2.682	-4.126	-3.489	-3.173
D.Log Exports to GDP		constant	1	-5.822	-3.563	-2.92	-2.595	-4.183	-3.562	-2.92	-2.595
Greece											
Log Real GDP	2000Q1 - 2010Q4	constant, trend	2	3.776	-4.214	-3.528	-3.197	2.922	-4.233	-3.536	-3.202
D.Log Real GDP		constant	1	-3.589	-3.634	-2.952	-2.61	-3.441	-3.641	-2.955	-2.611
Log GDP Deflator		constant, trend	2	-1.566	-4.214	-3.528	-3.197	-1.258	-4.233	-3.536	-3.202
D.Log GDP Deflator		constant	1	-7.361	-3.634	-2.952	-2.61	-4.342	-3.641	-2.955	-2.611
Unemployment		constant, trend	2	2.108	-4.214	-3.528	-3.197	1.279	-4.233	-3.536	-3.202
D.Unemployment		constant	1	-2.613	-3.634	-2.952	-2.61	-2.751	-3.641	-2.955	-2.611
10 Yr Bond Rates		constant, trend	2	1.182	-4.214	-3.528	-3.197	0.213	-4.233	-3.536	-3.202
D.10 Yr Bond Rates		constant	1	-3.468	-3.634	-2.952	-2.61	-4.994	-3.641	-2.955	-2.611
Log Exports to GDP		constant, trend	2	-2.205	-4.214	-3.528	-3.197	-2.63	-4.233	-3.536	-3.202
D.Log Exports to GDP		constant	1	-5.848	-3.634	-2.952	-2.61	-3.496	-3.641	-2.955	-2.611
Ireland											
Log Real GDP	1997Q1 - 2011Q4	constant, trend	3	-3.828	-3.567	-2.923	-2.596	-1.363	-4.137	-3.494	-3.176
D.Log Real GDP		constant	1	-8.362	-3.569	-2.924	-2.597	-5.376	-4.132	-3.492	-3.175
Log GDP Deflator		constant, trend	3	-2.566	-3.567	-2.923	-2.596	0.274	-4.137	-3.494	-3.176
D.Log GDP Deflator		constant	1	-9.052	-3.569	-2.924	-2.597	-6.784	-4.132	-3.492	-3.175
Unemployment		constant, trend	3	0.045	-3.567	-2.923	-2.596	-1.703	-4.137	-3.494	-3.176
D.Unemployment		constant	1	-3.652	-3.569	-2.924	-2.597	-2.926	-4.132	-3.492	-3.175
10 Yr Bond Rates		constant, trend	3	-1.364	-3.567	-2.923	-2.596	-1.597	-4.137	-3.494	-3.176
D.10 Yr Bond Rates		constant	1	-3.677	-3.569	-2.924	-2.597	-3.984	-4.132	-3.492	-3.175
Log Exports to GDP		constant, trend	3	-1.246	-3.567	-2.923	-2.596	-1.575	-4.137	-3.494	-3.176
D.Log Exports to GDP		constant	1	-7.402	-3.569	-2.924	-2.597	-4.06	-4.132	-3.492	-3.175
Italy											
Log Real GDP	1997Q1 - 2012Q4	constant, trend	2	-0.683	-4.121	-3.487	-3.172	-1.191	-4.126	-3.489	-3.173
D.Log Real GDP		constant	1	-4.066	-3.563	-2.92	-2.595	-3.722	-3.562	-2.92	-2.595
Log GDP Deflator		constant, trend	2	-0.549	-4.121	-3.487	-3.172	-0.112	-4.126	-3.489	-3.173
D.Log GDP Deflator		constant	1	-10.966	-3.563	-2.92	-2.595	-6.17	-3.562	-2.92	-2.595
Unemployment		constant, trend	2	1.94	-4.121	-3.487	-3.172	0.344	-4.126	-3.489	-3.173
D.Unemployment		constant	1	-4.769	-3.563	-2.92	-2.595	-3.261	-3.562	-2.92	-2.595
10 Yr Bond Rates		constant, trend	2	-3.108	-4.121	-3.487	-3.172	-3.121	-4.126	-3.489	-3.173
D.10 Yr Bond Rates		constant	1	-5.678	-3.563	-2.92	-2.595	-4.426	-3.562	-2.92	-2.595
Log Exports to GDP		constant, trend	2	-1.963	-4.121	-3.487	-3.172	-3.296	-4.126	-3.489	-3.173
D.Log Exports to GDP		constant	1	-4.783	-3.563	-2.92	-2.595	-4.008	-3.562	-2.92	-2.595
Portugal											
Log Real GDP	1997Q1 - 2012Q4	constant, trend	2	-1.086	-4.121	-3.487	-3.172	-0.804	-4.126	-3.489	-3.173
D.Log Real GDP		constant	2	-5.46	-3.563	-2.92	-2.595	-3.563	-3.562	-2.92	-2.595
Log GDP Deflator		constant, trend	2	0.897	-4.121	-3.487	-3.172	0.894	-4.126	-3.489	-3.173
D.Log GDP Deflator		constant	2	-7.513	-3.563	-2.92	-2.595	-6.894	-3.562	-2.92	-2.595
Unemployment		constant, trend	2	-0.817	-4.121	-3.487	-3.172	-1.341	-4.126	-3.489	-3.173
D.Unemployment		constant	2	-4.362	-3.563	-2.92	-2.595	-3.603	-3.562	-2.92	-2.595
10 Yr Bond Rates		constant, trend	2	-1.849	-4.121	-3.487	-3.172	-3.533	-4.126	-3.489	-3.173
D.10 Yr Bond Rates		constant	2	-3.119	-3.563	-2.92	-2.595	-2.595	-3.562	-2.92	-2.595
Log Exports to GDP		constant, trend	2	-1.475	-4.121	-3.487	-3.172	-2.267	-4.126	-3.489	-3.173
D.Log Exports to GDP		constant	2	-5.661	-3.563	-2.92	-2.595	-4.244	-3.562	-2.92	-2.595
Spain											
Log Real GDP	1997Q1 - 2012Q4	constant, trend	2	0.935	-4.121	-3.487	-3.172	-0.237	-4.126	-3.489	-3.173
D.Log Real GDP		constant	1	-1.566	-3.563	-2.92	-2.595	-2.678	-3.562	-2.92	-2.595
Log GDP Deflator		constant, trend	2	1.82	-4.121	-3.487	-3.172	-0.182	-4.126	-3.489	-3.173
D.Log GDP Deflator		constant	1	-2.537	-3.563	-2.92	-2.595	-3.033	-3.562	-2.92	-2.595
Unemployment		constant, trend	2	-0.368	-4.121	-3.487	-3.172	-1.241	-4.126	-3.489	-3.173
D.Unemployment		constant	1	-2.154	-3.563	-2.92	-2.595	-2.977	-3.562	-2.92	-2.595
10 Yr Bond Rates		constant, trend	2	-2.216	-4.121	-3.487	-3.172	-2.115	-4.126	-3.489	-3.173
D.10 Yr Bond Rates		constant	1	-5.744	-3.563	-2.92	-2.595	-5.308	-3.562	-2.92	-2.595
Log Exports to GDP		constant, trend	2	-0.93	-4.121	-3.487	-3.172	-0.843	-4.126	-3.489	-3.173
D.Log Exports to GDP		constant	1	-6.099	-3.563	-2.92	-2.595	-5.054	-3.562	-2.92	-2.595

Table 1.2: (A) Full Sample Period - Unit Root Test (Zivot-Andrews)

Variable	Sample Period	Lags	ZA (A) Intercept		ZA (B) Trend		ZA (C) Both	
			5%: -4.80	(TB)	5%: -4.42	(TB)	5%: -5.08	(TB)
Cyprus								
Log Real GDP	2001Q1 - 2013Q3	2	0.324	2011q3	-1.668	2008q2	-1.396	2007q1
D.Log Real		2	-6.52	2003q4	-6.765	2007q2	-6.929	2008q2
Log GDP		2	-1.963	2004q3	-3.266	2008q3	-3.36	2008q1
D.Log GDP		2	-8.152	2008q4	-8.285	2005q1	-8.263	2008q3
Unemployment		2	-1.103	2011q3	-2.923	2010q4	-2.871	2010q3
D.Unemployme		2	-6.064	2011q1	-5.446	2007q3	-5.993	2005q3
10 Yr Bond		2	-4.661	2011q2	-3.649	2007q4	-3.78	2005q3
D.10 Yr Bond		2	-4.08	2003q3	4.396	2011q4	-4.957	2011q3
Log Exports to		2	-3.219	2008q3	-3.216	2010q3	-4.344	2009q1
D.Log Exports		2	-5.637	2008q1	-5.264	2003q4	-5.993	2006q1
France								
Log Real GDP	1997Q1 - 2013Q3	2	-4.207	2008q2	-3.107	2006q3	-3.969	2008q2
D.Log Real		2	-5.169	2009q2	-4.777	2009q1	-5.297	2008q2
Log GDP		2	-2.003	2009q1	-2.784	2008q2	-3.36	2006q3
D.Log GDP		2	-6.552	2008q3	-5.156	2006q4	-6.443	2008q3
Unemployment		2	-3.468	2008q2	-3.752	2002q3	-3.721	2002q2
D.Unemployme		2	-4.605	2008q2	-4.3	1999q4	-4.911	2001q1
10 Yr Bond		2	-3.83	2006q2	-3.791	2008q4	-4.388	2007q1
D.10 Yr Bond		2	-6.428	2008q4	-6.495	1999q4	-6.893	2000q2
Log Exports to		2	-3.593	2010q4	-3.502	2009q4	-4.637	2008q4
D.Log Exports		2	-5.522	2009q2	-4.965	2002q4	-5.49	2010q1
Germany								
Log Real GDP	1997Q1 - 2013Q3	2	-0.34	2008q4	-4.301	2008q2	-4.042	2008q2
D.Log Real		1	-5.487	2009q2	-5.167	2009q1	-5.566	2008q2
Log GDP		2	-2.315	2008q4	-3.589	2008q3	-3.606	2008q4
D.Log GDP		1	-7.907	2004q2	-7.715	2011q1	-7.862	2004q2
Unemployment		2	0.951	2009q1	-2.652	2008q4	-2.751	2008q2
D.Unemployme		1	-5.072	2005q2	-3.435	2002q1	-5.297	2005q2
10 Yr Bond		2	0.481	2009q1	-1.813	2009q2	-1.58	2009q2
D.10 Yr Bond		1	-6.314	2008q3	-6.286	2000q1	-6.85	2000q2
Log Exports to		2	-3.391	2009q1	-3.156	2002q2	-3.572	2004q1
D.Log Exports		1	-6.374	2009q3	-6.043	2011q1	-6.612	2009q3
Greece								
Log Real GDP	2000Q1 - 2011Q1	2	-0.34	2008q4	-4.301	2008q2	-4.042	2008q2
D.Log Real		1	4.462	2008q4	-5.128	2007q2	-5.442	2005q4
Log GDP		2	-2.315	2008q4	-3.589	2008q3	-3.606	2008q4
D.Log GDP		1	-7.276	2002q1	-7.149	2008q1	-7.184	2003q4
Unemployment		2	0.951	2009q1	-2.652	2008q4	-2.751	2008q2
D.Unemployme		1	-3.709	2009q1	-4.751	2008q3	-4.776	2008q4
10 Yr Bond		2	0.481	2009q1	-1.813	2009q2	-1.58	2009q2
D.10 Yr Bond		1	-4.291	2009q1	-4.764	2009q2	-4.891	2009q2
Log Exports to		2	-3.391	2009q1	-3.156	2002q2	-3.572	2004q1
D.Log Exports		1	-6.876	2008q2	-6.806	2009q2	-7.926	2009q1
Ireland								
Log Real GDP	1997Q1 - 2013Q3	3	-4.198	2008q2	-3.34	2006q1	-4.043	2008q2
D.Log Real		1	-11.097	2008q2	-10.811	2009q3	-12.414	2008q2
Log GDP		3	-2.994	2008q1	-3.153	2004q3	-2.881	2004q2
D.Log GDP		1	-11.669	2007q3	-11.161	2010q1	-12.214	2007q3
Unemployment		3	-5.868	2008q3	-2.605	2004q3	-3.543	2008q3
D.Unemployme		1	-3.607	2011q1	-3.867	2009q3	-5.878	2008q3
10 Yr Bond		3	-4.647	2010q2	-4.022	2005q3	-6.526	2010q4
D.10 Yr Bond		1	-4.54	2011q1	-4.505	2011q1	-4.693	2010q2
Log Exports to		3	-4.296	2002q3	-2.877	2006q2	-4.02	2002q3
D.Log Exports		1	-5.61	2001q2	-5.019	2002q4	-5.575	2001q2
Italy								
Log Real GDP	1997Q1 - 2013Q3	2	-3.034	2008q2	-3.812	2007q1	-4.242	2008q2
D.Log Real		1	-5.117	2008q2	-4.786	2000q1	-5.222	2008q2
Log GDP		2	-2.523	2009q3	-2.727	2008q1	-2.713	2007q3
D.Log GDP		1	-12.331	2001q1	-12.047	2002q3	-12.503	2003q4
Unemployment		2	-1.494	2011q1	-4.044	2008q1	-3.861	2007q1
D.Unemployme		1	-4.359	2007q3	-4.225	2000q3	-4.403	2007q3
10 Yr Bond		2	-4.936	2002q3	-4.204	2005q3	-4.538	2002q3
D.10 Yr Bond		1	-6.28	2008q4	-7.096	1999q4	-7.467	2000q2
Log Exports to		2	-3.397	2010q4	-3.409	2010q1	-4.711	2008q4
D.Log Exports		1	-5.389	2009q3	-4.942	2009q1	-5.48	2009q3
Portugal								
Log Real GDP	1997Q1 - 2013Q3	2	-3.109	2011q1	-3.125	2007q2	-3.161	2007q1
D.Log Real		2	-7.614	2001q1	-7.511	2002q4	-7.753	2003q3
Log GDP		2	-1.428	2009q2	-3.872	2007q2	-3.613	2007q1
D.Log GDP		2	-9.548	2007q4	-10.057	1999q4	-10.059	1999q4
Unemployment		2	-3.514	2009q1	-3.197	2008q1	-3.323	2007q2
D.Unemployme		2	-4.71	2001q1	-4.63	2002q3	-4.784	2003q1
10 Yr Bond		2	-6.044	2010q4	-5.263	2008q4	-5.715	2010q4
D.10 Yr Bond		2	-3.683	2010q1	-3.727	2011q1	-4.145	2010q1
Log Exports to		2	-3.382	2011q1	-3.526	2009q2	-4.807	2008q4
D.Log Exports		2	-6.566	2009q2	-5.987	2009q1	-6.428	2009q3
Spain								
Log Real GDP	1997Q1 - 2013Q3	2	-3.161	2008q3	-4.858	2007q2	-4.483	2006q4
D.Log Real		1	-4.968	2008q2	-3.56	2005q2	-5.388	2008q2
Log GDP		2	-1.159	2008q4	-5.549	2007q3	-4.829	2007q2
D.Log GDP		1	-4.45	2008q4	-3.925	2004q3	-4.398	2008q4
Unemployment		2	-4.618	2008q2	-4.257	2006q3	-4.097	2004q4
D.Unemployme		1	-3.331	2007q2	-3.196	2009q2	-4.246	2008q2
10 Yr Bond		2	-4.494	2002q3	-3.908	2005q4	-4.253	2002q3
D.10 Yr Bond		1	-6.104	2005q4	-6.45	1999q4	-6.796	2000q2
Log Exports to		2	-3.637	2010q2	-4.093	2009q2	-5.051	2008q4
D.Log Exports		1	-8.309	2009q2	-7.23	2003q3	-8.13	2009q3

Table 1.3: (B) Reduced Sample Period - Unit Root Test (Zivot-Andrews)

Variable	Sample Period	Lags	ZA (A) Intercept		ZA (B) Trend		ZA (C) Both	
			5%: -4.80	(TB)	5%: -4.42	(TB)	5%: -5.08	(TB)
Cyprus								
Log Real GDP	2001Q1 - 2011Q4	2	-2.415	2009q1	-4.537	2008q2	-4.168	2007q1
D.Log Real		1	-7.219	2008q2	-6.501	2007q2	-7.177	2008q2
Log GDP		2	-3.731	2009q1	-3.657	2008q2	-3.875	2009q1
D.Log GDP		1	-8.042	2008q4	-7.543	2004q4	-8.217	2008q4
Unemployment		2	-1.759	2006q2	-2.226	2009q1	-2.499	2007q4
D.Unemployme		1	-5.357	2005q3	-4.791	2007q3	-5.311	2010q2
10 Yr Bond		2	-2.845	2005q3	-3.402	2010q1	-3.303	2010q1
D.10 Yr Bond		1	-4.77	2004q4	-4.421	2010q2	-5.306	2004q4
Log Exports to		2	-3.583	2008q3	-2.947	2010q1	-3.822	2009q1
D.Log Exports		1	-5.387	2006q1	-5.096	2003q4	-5.736	2006q1
France								
Log Real GDP	1997Q1 - 2012Q4	2	-4.575	2008q2	-3.839	2006q3	-4.535	2008q2
D.Log Real		2	-4.919	2009q2	-4.512	2009q1	-5.085	2008q2
Log GDP		2	-3.015	2009q1	-2.782	2008q2	-3.378	2006q3
D.Log GDP		2	-6.697	2008q3	-4.995	2006q4	-6.707	2009q1
Unemployment		2	-3.062	2008q2	-3.438	2002q3	-3.405	2002q2
D.Unemployme		2	-4.387	2008q2	-4.145	1999q3	-4.634	2001q1
10 Yr Bond		2	-3.676	2006q2	-3.596	2009q3	-4.144	2007q1
D.10 Yr Bond		2	-6.358	1999q3	-6.438	1999q4	-6.787	2000q2
Log Exports to		2	-3.495	2002q3	-3.453	2009q4	-4.729	2008q4
D.Log Exports		2	-5.327	2009q2	-4.818	2009q1	-5.328	2010q1
Germany								
Log Real GDP	1997Q1 - 2012Q4	2	-0.34	2008q4	-4.301	2008q2	-4.042	2008q2
D.Log Real		1	-5.299	2009q2	-4.948	2009q1	-5.386	2008q2
Log GDP		2	-2.315	2008q4	-3.589	2008q3	-3.606	2008q4
D.Log GDP		1	-7.875	2000q3	-7.62	2002q1	-7.833	2000q3
Unemployment		2	0.951	2009q1	-2.652	2008q4	-2.751	2008q2
D.Unemployme		1	-4.953	2005q2	-3.469	2002q2	-5.117	2005q2
10 Yr Bond		2	0.481	2009q1	-1.813	2009q2	-1.58	2009q2
D.10 Yr Bond		1	-6.45	2008q3	-6.599	1999q4	-7.031	2000q2
Log Exports to		2	-3.391	2009q1	-3.156	2002q2	-3.572	2004q1
D.Log Exports		1	-6.262	2009q3	-5.847	2009q1	-6.361	2009q3
Greece								
Log Real GDP	2000Q1 - 2010Q4	2	0.585	2008q4	-3.298	2008q2	-3.228	2008q2
D.Log Real		1	-3.722	2008q4	-4.86	2007q3	-5.052	2006q2
Log GDP		2	-3.857	2008q4	-4.082	2008q2	-4.277	2008q4
D.Log GDP		1	-8.245	2002q1	-7.992	2003q1	-8.241	2003q4
Unemployment		2	0.174	2009q1	-2.767	2008q4	-2.905	2008q2
D.Unemployme		1	-5.783	2008q4	-5.772	2008q3	-6.131	2008q4
10 Yr Bond		2	-0.831	2009q1	-2.979	2006q4	-2.881	2006q4
D.10 Yr Bond		1	-5.251	2004q3	-5.891	2009q2	-7.074	2009q2
Log Exports to		2	-3.145	2009q1	-3.046	2002q2	-3.375	2003q4
D.Log Exports		1	-5.997	2008q2	-6.421	2009q2	-8.365	2009q1
Ireland								
Log Real GDP	1997Q1 - 2011Q4	3	-4.575	2008q2	-3.163	2006q2	-3.379	2008q2
D.Log Real		1	-10.437	2008q2	-10.185	2009q3	-12.763	2008q2
Log GDP		3	-2.285	2008q1	-3.264	2006q2	-3.127	2006q1
D.Log GDP		1	-11.442	1999q3	-10.931	2001q3	-11.525	2007q3
Unemployment		3	-5.898	2008q3	-3.599	2006q3	-3.564	2005q3
D.Unemployme		1	-3.336	2009q3	-3.5	2009q2	-5.46	2008q3
10 Yr Bond		3	-4.843	2009q1	-5.802	2007q4	-5.789	2006q3
D.10 Yr Bond		1	-5.143	2002q2	-4.85	2000q1	-5.135	2000q4
Log Exports to		3	-3.808	2002q3	-2.701	2007q1	-3.288	2002q3
D.Log Exports		1	-5.605	2001q2	-4.891	2002q4	-5.548	2001q2
Italy								
Log Real GDP	1997Q1 - 2012Q4	2	-3.271	2008q2	-3.643	2007q1	-4.216	2008q2
D.Log Real		1	-4.967	2008q2	-4.651	2000q1	-5.069	2008q2
Log GDP		2	-2.585	2009q3	-2.617	2008q3	-2.608	2007q4
D.Log GDP		1	-12.332	2001q1	-12.022	2002q3	-12.469	2009q3
Unemployment		2	-1.011	2009q1	-4.302	2008q1	-4.249	2007q1
D.Unemployme		1	4.159	2007q3	-4.014	2000q3	-4.281	2007q3
10 Yr Bond		2	-4.873	2002q3	-4.141	2005q3	-4.468	2002q3
D.10 Yr Bond		1	-2.902	2006q1	-3.068	2000q1	-3.766	2000q2
Log Exports to		2	-3.227	2008q4	-3.314	2010q1	-4.724	2008q4
D.Log Exports		1	-5.301	2009q3	-4.874	2009q1	-5.304	2009q3
Portugal								
Log Real GDP	1997Q1 - 2012Q4	2	-1.699	2008q3	-2.901	2010q2	-2.743	2010q2
D.Log Real		1	-7.8	2005q1	-7.565	2010q3	-8.114	2009q3
Log GDP		2	-0.682	2009q2	-3.477	2007q2	-3.341	2007q1
D.Log GDP		1	-9.383	2000q2	-10.327	1999q3	-10.412	1999q3
Unemployment		2	-2.209	2009q1	-3.193	2008q3	-3.413	2007q3
D.Unemployme		1	-6.395	2005q4	-5.882	2010q3	-6.431	2005q4
10 Yr Bond		2	-4.953	2010q1	-4.408	2009q1	-4.306	2008q3
D.10 Yr Bond		1	-2.989	2005q4	-3.319	2010q3	-4.695	2010q3
Log Exports to		2	-3.23	2010q2	-3.475	2010q1	-4.79	2008q4
D.Log Exports		1	-6.376	2009q2	-5.865	2009q1	-6.216	2009q3
Spain								
Log Real GDP	1997Q1 - 2012Q4	2	-2.523	2008q3	-4.45	2007q3	-4.155	2006q4
D.Log Real		1	-4.908	2008q2	-3.744	2006q1	-5.138	2008q2
Log GDP		2	-1.661	2008q4	-5.5	2007q3	-4.786	2007q1
D.Log GDP		1	-4.426	2008q1	-3.748	2004q3	-4.131	2008q4
Unemployment		2	-3.91	2008q2	-4.403	2006q4	-4.305	2006q2
D.Unemployme		1	-3.68	2007q2	-3.218	2009q2	-4.156	2008q1
10 Yr Bond		2	-4.2	2002q3	-3.777	2005q4	-4.133	2004q3
D.10 Yr Bond		1	-6.126	1999q3	-6.364	1999q4	-7.022	2000q2
Log Exports to		2	-3.088	2010q2	-3.701	2009q3	-5.149	2008q4
D.Log Exports		1	-7.603	2009q2	-6.67	2009q1	-7.339	2009q2

Table 2: (A) - Johansens Test For Cointegration (Trace Test)
Closed Economy Variables: GDP, Unemployment, 10 Yr Bond Rates, Inflation

Country	Period	r=0 Test Stat	r=1 Test Stat	r=2 Test Stat	r=3 Test Stat	r=4 Test Stat
Cyprus	2001Q1 - 2013Q3	72.8043	19.7245*	5.8442	0.1393	-
	2001Q1 - 2011Q4	61.5227	13.7642*	4.5474	0.1493	-
France	2001Q1 - 2013Q3	83.85	40.4592	14.0769*	1.9171	-
	1997Q1 - 2012Q4	80.3644	37.2603	11.5578*	0.3809	-
Germany	1997Q1 - 2013Q3	39.7382*	19.2639	4.9363	1.9282	-
	2001Q1 - 2012Q4	34.5783*	17.2716	4.2012	0.9875	-
Greece	2000Q1 - 2011Q1	76.0997	15.3093*	5.3352	0.3976	-
	2000Q1 - 2010Q4	74.3301	18.6972*	7.6829	0.2593	-
Ireland	1997Q3 - 2013Q3	53.432	31.4988	15.2289*	5.3507	-
	1997Q3 - 2011Q4	55.1929	25.9849*	11.3521	1.7255	-
Italy	1997Q3 - 2013Q3	62.8578	34.72	11.4329*	0.0865	-
	1997Q1 - 2012Q4	60.3713	34.6448	11.8565*	0.3913	-
Spain	1997Q1 - 2013Q3	79.4623	44.0504	13.5316*	4.466	-
	1997Q1 - 2012Q4	101.5762	46.1836	18.1535	3.5051*	-
Portugal	1997Q1 - 2013Q3	91.897	42.5827	21.8316	3.3808*	-
	1997Q1 - 2012Q4	91.111	37.9211	15.7965	1.2073*	-
Critical Value		47.21	29.68	15.41	3.76	

Table 2: (B) - Johansens Test For Cointegration (Maximum Eigenvalue Test)
Closed Economy Variables: GDP, Unemployment, 10 Yr Bond Rates, Inflation

Country	Period	r=0 Test Stat	r=1 Test Stat	r=2 Test Stat	r=3 Test Stat	r=4 Test Stat
Cyprus	2001Q1 - 2013Q3	53.0798	13.8804	5.7049	0.1393	-
	2001Q1 - 2011Q4	47.7585	9.2167	4.3981	0.1493	-
France	2001Q1 - 2013Q3	43.3908	26.3823	12.1599	1.9171	-
	1997Q1 - 2012Q4	43.1041	25.7024	11.1769	0.3809	-
Germany	1997Q1 - 2013Q3	20.4743	14.3276	3.0081	1.9282	-
	2001Q1 - 2012Q4	17.3068	13.0704	3.2136	0.9875	-
Greece	2000Q1 - 2011Q1	60.7904	9.974	4.9376	0.3976	-
	2000Q1 - 2010Q4	55.6329	11.0143	7.4236	0.2593	-
Ireland	1997Q3 - 2013Q3	21.9332	16.2699	9.8782	5.3507	-
	1997Q3 - 2011Q4	29.208	14.6328	9.6266	1.7255	-
Italy	1997Q3 - 2013Q3	28.1378	23.2871	11.3463	0.0865	-
	1997Q1 - 2012Q4	25.7265	22.7882	11.4652	0.3913	-
Spain	1997Q1 - 2013Q3	60.3357	34.2452	15.8127	3.8209	-
	1997Q1 - 2012Q4	55.3925	28.0301	14.6484	3.5051	-
Portugal	1997Q1 - 2013Q3	49.3143	20.7511	18.4508	3.3808	-
	1997Q1 - 2012Q4	53.1899	22.1246	14.5892	1.2073	-
Critical Value		27.07	20.97	14.07	3.76	

Table 2: (C) - Johansens Test For Cointegration (Trace Test)
Open Economy Variables: GDP, Unemployment, 10 Yr Bond Rates, Inflation, Exports

		r=0	r=1	r=2	r=3	r=4
Country	Period	Test Stat	Test Stat	Test Stat	Test Stat	Test Stat
Cyprus	2001Q1 - 2013Q3	113.5932	59.8341	24.7323*	8.8805	1.1929
	2001Q1 - 2011Q4	94.9051	46.6392*	18.934	6.0727	0.1606
France	2001Q1 - 2013Q3	116.2447	69.5327	36.4653	15.4564	2.4530*
	1997Q1 - 2012Q4	112.4193	66.6402	32.5709	12.8662*	0.3426
Germany	1997Q1 - 2013Q3	50.0908*	29.7801	14.9856	3.6597	0.6293
	1997Q1 - 2012Q4	49.2293*	30.5685	16.8294	4.2915	0.8499
Greece	2000Q1 - 2011Q1	69.6918	41.2405*	19.6927	6.3948	2.6861
	2000Q1 - 2010Q4	82.4145	50.755	27.3300*	8.3201	1.0829
Ireland	1997Q1 - 2013Q3	75.1736	49.399	27.5554*	12.8975	2.6347
	1997Q1 - 2011Q4	105.0719	50.4509	26.0102*	8.567	0.0001
Italy	1997Q1 - 2013Q3	84.4031	52.5498	27.2962*	8.2411	0.0297
	1997Q1 - 2012Q4	110.0949	41.1313*	20.4318	6.4229	0.0205
Spain	1997Q1 - 2013Q3	74.3601	40.6414	26.333	6.5352	5.0921
	1997Q1 - 2012Q4	147.2392	71.2514	35.3938	11.5748*	4.3388
Portugal	1997Q1 - 2013Q3	132.0947	71.4199	42.9133	19.6524	4.9703
	1997Q1 - 2012Q4	135.5779	56.7852	25.1353*	10.9829	2.0098
Critical Value		68.52	47.21	29.68	15.41	3.76

Table 2: (D) - Johansens Test For Cointegration (Maximum Eigenvalue Test)
Open EconomyVariables: GDP, Unemployment, 10 Yr Bond Rates, Inflation, Exports

		r=0	r=1	r=2	r=3	r=4
Country	Period	Test Stat	Test Stat	Test Stat	Test Stat	Test Stat
Cyprus	2001Q1 - 2013Q3	53.7591	35.1018	15.8517	7.6876	1.1929
	2001Q1 - 2011Q4	48.2659	27.7053	12.8613	5.912	0.1606
France	2001Q1 - 2013Q3	46.712	33.0674	21.0089	13.0033	2.453
	1997Q1 - 2012Q4	45.779	34.0693	19.7048	12.5236	0.3426
Germany	1997Q1 - 2013Q3	20.3106	14.7946	11.3259	3.0304	0.6293
	1997Q1 - 2012Q4	18.6608	13.7391	12.5379	3.4416	0.8499
Greece	2000Q1 - 2011Q1	28.4513	21.5477	13.298	3.7086	2.6861
	2000Q1 - 2010Q4	31.6595	23.4251	19.0098	7.2373	1.0829
Ireland	1997Q1 - 2013Q3	25.7746	21.8436	14.6579	10.2628	2.6347
	1997Q1 - 2011Q4	54.621	24.4407	17.4431	8.5669	0.0001
Italy	1997Q1 - 2013Q3	31.8533	25.2536	19.0551	8.2114	0.0297
	1997Q1 - 2012Q4	68.9636	20.6994	14.0089	6.4024	0.0205
Spain	1997Q1 - 2013Q3	74.3601	40.6414	26.333	6.5352	5.0921
	1997Q1 - 2012Q4	75.9878	35.8576	23.819	7.236	4.3388
Portugal	1997Q1 - 2013Q3	60.6748	28.5066	23.2609	14.6821	4.9703
	1997Q1 - 2012Q4	78.7927	31.6499	14.1525	8.973	2.0098
Critical Value		33.46	27.07	20.97	14.07	3.76

Table 3.1.1 (A.i): Cyprus VEC Results - 2001Q1-2013Q3 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.0105	0.873***	-13.29**	15.33**
	(0.146)	(0.120)	(6.437)	(7.609)
LD.Log real GDP	0.256	-0.283**	-11.77	4.031
	(0.170)	(0.139)	(7.476)	(8.837)
LD.Log Price Deflator	0.436***	0.208*	-24.83***	3.941
	(0.133)	(0.109)	(5.862)	(6.929)
LD.Unemployment	-0.00652**	-0.00335	0.252**	0.142
	(0.00268)	(0.00220)	(0.118)	(0.139)
LD.10 Yr Bond Yield	-0.00108	0.00886***	0.230*	0.614***
	(0.00287)	(0.00235)	(0.126)	(0.149)
Constant	0.00128	0.0201***	0.173	0.149
	(0.00298)	(0.00245)	(0.131)	(0.155)
Observations	49	49	49	49

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1.1 (A.ii): Cyprus VEC Results - 2001Q1-2013Q3 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemploym ent	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.116	0.898***	0.0556	-12.06*	14.95*
	(0.132)	(0.127)	(0.410)	(6.988)	(8.306)
L._ce2	0.139	-1.017***	-0.0900	13.58*	-16.92*
	(0.150)	(0.145)	(0.466)	(7.945)	(9.444)
LD.Log real GDP	0.0665	-0.303**	0.652	-11.23	4.084
	(0.153)	(0.148)	(0.475)	(8.097)	(9.625)
LD.Log Price Deflator	0.278**	0.229*	0.395	-23.41***	3.840
	(0.125)	(0.121)	(0.389)	(6.638)	(7.890)
LD.Log Exports/GDP	0.150***	0.0454	0.209	0.548	0.606
	(0.0433)	(0.0418)	(0.135)	(2.294)	(2.726)
LD.Unemployment	-0.000792	-0.00391	-0.0142	0.196	0.142
	(0.00298)	(0.00288)	(0.00927)	(0.158)	(0.188)
LD.10 Yr Bond Yield	0.000703	0.00879***	-0.00340	0.225*	0.610***
	(0.00250)	(0.00241)	(0.00776)	(0.132)	(0.157)
Constant	0.0342***	0.0127	-0.108***	0.0537	0.0432
	(0.00937)	(0.00906)	(0.0291)	(0.497)	(0.590)
Observations	49	49	49	49	49

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1.1 (A.iii): Cyprus VEC Results - 2001Q3-2011Q4 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.0436	0.877***	-11.05*	18.07**
	(0.149)	(0.112)	(6.487)	(7.163)
LD.Log real GDP	0.249	-0.361***	-15.11*	-0.368
	(0.181)	(0.137)	(7.886)	(8.708)
LD.Log Price Deflator	0.399***	0.181*	-23.91***	5.294
	(0.142)	(0.107)	(6.171)	(6.814)
LD.Unemployment	-0.00628**	-0.00430**	0.298**	0.150
	(0.00284)	(0.00214)	(0.124)	(0.136)
LD.10 Yr Bond Yield	-0.00132	0.00889***	0.224*	0.615***
	(0.00297)	(0.00224)	(0.129)	(0.143)
Constant	0.00126	0.0184***	0.255**	0.155
	(0.00276)	(0.00208)	(0.120)	(0.133)
Observations	46	46	46	46

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1.1 (A.iv): Cyprus VEC Results - 2001Q3-2011Q4 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemploym ent	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.0498	0.795***	-0.197	-11.11*	17.03**
	(0.137)	(0.112)	(0.451)	(6.594)	(7.538)
LD.Log real GDP	0.125	-0.347**	0.387	-14.13*	-0.906
	(0.174)	(0.142)	(0.571)	(8.349)	(9.544)
LD.Log Price Deflator	0.441***	0.184	0.246	-24.08***	4.034
	(0.138)	(0.113)	(0.455)	(6.650)	(7.602)
LD.Log Exports/GDP	0.119**	0.0250	0.328**	2.089	1.807
	(0.0485)	(0.0397)	(0.159)	(2.330)	(2.663)
LD.Unemployment	-0.00400	-0.00392	0.00763	0.202	0.204
	(0.00315)	(0.00258)	(0.0103)	(0.151)	(0.173)
LD.10 Yr Bond Yield	-0.00241	0.00871***	0.00125	0.244*	0.623***
	(0.00276)	(0.00226)	(0.00908)	(0.133)	(0.152)
Constant	0.00257	0.0172***	-0.0115	0.256**	0.166
	(0.00262)	(0.00214)	(0.00860)	(0.126)	(0.144)
Observations	42	42	42	42	42

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (B.i): France VEC Results - 1997Q1-2013Q3 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.127***	0.0812***	-2.339	-6.333**
	(0.0449)	(0.0208)	(1.826)	(2.869)
L._ce2	0.0730***	-0.0531***	0.567	1.844
	(0.0241)	(0.0112)	(0.982)	(1.543)
LD.Log real GDP	0.380***	0.201***	-11.73**	8.025
	(0.142)	(0.0658)	(5.767)	(9.060)
LD.Log Price Deflator	0.0788	-0.0278	-12.90	-21.72
	(0.261)	(0.121)	(10.60)	(16.66)
LD.Unemployment	-0.00614*	-2.89e-05	0.295**	-0.360*
	(0.00327)	(0.00152)	(0.133)	(0.209)
LD.10 Yr Bond Yield	0.00437*	-0.00307***	-0.0608	0.309**
	(0.00234)	(0.00109)	(0.0952)	(0.150)
Constant	0.0203***	-0.0121***	0.00956	-0.00409
	(0.00619)	(0.00287)	(0.252)	(0.396)
Observations	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (B.ii): France VEC Results - 1997Q1-2013Q3 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemploy ment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	0.118*	0.113***	0.367	-12.70***	-0.569
	(0.0702)	(0.0376)	(0.316)	(2.851)	(5.045)
L._ce2	-0.137***	-0.0825***	-0.278	9.031***	-2.408
	(0.0521)	(0.0280)	(0.235)	(2.118)	(3.748)
L._ce3	-0.0470***	-0.00265	-0.198***	2.144***	-0.963
	(0.0129)	(0.00691)	(0.0582)	(0.524)	(0.927)
L._ce4	0.00235**	0.000702	0.00955*	-0.234***	-0.109
	(0.00119)	(0.000638)	(0.00537)	(0.0484)	(0.0856)
LD.Log real GDP	-0.134	0.145	-0.676	5.354	8.846
	(0.201)	(0.108)	(0.905)	(8.154)	(14.43)
LD.Log Price Deflator	0.161	-0.0361	0.913	-15.27	-25.41
	(0.235)	(0.126)	(1.061)	(9.556)	(16.91)
LD.Log Exports/GDP	0.0735*	0.00111	0.375**	-1.801	-2.636
	(0.0416)	(0.0223)	(0.188)	(1.691)	(2.992)
LD.Unemployment	-0.00373	0.000430	-0.0177	0.240*	-0.395*
	(0.00308)	(0.00165)	(0.0139)	(0.125)	(0.221)
LD.10 Yr Bond Yield	0.00319	-0.00302***	0.0160*	-0.00131	0.287*
	(0.00209)	(0.00112)	(0.00942)	(0.0848)	(0.150)
Constant	0.00192	0.00406***	0.000434	6.85e-05	-4.14e-05
	(0.00122)	(0.000652)	(0.00548)	(0.0494)	(0.0874)
Observations	65	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (B.iii): France VEC Results - 1997Q1-2012Q4 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.126***	0.0733***	-2.061	-5.841**
	(0.0411)	(0.0191)	(1.723)	(2.632)
L._ce2	0.0682***	-0.0487***	0.396	1.438
	(0.0219)	(0.0102)	(0.916)	(1.400)
LD.Log real GDP	0.376***	0.227***	-12.85**	4.879
	(0.145)	(0.0672)	(6.057)	(9.254)
LD.Log Price Deflator	0.0322	-0.0650	-12.46	-18.35
	(0.263)	(0.122)	(11.03)	(16.86)
LD.Unemployment	-0.00651**	-0.000289	0.313**	-0.392*
	(0.00329)	(0.00153)	(0.138)	(0.211)
LD.10 Yr Bond Yield	0.00442*	-0.00326***	-0.0525	0.344**
	(0.00239)	(0.00111)	(0.100)	(0.153)
Constant	0.0240***	-0.0150***	0.0122	-0.00499
	(0.00747)	(0.00347)	(0.313)	(0.478)
Observations	62	62	62	62

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (B.iv): France VEC Results - 1997Q4-2012Q4 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemploy ment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	0.0933	0.108***	0.0109	-11.96***	-2.570
	(0.0665)	(0.0350)	(0.326)	(2.705)	(4.754)
L._ce2	-0.127**	-0.0782***	-0.129	8.860***	-1.454
	(0.0521)	(0.0274)	(0.255)	(2.120)	(3.724)
L._ce3	-0.0385***	-0.00477	-0.0630	1.907***	-0.0706
	(0.0101)	(0.00531)	(0.0495)	(0.411)	(0.722)
LD.Log real GDP	-0.130	0.183*	-0.755	4.488	7.212
	(0.207)	(0.109)	(1.014)	(8.416)	(14.79)
LD.Log Price Deflator	0.103	-0.0720	0.450	-13.99	-24.38
	(0.241)	(0.127)	(1.183)	(9.814)	(17.25)
LD.Log Exports/GDP	0.0845**	-0.000860	0.488**	-2.158	-2.655
	(0.0426)	(0.0224)	(0.209)	(1.733)	(3.045)
LD.Unemployment	-0.00270	6.88e-05	-0.00403	0.180	-0.351
	(0.00304)	(0.00160)	(0.0149)	(0.124)	(0.218)
LD.10 Yr Bond Yield	0.00323	-0.00336***	0.0203*	0.0118	0.353**
	(0.00216)	(0.00114)	(0.0106)	(0.0880)	(0.155)
Constant	0.00311**	0.00397***	1.65e-05	7.14e-05	-5.13e-05
	(0.00121)	(0.000638)	(0.00595)	(0.0493)	(0.0867)
Observations	62	62	62	62	62

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (C.i): Germany VEC Results - 1997Q1-2013Q3 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	0.0286	0.0210**	-0.542	2.856***
	(0.0227)	(0.00982)	(0.404)	(0.827)
LD.Log real GDP	0.344***	-0.0225	-3.908*	1.383
	(0.131)	(0.0566)	(2.330)	(4.767)
LD.Log Price Deflator	-0.0793	0.0566	-0.251	1.609
	(0.281)	(0.121)	(4.994)	(10.22)
LD.Unemployment	0.00299	0.000145	0.718***	0.0360
	(0.00460)	(0.00199)	(0.0819)	(0.168)
LD.10 Yr Bond Yield	0.00942***	-0.00126	-0.0760	0.399***
	(0.00358)	(0.00155)	(0.0637)	(0.130)
Constant	0.00345**	0.00257***	-0.0187	-0.00360
	(0.00141)	(0.000608)	(0.0250)	(0.0512)
Observations	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (C.ii): Germany VEC Results - 1997Q1-2013Q3 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.0375*	-0.0186**	-0.0108	0.579	-2.304***
	(0.0195)	(0.00872)	(0.0601)	(0.356)	(0.744)
LD.Log real GDP	0.241	0.0139	1.498***	-3.148	6.395
	(0.152)	(0.0681)	(0.469)	(2.777)	(5.807)
LD.Log Price Deflator	-0.0364	0.0537	-1.375	-0.786	1.730
	(0.275)	(0.123)	(0.846)	(5.005)	(10.47)
LD.Log Exports/GDP	0.0637	-0.0150	-0.0819	-0.551	-2.074
	(0.0466)	(0.0208)	(0.144)	(0.850)	(1.777)
LD.Unemployment	0.00267	0.000204	0.0232*	0.721***	0.0388
	(0.00449)	(0.00201)	(0.0138)	(0.0818)	(0.171)
LD.10 Yr Bond Yield	0.00978***	-0.00116	0.0175	-0.0787	0.399***
	(0.00350)	(0.00157)	(0.0108)	(0.0639)	(0.134)
Constant	0.00321**	0.00261***	0.0114***	-0.0156	-0.00404
	(0.00139)	(0.000621)	(0.00428)	(0.0253)	(0.0529)
Observations	65	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (C.iii): Germany VEC Results - 1997Q1-2012Q4 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	0.0405**	0.00967	-0.655*	2.918***
	(0.0198)	(0.00871)	(0.347)	(0.690)
LD.Log real GDP	0.337**	-0.00451	-4.190*	0.644
	(0.135)	(0.0594)	(2.369)	(4.711)
LD.Log Price Deflator	-0.0669	0.0358	-1.650	0.769
	(0.298)	(0.131)	(5.229)	(10.40)
LD.Unemployment	0.00359	-2.22e-05	0.710***	0.0560
	(0.00472)	(0.00207)	(0.0827)	(0.164)
LD.10 Yr Bond Yield	0.0113***	-0.00194	-0.103	0.479***
	(0.00382)	(0.00168)	(0.0670)	(0.133)
Constant	0.00367***	0.00205***	-0.0178	-0.00406
	(0.00141)	(0.000620)	(0.0247)	(0.0491)
Observations	58	58	58	58

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (C.iv): Germany VEC Results - 1997Q1-2012Q4 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.123**	-0.0362	-0.0152	1.629	-6.201***
	(0.0550)	(0.0244)	(0.171)	(1.008)	(2.094)
LD.Log real GDP	0.269*	0.0229	1.519***	-3.713	7.291
	(0.156)	(0.0692)	(0.484)	(2.863)	(5.948)
LD.Log Price Deflator	-0.0296	0.0483	-1.187	-1.818	1.930
	(0.285)	(0.126)	(0.885)	(5.232)	(10.87)
LD.Log Exports/GDP	0.0504	-0.0122	-0.0915	-0.399	-2.824
	(0.0486)	(0.0215)	(0.151)	(0.891)	(1.851)
LD.Unemployment	0.00204	-0.000291	0.0232*	0.731***	0.00252
	(0.00452)	(0.00200)	(0.0140)	(0.0828)	(0.172)
LD.10 Yr Bond Yield	0.00998***	-0.00199	0.0174	-0.0732	0.404***
	(0.00358)	(0.00159)	(0.0111)	(0.0656)	(0.136)
Constant	0.00334**	0.00227***	0.0115***	-0.0135	-0.00366
	(0.00142)	(0.000628)	(0.00440)	(0.0260)	(0.0540)
Observations	62	62	62	62	62

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (D.i): Greece VEC Results - 2000Q1-2011Q1 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	0.137***	0.0483***	-7.338***	-6.901***
	-0.0302	-0.0145	-0.99	-1.437
Constant	0.00661***	0.00715***	-0.0187	0.0201
	-0.00162	-0.000774	-0.0531	-0.077
Observations	44	44	44	44

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (D.ii): Greece VEC Results - 2000Q1-2011Q1 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemploy ment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	0.152	0.0843	0.401	-11.34***	-11.92***
	(0.117)	(0.0566)	(0.529)	(4.010)	(4.494)
LD.Log real GDP	-0.208	0.0863	0.110	6.964	17.31**
	(0.210)	(0.102)	(0.951)	(7.212)	(8.081)
LD.Log Price Deflator	0.0391	-0.0850	2.496	-12.87	30.23**
	(0.343)	(0.166)	(1.551)	(11.76)	(13.18)
LD.Log Exports/GDP	0.0142	0.00812	0.0683	-0.0440	2.275*
	(0.0338)	(0.0164)	(0.153)	(1.160)	(1.300)
LD.Unemployment	-0.00875**	0.000819	-0.00521	0.363**	0.549***
	(0.00438)	(0.00212)	(0.0198)	(0.150)	(0.168)
LD.10 Yr Bond Yield	-0.00693**	-0.000715	0.0414**	0.127	0.303**
	(0.00332)	(0.00161)	(0.0150)	(0.114)	(0.128)
Constant	0.00590**	0.00629***	-0.0263*	0.167	-0.160
	(0.00296)	(0.00143)	(0.0134)	(0.102)	(0.114)
Observations	43	43	43	43	43

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (D.iii): Greece VEC Results - 2000Q1-2010Q4 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	0.170	0.0446	-13.80***	-8.398*
	(0.105)	(0.0508)	(3.386)	(4.635)
LD.Log real GDP	-0.171	0.0806	11.08*	13.40
	(0.205)	(0.0995)	(6.637)	(9.083)
LD.Log Price Deflator	0.179	-0.165	-14.18	23.62
	(0.339)	(0.164)	(10.96)	(15.00)
LD.Unemployment	-0.00898**	0.00166	0.256*	0.486**
	(0.00443)	(0.00215)	(0.143)	(0.196)
LD.10 Yr Bond Yield	-0.00551	-0.00140	0.0770	0.307**
	(0.00336)	(0.00163)	(0.109)	(0.149)
Constant	0.00512*	0.00757***	0.0996	-0.163
	(0.00310)	(0.00150)	(0.100)	(0.137)
Observations	42	42	42	42

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (D.iv): Greece VEC Results - 2000Q1-2010Q4 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemploy ment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.0475	0.0609	0.756	-10.94**	-18.68***
	(0.133)	(0.0694)	(0.640)	(4.665)	(5.288)
L._ce2	-0.00550	-0.0675	-0.665	14.02***	19.61***
	(0.146)	(0.0760)	(0.701)	(5.111)	(5.794)
LD.Log real GDP	-0.138	0.0845	0.504	10.14	14.32*
	(0.197)	(0.103)	(0.947)	(6.905)	(7.827)
LD.Log Price Deflator	0.0767	-0.135	2.875*	-13.50	21.65
	(0.333)	(0.173)	(1.594)	(11.63)	(13.18)
LD.Log Exports/GDP	-0.00407	0.0130	0.0444	0.240	3.071**
	(0.0323)	(0.0168)	(0.155)	(1.128)	(1.279)
LD.Unemployment	-0.00421	0.00142	-0.0252	0.182	0.733***
	(0.00477)	(0.00248)	(0.0229)	(0.167)	(0.189)
LD.10 Yr Bond Yield	0.00308	-0.00238	0.00255	-0.0228	0.712***
	(0.00484)	(0.00252)	(0.0232)	(0.169)	(0.192)
Constant	0.00998***	0.00717***	-0.0428**	0.00240	-0.00314
	(0.00355)	(0.00185)	(0.0170)	(0.124)	(0.141)
Observations	42	42	42	42	42

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (E.i): Ireland VEC Results - 1997Q1-2013Q3 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	0.0317	0.0745**	0.0159	2.618***
	(0.0385)	(0.0292)	(0.915)	(0.883)
L._ce2	-0.0600	-0.141**	-0.0190	-5.010***
	(0.0731)	(0.0556)	(1.740)	(1.679)
LD.Log real GDP	-0.318***	-0.121	-6.298**	-5.373*
	(0.123)	(0.0937)	(2.931)	(2.828)
LD.Log Price Deflator	0.0302	-0.288**	-1.411	3.760
	(0.163)	(0.124)	(3.885)	(3.748)
LD.Unemployment	-0.0190***	-0.00683*	0.514***	-0.0650
	(0.00502)	(0.00382)	(0.119)	(0.115)
LD.10 Yr Bond Yield	0.00770*	0.00283	0.0801	0.736***
	(0.00442)	(0.00336)	(0.105)	(0.101)
Constant	0.00679	-0.00482	0.000264	5.32e-05
	(0.00547)	(0.00416)	(0.130)	(0.126)
Observations	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (E.ii): Ireland VEC Results - 1997Q1-2013Q3 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.144***	-0.0669	0.303***	-0.761	1.737
	(0.0531)	(0.0462)	(0.0840)	(1.361)	(1.290)
L._ce2	0.235***	0.107	-0.499***	1.343	-3.519
	(0.0893)	(0.0778)	(0.141)	(2.292)	(2.172)
LD.Log real GDP	-0.208*	-0.00700	0.164	-6.006**	-4.465
	(0.113)	(0.0985)	(0.179)	(2.903)	(2.751)
LD.Log Price Deflator	-0.0781	-0.356**	0.510*	-3.029	4.455
	(0.174)	(0.151)	(0.275)	(4.451)	(4.219)
LD.Log Exports/GDP	0.131	0.0323	-0.0344	-1.793	2.748
	(0.0830)	(0.0723)	(0.131)	(2.130)	(2.019)
LD.Unemployment	-0.0185***	-0.00892**	0.00396	0.489***	-0.0476
	(0.00460)	(0.00401)	(0.00728)	(0.118)	(0.112)
LD.10 Yr Bond Yield	0.00844**	0.00469	-0.00225	0.103	0.728***
	(0.00409)	(0.00356)	(0.00648)	(0.105)	(0.0995)
Constant	-0.00918	-0.00307	0.0412**	0.0269	0.00373
	(0.00722)	(0.00629)	(0.0114)	(0.185)	(0.176)
Observations	65	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (E.iii): Ireland VEC Results - 1997Q3-2011Q4 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.00831	-0.00266	0.0588	3.597***
	(0.0297)	(0.0266)	(0.739)	(0.635)
LD.Log real GDP	-0.300**	-0.0361	-6.018**	-5.563**
	(0.123)	(0.110)	(3.059)	(2.630)
LD.Log Price Deflator	-0.0443	-0.299**	-0.566	5.096
	(0.160)	(0.144)	(3.990)	(3.429)
LD.Unemployment	-0.0221***	-0.0103**	0.507***	-0.197*
	(0.00492)	(0.00442)	(0.122)	(0.105)
LD.10 Yr Bond Yield	0.00374	0.00415	0.0389	0.795***
	(0.00523)	(0.00469)	(0.130)	(0.112)
Constant	0.0140***	0.00718***	0.108	-0.00172
	(0.00290)	(0.00260)	(0.0721)	(0.0620)
Observations	58	58	58	58

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (E.iv): Ireland VEC Results - 1997Q4-2011Q4 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.142***	-0.111**	1.460	-3.838***	0.292***
	(0.0513)	(0.0430)	(1.298)	(1.264)	(0.0745)
LD.Log real GDP	-0.339**	-0.0348	-5.056	0.625	0.355*
	(0.141)	(0.118)	(3.557)	(3.465)	(0.204)
L2D.Log Real GDP	-0.153	0.225*	-6.255*	-0.172	-0.384*
	(0.140)	(0.117)	(3.532)	(3.441)	(0.203)
LD.Log Price Deflator	-0.265	-0.482***	1.625	-2.973	0.784***
	(0.197)	(0.165)	(4.982)	(4.854)	(0.286)
L2D.Log Price	-0.175	-0.360**	2.585	-8.949**	0.533**
	(0.176)	(0.148)	(4.457)	(4.342)	(0.256)
LD.Unemployment	-0.0193***	-0.00282	0.242*	-0.209	0.00138
	(0.00575)	(0.00482)	(0.146)	(0.142)	(0.00836)
L2D.Unemployment	-0.0142**	-0.0105**	0.323**	0.182	0.0129
	(0.00625)	(0.00524)	(0.158)	(0.154)	(0.00909)
LD.10 Yr Bond Yield	0.00573	0.0107**	-0.0117	0.835***	-0.0113
	(0.00572)	(0.00480)	(0.145)	(0.141)	(0.00832)
L2D.10 Yr Bond Yield	0.0146*	0.00792	-0.159	0.0503	-0.0335***
	(0.00803)	(0.00673)	(0.203)	(0.198)	(0.0117)
LD.Log Exports/GDP	0.0270	-0.0725	1.508	3.869*	0.328**
	(0.0954)	(0.0799)	(2.414)	(2.352)	(0.139)
L2D.Log Exports/GDP	0.0120	-0.148*	0.218	-3.182	0.230*
	(0.0938)	(0.0786)	(2.374)	(2.313)	(0.136)
Constant	0.0181***	0.00786**	0.145	0.0539	-0.00336
	(0.00394)	(0.00330)	(0.0997)	(0.0971)	(0.00573)
Observations	57	57	57	57	57

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (F.i): Italy VEC Results - 1997Q1-2013Q3 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.0491	0.1000***	-4.656***	-0.455
	(0.0383)	(0.0271)	(1.433)	(2.129)
L._ce2	0.0177	-0.0397***	2.120***	-0.178
	(0.0161)	(0.0114)	(0.602)	(0.895)
LD.Log real GDP	0.554***	-0.200**	-10.14**	1.494
	(0.127)	(0.0899)	(4.760)	(7.072)
LD.Log Price Deflator	0.210	-0.498***	-6.822	0.112
	(0.169)	(0.119)	(6.319)	(9.388)
LD.Unemployment	-0.00691**	-0.000160	-0.00521	0.0188
	(0.00329)	(0.00232)	(0.123)	(0.183)
LD.10 Yr Bond Yield	-0.000300	-0.00109	-0.0557	0.337***
	(0.00218)	(0.00154)	(0.0816)	(0.121)
Constant	-0.000838	0.00852***	0.000178	0.000139
	(0.00137)	(0.000968)	(0.0513)	(0.0762)
Observations	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (F.ii): Italy VEC Results - 1997Q1-2013Q3 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemp loyment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.0907**	0.0933***	-0.408***	0.400	-6.417***
	(0.0388)	(0.0281)	(0.146)	(1.539)	(2.302)
L._ce2	-0.00593	-0.0268**	0.167***	1.756***	0.221
	(0.0171)	(0.0124)	(0.0645)	(0.678)	(1.014)
LD.Log real GDP	0.322*	-0.0375	2.561***	-13.41*	-0.117
	(0.188)	(0.136)	(0.710)	(7.466)	(11.17)
LD.Log Price Deflator	0.205	-0.517***	0.564	-6.528	2.572
	(0.166)	(0.120)	(0.627)	(6.597)	(9.868)
LD.Log Exports/GDP	0.0622	-0.0507	0.000671	0.883	1.362
	(0.0462)	(0.0334)	(0.174)	(1.830)	(2.737)
LD.Unemployment	-0.00350	-0.00150	0.00633	-0.00869	0.000884
	(0.00338)	(0.00244)	(0.0127)	(0.134)	(0.200)
LD.10 Yr Bond Yield	0.000860	-0.00104	0.0122	-0.0973	0.345***
	(0.00225)	(0.00162)	(0.00846)	(0.0890)	(0.133)
Constant	0.000353	0.00795***	-0.00401	0.000455	0.000394
	(0.00134)	(0.000971)	(0.00507)	(0.0533)	(0.0797)
Observations	65	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (F.iii): Italy VEC Results - 1997Q1-2012Q4 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.0361	0.0874***	-4.970***	1.178
	(0.0392)	(0.0269)	(1.442)	(2.125)
L._ce2	0.0190	-0.0419***	2.030***	-0.0622
	(0.0174)	(0.0120)	(0.640)	(0.944)
LD.Log real GDP	0.548***	-0.195**	-9.968**	1.198
	(0.132)	(0.0905)	(4.845)	(7.142)
LD.Log Price Deflator	0.210	-0.516***	-7.177	1.486
	(0.177)	(0.121)	(6.504)	(9.587)
LD.Unemployment	-0.00734**	-0.000260	0.00170	0.00906
	(0.00345)	(0.00237)	(0.127)	(0.187)
LD.10 Yr Bond Yield	-0.000673	-0.000409	-0.0243	0.310**
	(0.00236)	(0.00162)	(0.0867)	(0.128)
Constant	-0.000831	0.00854***	0.000188	0.000134
	(0.00142)	(0.000977)	(0.0523)	(0.0771)
Observations	62	62	62	62

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (F.iv): Italy VEC Results - 1997Q4-2012Q4 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemp loyment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	0.00496***	0.00194**	-0.00467	-0.288***	0.0237
	(0.00139)	(0.000976)	(0.00550)	(0.0479)	(0.0742)
Constant	0.00143	0.00519***	0.00332	-0.00357	-0.0434
	(0.000894)	(0.000626)	(0.00353)	(0.0307)	(0.0476)
Observations	63	63	63	63	63

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (G.i): Portugal VEC Results - 1997Q1-2013Q3 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.145	0.321***	-4.720	14.09**
	(0.0939)	(0.0569)	(3.728)	(5.925)
L._ce2	0.0295	-0.245***	6.011**	-12.60***
	(0.0692)	(0.0419)	(2.746)	(4.364)
L._ce3	-9.37e-05	0.00396***	-0.166***	0.311***
	(0.00137)	(0.000831)	(0.0544)	(0.0865)
LD.Log real GDP	0.0127	-0.210**	-6.492	-22.20**
	(0.159)	(0.0962)	(6.305)	(10.02)
LD.Log Price Deflator	0.140	-0.316***	-3.173	-6.453
	(0.186)	(0.113)	(7.374)	(11.72)
LD.Unemployment	-0.000931	-0.000791	0.213*	-0.404**
	(0.00317)	(0.00192)	(0.126)	(0.200)
LD.10 Yr Bond Yield	0.00234	-0.000871	-0.102	0.825***
	(0.00176)	(0.00107)	(0.0699)	(0.111)
Constant	0.0137***	-0.00283	0.000833	0.000484
	(0.00380)	(0.00230)	(0.151)	(0.240)
Observations	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (G.ii): Portugal VEC Results - 1997Q1-2013Q3 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	0.0723	0.157***	-0.104	-8.738***	8.939***
	-0.0551	-0.0326	-0.183	-1.899	-3.244
LD.Log real GDP	0.1	-0.105	0.26	-1.631	-23.16**
	-0.172	-0.102	-0.57	-5.925	-10.12
LD.Log Price Deflator	0.151	-0.217*	0.374	5.087	-15.13
	-0.202	-0.119	-0.668	-6.945	-11.87
LD.Log Exports/GDP	-0.0312	-0.0118	0.300**	-0.175	0.0851
	-0.0404	-0.0238	-0.134	-1.39	-2.375
LD.Unemployment	-0.00294	0.00297	0.013	0.05	-0.176
	-0.00375	-0.00221	-0.0124	-0.129	-0.22
LD.10 Yr Bond Yield	0.000396	0.00162	0.00494	-0.106	0.807***
	-0.00201	-0.00118	-0.00665	-0.0691	-0.118
Constant	0.00156	0.00579***	-6.27E-05	0.144**	0.141
	-0.00178	-0.00105	-0.00589	-0.0612	-0.105
Observations	65	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (G.iii): Portugal VEC Results - 1997Q1-2012Q4 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.152	0.318***	-3.528	12.34**
	(0.0943)	(0.0572)	(3.635)	(6.082)
L._ce2	0.0387	-0.246***	4.475*	-10.47**
	(0.0678)	(0.0412)	(2.613)	(4.373)
LD.Log real GDP	0.0122	-0.185*	-6.376	-26.36**
	(0.163)	(0.0989)	(6.279)	(10.51)
LD.Log Price Deflator	0.107	-0.249**	-0.423	-14.10
	(0.186)	(0.113)	(7.185)	(12.02)
LD.Unemployment	-0.00109	-0.000303	0.127	-0.297
	(0.00331)	(0.00201)	(0.128)	(0.214)
LD.10 Yr Bond Yield	0.00265	-0.000751	-0.105	0.765***
	(0.00183)	(0.00111)	(0.0707)	(0.118)
Constant	0.0170***	-0.000843	0.00104	0.000529
	(0.00431)	(0.00261)	(0.166)	(0.278)
Observations	62	62	62	62

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (G.iv): Portugal VEC Results - 1997Q4-2012Q4 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.206**	0.232***	0.302	-2.124	6.485
	(0.0865)	(0.0520)	(0.318)	(3.211)	(7.148)
L._ce2	0.0955	-0.190***	-0.134	4.067*	-3.862
	(0.0616)	(0.0370)	(0.226)	(2.287)	(5.089)
Constant	0.00456***	0.00760***	0.00247	0.000145	-0.000195
	(0.00121)	(0.000729)	(0.00446)	(0.0450)	(0.100)
Observations	63	63	63	63	63

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (H.i): Spain VEC Results - 1997Q1-2013Q3 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.0766**	0.172***	15.85***	15.51***
	(0.0376)	(0.0392)	(4.008)	(3.551)
LD.Log real GDP	0.289**	0.149	-10.14	-5.151
	(0.129)	(0.134)	(13.70)	(12.14)
LD.Log Price Deflator	0.334***	0.212*	-36.43***	-41.18***
	(0.112)	(0.116)	(11.88)	(10.53)
LD.Unemployment	-0.00539***	-0.00171	0.632***	-0.203*
	(0.00124)	(0.00130)	(0.133)	(0.117)
LD.10 Yr Bond Yield	0.00104	-0.00280**	-0.00351	0.207*
	(0.00120)	(0.00125)	(0.128)	(0.113)
Constant	0.00352***	0.000842	0.0174	-0.0178
	(0.000884)	(0.000919)	(0.0941)	(0.0833)
Observations	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (H.ii): Spain VEC Results - 1997Q1-2013Q3 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.158***	0.0298	0.295	7.368*	10.42***
	(0.0357)	(0.0404)	(0.295)	(4.157)	(3.615)
L._ce2	0.119***	-0.0396	-0.0955	-6.870**	-9.115***
	(0.0274)	(0.0310)	(0.227)	(3.192)	(2.776)
LD.Log real GDP	-0.0118	-0.0221	1.743	-13.87	-2.899
	(0.139)	(0.157)	(1.151)	(16.22)	(14.10)
LD.Log Price Deflator	0.227*	0.0815	1.360	-51.81***	-53.44***
	(0.120)	(0.136)	(0.994)	(14.00)	(12.17)
LD.Log Exports/GDP	0.0129	0.000782	-0.159	-3.048*	-2.559*
	(0.0148)	(0.0168)	(0.123)	(1.726)	(1.501)
LD.Unemployment	-0.00577***	-0.000459	-0.0190**	0.679***	-0.147
	(0.00115)	(0.00130)	(0.00947)	(0.133)	(0.116)
LD.10 Yr Bond Yield	0.00213*	-0.000700	0.0242**	0.193	0.348***
	(0.00121)	(0.00137)	(0.00999)	(0.141)	(0.122)
Constant	0.00203*	-0.000822	0.0465**	0.0178	-0.0139
	(0.00107)	(0.00120)	(0.00880)	(0.124)	(0.108)
Observations	65	65	65	65	65

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (H.iii): Spain VEC Results - 1997Q1-2012Q4 - Closed Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield
L._ce1	-0.137***	0.114***	12.69***	17.54***
	(0.0384)	(0.0393)	(4.407)	(3.908)
L._ce2	0.0985***	-0.100***	-9.630***	-15.36***
	(0.0315)	(0.0322)	(3.611)	(3.202)
L._ce3	-0.000746***	7.60e-05	0.00133	0.0781***
	(0.000228)	(0.000233)	(0.0261)	(0.0232)
LD.Log real GDP	0.0222	-0.00756	-24.55	-2.446
	(0.139)	(0.142)	(15.97)	(14.16)
LD.Log Price Deflator	0.220*	0.153	-45.86***	-43.21***
	(0.125)	(0.128)	(14.34)	(12.71)
LD.Unemployment	-0.00566***	-0.00197	0.459***	-0.111
	(0.00123)	(0.00126)	(0.141)	(0.125)
LD.10 Yr Bond Yield	0.00318**	-0.000916	-0.108	0.300**
	(0.00130)	(0.00132)	(0.149)	(0.132)
Constant	0.000525	-0.00109	7.22e-06	5.94e-06
	(0.00127)	(0.00130)	(0.146)	(0.129)
Observations	62	62	62	62

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 (H.iv): Spain VEC Results - 1997Q4-2012Q4 - Open Economy

VARIABLES	D_Log Real GDP	D_Log Price Deflator	D_Unemployment	D_10 Yr Bond Yield	D_Log Exports/GDP
L._ce1	-0.166***	-0.00538	0.599**	8.031**	5.179
	(0.0374)	(0.0387)	(0.300)	(3.972)	(3.604)
L._ce2	0.120***	-0.00829	-0.340	-5.904**	-6.052**
	(0.0270)	(0.0279)	(0.216)	(2.864)	(2.598)
L._ce3	0.00951	0.0305***	-0.283***	1.243	3.672***
	(0.00903)	(0.00935)	(0.0724)	(0.960)	(0.871)
LD.Log real GDP	0.0227	0.0167	1.500	-22.28	-1.203
	(0.143)	(0.148)	(1.147)	(15.21)	(13.80)
LD.Log Price Deflator	0.291**	0.138	1.119	-59.55***	-52.09***
	(0.135)	(0.140)	(1.083)	(14.36)	(13.03)
LD.Log Exports/GDP	0.0149	-0.00981	-0.0882	-3.781**	-1.857
	(0.0156)	(0.0161)	(0.125)	(1.656)	(1.502)
LD.Unemployment	-0.00482***	-0.000536	-0.0223**	0.435***	0.0344
	(0.00140)	(0.00145)	(0.0112)	(0.148)	(0.135)
LD.10 Yr Bond Yield	0.00273*	-0.000349	0.0199*	0.00506	0.396***
	(0.00140)	(0.00145)	(0.0112)	(0.149)	(0.135)
Constant	0.00857***	0.00258	0.00129	5.98e-05	3.54e-05
	(0.00154)	(0.00159)	(0.0123)	(0.164)	(0.148)
Observations	62	62	62	62	62

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.2 (A.i): Cyprus EC Parameter Estimates - 2001Q3-2013Q3 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0105096	.1462505	-0.07	0.943	-.2971554	.2761361

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.126436	.0149386	-75.40	0.000	-1.155715	-1.097157
unemp	.0116174	.0005731	20.27	0.000	.0104942	.0127407
rates	-.004299	.0011	-3.91	0.000	-.0064549	-.0021432
_cons	-2.991334	.	.	.	.	.

Table 3.2 (A.ii): Cyprus EC Parameter Estimates - 2001Q1-2013Q3 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.1155649	.1318449	-0.88	0.381	-.3739761	.1428464
_ce2						
L1.	.1393615	.1499067	0.93	0.353	-.1544503	.4331733

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	(omitted)					
lnexports	5.941998	1.478121	4.02	0.000	3.044934	8.839062
unemp	-.1716354	.0464735	-3.69	0.000	-.2627218	-.080549
rates	-.1837154	.1063459	-1.73	0.084	-.3921496	.0247189
_cons	-33.32803	.	.	.	.	.
_ce2						
lnrgdp	(omitted)					
lndeflator	1	.	.	.	.	.
lnexports	5.260717	1.302978	4.04	0.000	2.706928	7.814507
unemp	-.161729	.0409668	-3.95	0.000	-.2420225	-.0814355
rates	-.1590207	.093745	-1.70	0.090	-.3427574	.0247161
_cons	-26.87242	.	.	.	.	.

Table 3.2 (A.iii): Cyprus EC Parameter Estimates - 2001Q3-2011Q4 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0405708	.1515569	-0.27	0.789	-.3376169	.2564753

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.145187	.0169282	-67.65	0.000	-1.178365	-1.112008
unemp	.0134081	.0010514	12.75	0.000	.0113474	.0154688
rates	-.0052878	.0012464	-4.24	0.000	-.0077307	-.0028449
_cons	-2.905264	.	.	.	.	.

Table 3.2 (A.iv): Cyprus EC Parameter Estimates - 2001Q3-2011Q4 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0498461	.1372099	-0.36	0.716	-.3187726	.2190803

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.144793	.0196867	-58.15	0.000	-1.183378	-1.106207
lnexports	.0144297	.0253659	0.57	0.569	-.0352867	.064146
unemp	.0137325	.0013809	9.94	0.000	.011026	.016439
rates	-.0062053	.0015303	-4.06	0.000	-.0092047	-.003206
_cons	-2.959179	.	.	.	.	.

Table 3.2 (B.i): France EC Parameter Estimates - 1997Q1-2013Q3 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	**-.1271209**	**.0448795**	**-2.83**	**0.005**	**-.2150831**	**-.0391587**
_ce2						
L1.	**.0730233**	**.0241451**	**3.02**	**0.002**	**.0256998**	**.1203469**

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	**1**	.	.	.	.	.
lndeflator	**(omitted)**					
unemp	**.0547109**	**.0070404**	**7.77**	**0.000**	**.0409119**	**.0685098**
rates	**.072104**	**.0086789**	**8.31**	**0.000**	**.0550938**	**.0891143**
_cons	**-13.90857**	.	.	.	.	.
_ce2						
lnrgdp	**(omitted)**					
lndeflator	**1**	.	.	.	.	.
unemp	**.0794673**	**.0124687**	**6.37**	**0.000**	**.0550291**	**.1039054**
rates	**.0848975**	**.0153704**	**5.52**	**0.000**	**.0547722**	**.1150229**
_cons	**-6.20411**	.	.	.	.	.

Table 3.1 (B.ii): France EC Parameter Estimates - 1997Q1-2013Q3 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.1176947	.0701732	1.68	0.094	-.0198423	.2552317
_ce2						
L1.	-.1366665	.0521299	-2.62	0.009	-.2388391	-.0344939
_ce3						
L1.	-.0470209	.0128952	-3.65	0.000	-.0722949	-.0217468
_ce4						
L1.	.0023523	.0011906	1.98	0.048	.0000188	.0046858

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	1.11e-16	.	.	.	.	.
lnexports	(omitted)					
unemp	-3.47e-18	.	.	.	.	.
rates	.0403758	.0092048	4.39	0.000	.0223348	.0584168
_cons	-13.16109	.	.	.	.	.
_ce2						
lnrgdp	2.22e-16	.	.	.	.	.
lndeflator	1	.	.	.	.	.
lnexports	(omitted)					
unemp	-6.94e-18	.	.	.	.	.
rates	.0447806	.0107965	4.15	0.000	.02362	.0659413
_cons	-4.828008	.	.	.	.	.
_ce3						
lnrgdp	-8.88e-16	.	.	.	.	.
lndeflator	4.44e-16	.	.	.	.	.
lnexports	1	.	.	.	.	.
unemp	-2.78e-17	.	.	.	.	.
rates	.0691469	.0220919	3.13	0.002	.0258476	.1124463
_cons	-3.546398	.	.	.	.	.
_ce4						
lnrgdp	-3.55e-15	.	.	.	.	.
lndeflator	-3.55e-15	.	.	.	.	.
lnexports	(omitted)					
unemp	1	.	.	.	.	.
rates	.779005	.2951023	2.64	0.008	.200615	1.357395
_cons	-11.68344	.	.	.	.	.

Table 3.2 (B.iii): France EC Parameter Estimates - 1997Q1-2012Q4 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.1261209	.0411179	-3.07	0.002	-.2067106	-.0455313
_ce2						
L1.	.0682208	.0218691	3.12	0.002	.0253581	.1110835

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	(omitted)					
unemp	.0500015	.0072527	6.89	0.000	.0357865	.0642166
rates	.0750662	.0098572	7.62	0.000	.0557464	.094386
_cons	-13.87148	.	.	.	.	.
_ce2						
lnrgdp	4.44e-16	.	.	.	.	.
lndeflator	1	.	.	.	.	.
unemp	.0754763	.0130923	5.76	0.000	.0498158	.1011367
rates	.0866811	.0177938	4.87	0.000	.0518059	.1215564
_cons	-6.247866	.	.	.	.	.

Table 3.2 (B.iv): France EC Parameter Estimates - 1997Q4-2012Q4 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.0933021	.0665261	1.40	0.161	-.0370866	.2236909
_ce2						
L1.	-.1267198	.0521172	-2.43	0.015	-.2288676	-.0245719
_ce3						
L1.	-.0384928	.0100968	-3.81	0.000	-.0582822	-.0187035

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	2.22e-16	.	.	.	.	.
lnexports	(omitted)					
unemp	.031871	.005717	5.57	0.000	.0206658	.0430762
rates	.0730239	.0078206	9.34	0.000	.0576959	.0883519
_cons	-13.5559	.	.	.	.	.
_ce2						
lnrgdp	-4.44e-16	.	.	.	.	.
lndeflator	1	.	.	.	.	.
lnexports	(omitted)					
unemp	.0447859	.0098834	4.53	0.000	.0254147	.0641571
rates	.085511	.0135199	6.32	0.000	.0590124	.1120096
_cons	-5.366746	.	.	.	.	.
_ce3						
lnrgdp	-4.44e-16	.	.	.	.	.
lndeflator	-4.44e-16	.	.	.	.	.
lnexports	1	.	.	.	.	.
unemp	-.1161768	.0199499	-5.82	0.000	-.155278	-.0770757
rates	-.0216951	.0272903	-0.79	0.427	-.0751831	.0317929
_cons	-2.15963	.	.	.	.	.

Table 3.2 (C.i): Germany EC Parameter Estimates - 1997Q1-2013Q3 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.0286482	.0227116	1.26	0.207	-.0158657	.0731622

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-3.179566	.5351121	-5.94	0.000	-4.228366	-2.130765
unemp	.0036242	.0072523	0.50	0.617	-.01059	.0178384
rates	-.1029475	.0204596	-5.03	0.000	-.1430475	-.0628475
_cons	1.755651	.	.	.	.	.

Table 3.2 (C.ii): Germany EC Parameter Estimates - 1997Q1-2013Q3 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0375482	.0195199	-1.92	0.054	-.0758066	.0007102

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	3.609894	1.12934	3.20	0.001	1.39643	5.823359
lnexports	-.5802123	.1596042	-3.64	0.000	-.8930307	-.2673939
unemp	.0123083	.0087065	1.41	0.157	-.0047561	.0293727
rates	.1107499	.0255368	4.34	0.000	.0606987	.1608012
_cons	-28.25257	.	.	.	.	.

Table 3.2 (C.iii): Germany EC Parameter Estimates - 1997Q1-2012Q4 -'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.0300677	.0186944	1.61	0.108	-.0065727	.0667081

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-3.78942	.7189244	-5.27	0.000	-5.198486	-2.380354
unemp	.0089705	.0099719	0.90	0.368	-.0105742	.0285151
rates	-.1298829	.0283776	-4.58	0.000	-.185502	-.0742638
_cons	4.622109	.	.	.	.	.

Table 3.2 (C.iv): Germany EC Parameter Estimates - 1997Q1-2012Q4 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.1230284	.0549863	-2.24	0.025	-.2307995	-.0152573

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	1.383086	.4340352	3.19	0.001	.5323929	2.23378
lnexports	-.3920813	.0618031	-6.34	0.000	-.5132132	-.2709495
unemp	.0083436	.0033376	2.50	0.012	.001802	.0148852
rates	.037163	.0098717	3.76	0.000	.0178147	.0565113
_cons	-18.37915	.	.	.	.	.

Table 3.2 (D.i): Greece EC Parameter Estimates - 2000Q1-2011Q1 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.1365495	.0302207	4.52	0.000	.077318	.195781

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.38189	.060766	-22.74	0.000	-1.500989	-1.262791
unemp	.0032444	.0056489	0.57	0.566	-.0078272	.0143161
rates	-.0025641	.0049571	-0.52	0.605	-.0122799	.0071517
_cons	-4.44923	.	.	.	.	.

Table 3.2 (D.ii): Greece EC Parameter Estimates - 2000Q1-2011Q1 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.1524172	.1167982	1.30	0.192	-.076503	.3813374

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.219979	.0538698	-22.65	0.000	-1.325562	-1.114396
lnexports	-.0970196	.038675	-2.51	0.012	-.1728212	-.021218
unemp	.0072962	.0037905	1.92	0.054	-.0001332	.0147255
rates	.0092663	.003287	2.82	0.005	.0028239	.0157087
_cons	-4.975178	.	.	.	.	.

Table 3.2 (D.iii): Greece EC Parameter Estimates - 2000Q1-2010Q4 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.1702304	.1046872	1.63	0.104	-.0349528	.3754136

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.191031	.0650895	-18.30	0.000	-1.318604	-1.063458
unemp	.0109454	.0043772	2.50	0.012	.0023662	.0195245
rates	.0050055	.0044672	1.12	0.263	-.0037501	.013761
_cons	-5.428713	.	.	.	.	.

Table 3.2 (D.iv): Greece EC Parameter Estimates - 2000Q1-2010Q4 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0475074	.1334297	-0.36	0.722	-.3090247	.2140099
_ce2						
L1.	-.0055013	.1461825	-0.04	0.970	-.2920138	.2810111

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	(omitted)					
lnexports	-.6527659	.2502321	-2.61	0.009	-1.143212	-.16232
unemp	.0298853	.0183455	1.63	0.103	-.0060711	.0658418
rates	.1076861	.0249854	4.31	0.000	.0587156	.1566566
_cons	-9.487907	.	.	.	.	.
_ce2						
lnrgdp	2.22e-16	.	.	.	.	.
lndeflator	1	.	.	.	.	.
lnexports	-.5361056	.2314891	-2.32	0.021	-.9898159	-.0823952
unemp	.0175371	.0169713	1.03	0.301	-.0157261	.0508004
rates	.0832989	.0231139	3.60	0.000	.0379964	.1286014
_cons	-3.444965	.	.	.	.	.

Table 3.2 (E.i): Ireland EC Parameter Estimates - 1997Q1-2013Q3 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.0317309	.0384692	0.82	0.409	-.0436673	.1071291
_ce2						
L1.	-.0600056	.0731242	-0.82	0.412	-.2033265	.0833153

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	(omitted)					
unemp	-3.291594	.8060204	-4.08	0.000	-4.871365	-1.711824
rates	8.285498	2.164221	3.83	0.000	4.043702	12.52729
_cons	-13.79459	.	.	.	.	.
_ce2						
lnrgdp	(omitted)					
lndeflator	1	.	.	.	.	.
unemp	-1.728657	.4235974	-4.08	0.000	-2.558893	-.8984214
rates	4.376628	1.137389	3.85	0.000	2.147387	6.605869
_cons	-6.397403	.	.	.	.	.

Table 3.2 (E.ii): Ireland EC Parameter Estimates - 1997Q1-2013Q3 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.1442063	.0530721	-2.72	0.007	-.2482256	-.040187
_ce2						
L1.	.2346895	.0893401	2.63	0.009	.0595862	.4097929

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	(omitted)					
lnexports	-3.576568	1.63708	-2.18	0.029	-6.785186	-.3679501
unemp	-.0109337	.0466798	-0.23	0.815	-.1024244	.0805571
rates	.5351216	.1223888	4.37	0.000	.2952439	.7749993
_cons	2.212679	.	.	.	.	.
_ce2						
lnrgdp	(omitted)					
lndeflator	1	.	.	.	.	.
lnexports	-1.887824	.9785794	-1.93	0.054	-3.805804	.0301566
unemp	-.0142502	.0279033	-0.51	0.610	-.0689397	.0404392
rates	.3289503	.073159	4.50	0.000	.1855612	.4723394
_cons	2.066106	.	.	.	.	.

Table 3.2 (E.iii): Ireland EC Parameter Estimates - 1997Q3-2011Q4 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0083062	.0296917	-0.28	0.780	-.0665009	.0498886

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.715761	.1616329	-10.62	0.000	-2.032555	-1.398966
unemp	.0199456	.0059187	3.37	0.001	.008345	.0315461
rates	-.0907516	.0151409	-5.99	0.000	-.1204271	-.0610761
_cons	-2.4591	.	.	.	.	.

Table 3.2 (E.iv): Ireland EC Parameter Estimates - 1997Q4-2011Q4 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.2857656	.0830173	-3.44	0.001	-.4484765	-.1230548
_ce2						
L1.	.4308581	.128275	3.36	0.001	.1794437	.6822724

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.78e-15	.	.	.	.	.
lnexports	-4.372718	.9119855	-4.79	0.000	-6.160177	-2.58526
unemp	-.073671	.0273574	-2.69	0.007	-.1272905	-.0200514
rates	.6189904	.0947215	6.53	0.000	.4333397	.8046412
_cons	6.681206	.	.	.	.	.
_ce2						
lnrgdp	(omitted)					
lndeflator	1	.	.	.	.	.
lnexports	-2.630644	.6159934	-4.27	0.000	-3.837969	-1.423319
unemp	-.0527114	.0184784	-2.85	0.004	-.0889283	-.0164945
rates	.4043042	.0639789	6.32	0.000	.2789079	.5297005
_cons	5.693537	.	.	.	.	.

Table 3.2 (F.i): Italy EC Parameter Estimates - 1997Q1-2013Q3 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0490615	.0383245	-1.28	0.200	-.1241762	.0260531
_ce2						
L1.	.017704	.0161091	1.10	0.272	-.0138692	.0492772

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	(omitted)					
unemp	-.0269236	.0266287	-1.01	0.312	-.0791149	.0252676
rates	.2688303	.0545224	4.93	0.000	.1619683	.3756923
_cons	-13.7722	.	.	.	.	.
_ce2						
lnrgdp	-2.22e-16	.	.	.	.	.
lndeflator	1	.	.	.	.	.
unemp	-.0899193	.0633042	-1.42	0.155	-.2139932	.0341546
rates	.6593158	.129616	5.09	0.000	.4052731	.9133584
_cons	-6.829635	.	.	.	.	.

Table 3.2 (F.ii): Italy EC Parameter Estimates - 1997Q1-2013Q3 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0907218	.0388443	-2.34	0.020	-.1668552	-.0145883
_ce2						
L1.	-.0059336	.0171103	-0.35	0.729	-.0394693	.027602

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	2.78e-17	.	.	.	.	.
lnexports	-.1166875	.0643269	-1.81	0.070	-.2427659	.0093909
unemp	.0119357	.0031283	3.82	0.000	.0058043	.0180671
rates	.0362767	.0064631	5.61	0.000	.0236093	.0489441
_cons	-12.65196	.	.	.	.	.
_ce2						
lnrgdp	-1.39e-17	.	.	.	.	.
lndeflator	1	.	.	.	.	.
lnexports	-.2463322	.1289467	-1.91	0.056	-.4990631	.0063986
unemp	.0064496	.0062709	1.03	0.304	-.005841	.0187403
rates	.0656257	.0129556	5.07	0.000	.0402332	.0910182
_cons	-4.121227	.	.	.	.	.

Table 3.2 (F.iii): Italy EC Parameter Estimates - 1997Q1-2012Q4 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0360882	.0391936	-0.92	0.357	-.1129063	.0407299
_ce2						
L1.	.0189713	.0174136	1.09	0.276	-.0151587	.0531013

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-2.78e-17	.	.	.	.	.
unemp	.0706345	.0265827	2.66	0.008	.0185333	.1227357
rates	-.2437872	.0514913	-4.73	0.000	-.3447083	-.142866
_cons	-12.26006	.	.	.	.	.
_ce2						
lnrgdp	(omitted)					
lndeflator	1	.	.	.	.	.
unemp	.1363239	.0598278	2.28	0.023	.0190635	.2535843
rates	-.5269271	.1158878	-4.55	0.000	-.754063	-.2997911
_cons	-3.334363	.	.	.	.	.

Table 3.2 (F.iv): Italy EC Parameter Estimates - 1997Q4-2012Q4 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.0049634	.0013939	3.56	0.000	.0022313	.0076954

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-8.410488	.866366	-9.71	0.000	-10.10853	-6.712442
lnexports	1.371325	1.082569	1.27	0.205	-.7504713	3.493122
unemp	-.1140853	.0583389	-1.96	0.051	-.2284274	.0002568
rates	-.3696824	.0982565	-3.76	0.000	-.5622616	-.1771032
_cons	24.02464	.	.	.	.	.

Table 3.2 (G.i): Portugal EC Parameter Estimates - 1997Q1-2013Q3 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.1448689	.0939309	-1.54	0.123	-.3289702	.0392323
_ce2						
L1.	.0295378	.0691944	0.43	0.669	-.1060808	.1651563
_ce3						
L1.	-.0000937	.0013709	-0.07	0.946	-.0027806	.0025932

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.11e-16	.	.	.	.	.
unemp	(omitted)					
rates	.0164805	.0052348	3.15	0.002	.0062205	.0267405
_cons	-10.53235	.	.	.	.	.
_ce2						
lnrgdp	4.44e-16	.	.	.	.	.
lndeflator	1	.	.	.	.	.
unemp	(omitted)					
rates	.0194339	.0105379	1.84	0.065	-.0012199	.0400877
_cons	-4.618468	.	.	.	.	.
_ce3						
lnrgdp	-1.42e-14	.	.	.	.	.
lndeflator	7.11e-15	.	.	.	.	.
unemp	1	.	.	.	.	.
rates	-.5812647	.3061504	-1.90	0.058	-1.181309	.0187791
_cons	-6.710617	.	.	.	.	.

Table 3.2 (G.ii): Portugal EC Parameter Estimates - 1997Q1-2013Q3 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	.0722874	.0551304	1.31	0.190	-.0357661	.1803409

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-1.029187	.0497481	-20.69	0.000	-1.126691	-.9316826
lnexports	.226701	.049583	4.57	0.000	.1295202	.3238818
unemp	.0161691	.0016108	10.04	0.000	.0130119	.0193263
rates	-.019501	.0021827	-8.93	0.000	-.023779	-.015223
_cons	-6.63104	.	.	.	.	.

Table 3.2 (G.iii): Portugal EC Parameter Estimates - 1997Q1-2012Q4 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.1516554	.0942718	-1.61	0.108	-.3364246	.0331139
_ce2						
L1.	.0387083	.0677842	0.57	0.568	-.0941461	.1715628

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	2.22e-16	.	.	.	.	.
unemp	-.0027727	.0046232	-0.60	0.549	-.011834	.0062887
rates	.0204239	.0054942	3.72	0.000	.0096554	.0311924
_cons	-10.48872	.	.	.	.	.
_ce2						
lnrgdp	(omitted)					
lndeflator	1	.	.	.	.	.
unemp	-.0212772	.0058155	-3.66	0.000	-.0326754	-.009879
rates	.0352511	.0069112	5.10	0.000	.0217055	.0487968
_cons	-4.439	.	.	.	.	.

Table 3.2 (G.iv): Portugal EC Parameter Estimates - 1997Q4-2012Q4 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.2057742	.0865391	-2.38	0.017	-.3753876	-.0361607
_ce2						
L1.	.0955137	.061617	1.55	0.121	-.0252534	.2162807

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	(omitted)					
lnexports	-.5648833	.1149657	-4.91	0.000	-.790212	-.3395547
unemp	.0135273	.003279	4.13	0.000	.0071005	.019954
rates	.0289989	.0040879	7.09	0.000	.0209867	.037011
_cons	-8.851677	.	.	.	.	.
_ce2						
lnrgdp	(omitted)					
lndeflator	1	.	.	.	.	.
lnexports	-.7579428	.1532359	-4.95	0.000	-1.05828	-.457606
unemp	-.0011739	.0043706	-0.27	0.788	-.00974	.0073923
rates	.0450382	.0054487	8.27	0.000	.0343589	.0557175
_cons	-2.172501	.	.	.	.	.

Table 3.2 (H.i): Spain EC Parameter Estimates - 1997Q1-2013Q3 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.0765998	.0376453	-2.03	0.042	-.1503832	-.0028164

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	-.8216842	.0137027	-59.96	0.000	-.8485411	-.7948274
unemp	.0032094	.0003903	8.22	0.000	.0024444	.0039745
rates	-.0047664	.0020835	-2.29	0.022	-.00885	-.0006829
_cons	-8.540559	.	.	.	.	.

Table 3.2 (H.ii): Spain EC Parameter Estimates - 1997Q1-2013Q3 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.1582804	.0357423	-4.43	0.000	-.2283339	-.0882268
_ce2						
L1.	.1193785	.0274458	4.35	0.000	.0655857	.1731713

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	(omitted)					
lnexports	-1.273868	.1720618	-7.40	0.000	-1.611103	-.9366333
unemp	.0338113	.0036002	9.39	0.000	.0267551	.0408675
rates	.1002535	.0171176	5.86	0.000	.0667035	.1338034
_cons	-9.338937	.	.	.	.	.
_ce2						
lnrgdp	(omitted)					
lndeflator	1	.	.	.	.	.
lnexports	-1.634095	.2127321	-7.68	0.000	-2.051042	-1.217148
unemp	.0364714	.0044512	8.19	0.000	.0277473	.0451955
rates	.1358656	.0211637	6.42	0.000	.0943855	.1773458
_cons	-.7137549	.	.	.	.	.

Table 3.2 (H.iii): Spain EC Parameter Estimates - 1997Q1-2012Q4 - 'closed' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.1369361	.0384244	-3.56	0.000	-.2122466	-.0616256
_ce2						
L1.	.0985499	.0314799	3.13	0.002	.0368504	.1602494
_ce3						
L1.	-.0007464	.0002277	-3.28	0.001	-.0011927	-.0003001

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	5.55e-17	.	.	.	.	.
unemp	-3.25e-19	.	.	.	.	.
rates	.1231328	.025895	4.76	0.000	.0723796	.173886
_cons	-12.9737	.	.	.	.	.
_ce2						
lnrgdp	1.11e-16	.	.	.	.	.
lndeflator	1	.	.	.	.	.
unemp	4.34e-19	.	.	.	.	.
rates	.1457186	.0309349	4.71	0.000	.0850874	.2063498
_cons	-5.443575	.	.	.	.	.
_ce3						
lnrgdp	-1.38e-14	.	.	.	.	.
lndeflator	-3.33e-15	.	.	.	.	.
unemp	1	.	.	.	.	.
rates	-2.60747	.5888169	-4.43	0.000	-3.76153	-1.45341
_cons	-12.60357	.	.	.	.	.

Table 3.2 (H.iv): Spain EC Parameter Estimates - 1997Q4-2012Q4 - 'open' economy

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnrgdp						
_ce1						
L1.	-.1656413	.0373942	-4.43	0.000	-.2389325	-.0923501
_ce2						
L1.	.1195975	.0269596	4.44	0.000	.0667577	.1724373
_ce3						
L1.	.0095115	.0090339	1.05	0.292	-.0081947	.0272177

Johansen normalization restrictions imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnrgdp	1	.	.	.	.	.
lndeflator	(omitted)					
lnexports	(omitted)					
unemp	-.0467064	.0113621	-4.11	0.000	-.0689756	-.0244371
rates	.2229704	.0449909	4.96	0.000	.1347899	.3111509
_cons	-12.40331	.	.	.	.	.
_ce2						
lnrgdp	4.44e-16	.	.	.	.	.
lndeflator	1	.	.	.	.	.
lnexports	(omitted)					
unemp	-.0684477	.0149378	-4.58	0.000	-.0977254	-.0391701
rates	.2978402	.05915	5.04	0.000	.1819084	.4137721
_cons	-4.680039	.	.	.	.	.
_ce3						
lnrgdp	6.66e-16	.	.	.	.	.
lndeflator	-4.44e-16	.	.	.	.	.
lnexports	1	.	.	.	.	.
unemp	-.0437912	.007329	-5.98	0.000	-.0581557	-.0294266
rates	.0437344	.0290209	1.51	0.132	-.0131455	.1006143
_cons	-2.674353	.	.	.	.	.

Table 4: (A) Short Run Joint Causality F-Test - D.Log(Real GDP)
H0: Estimated Coefficients Jointly = 0

		chi2	Prob > chi2
Cyprus	2001Q1 - 2013Q3	45.73	0.00110
	2001Q1 - 2011Q4	26.59	0.00010
France	1997Q1 - 2013Q3	44.61	0.00000
	1997Q1 - 2012Q4	46.78	0.00000
Germany	1997Q1 - 2013Q3	20.89	0.00090
	1997Q1 - 2012Q4	21.17	0.00080
Greece	2000Q1 - 2011Q1	20.42	0.00000
	2000Q1 - 2010Q4	27.85	0.00000
Ireland	1997Q1 - 2013Q3	21.29	0.00160
	1997Q1 - 2011Q4	22.38	0.00040
Italy	1997Q1 - 2013Q3	40.03	0.00000
	1997Q1 - 2012Q4	34.63	0.00000
Portugal	1997Q1 - 2013Q3	36.6	0.00000
	1997Q1 - 2012Q4	35.37	0.00000
Spain	1997Q1 - 2013Q3	283.17	0.00000
	1997Q1 - 2012Q4	357.91	0.00000

Table 4: (B) Short Run Joint Causality F-Test - D.Log(Real GDP)
H0: Estimated Coefficients Jointly = 0

		chi2	Prob > chi2
Cyprus	2001Q1 - 2013Q3	80.38	0.00000
	2001Q1 - 2011Q4	26.1	0.00020
France	1997Q1 - 2013Q3	79.39	0.00000
	1997Q4 - 2011Q4	76	0.00000
Germany	1997Q1 - 2013Q3	26.44	0.00020
	1997Q4 - 2011Q4	27.3	0.00010
Greece	2001Q1 - 2011Q1	24.23	0.00050
	2000Q1 - 2010Q4	35.5	0.00000
Ireland	1997Q1 - 2013Q3	21.29	0.00160
	1997Q4 - 2011Q4	36.16	0.00020
Italy	1997Q1 - 2013Q3	46.54	0.00000
	1997Q1 - 2013Q3	12.68	0.00000
Portugal	1997Q1 - 2013Q3	14.97	0.02050
	1997Q1 - 2013Q3	28.2	0.00000
Spain	1997Q1 - 2013Q3	355.35	0.00000
	1997Q1 - 2013Q3	338.88	0.00000

Table 5: (A) Closed Economy Lagrange Multiplier Test for Serial Autocorrelation
H0: no autocorrelation at lag order

		Lag	chi2	df	Prob > chi2
Cyprus	2001Q1 - 2013Q3	1	15.4802	16	0.48979
		2	16.129	16	0.44399
	2001Q1 - 2011Q4	1	15.5255	16	0.48654
		2	16.8101	16	0.39799
France	1997Q1 - 2013Q3	1	18.4165	16	0.30008
		2	17.2099	16	0.37214
	1997Q1 - 2012Q4	1	20.004	16	0.22004
		2	16.6095	16	0.41129
Germany	1997Q1 - 2013Q3	1	23.2476	16	0.10727
		2	19.4495	16	0.24604
	1997Q1 - 2012Q4	1	22.4871	16	0.12815
		2	17.6588	16	0.34425
Greece	2000Q1 - 2011Q1	1	17.2055	16	0.37242
		2	12.0178	16	0.74275
	2000Q1 - 2010Q4	1	11.3308	16	0.78862
		2	6.8143	16	0.97668
Ireland	1997Q1 - 2013Q3	1	17.6071	16	0.34740
		2	17.0307	16	0.38361
	1997Q1 - 2011Q4	1	17.1143	16	0.37824
		2	16.4899	16	0.41932
Italy	1997Q1 - 2013Q3	1	15.2456	16	0.50673
		2	12.9403	16	0.67711
	1997Q1 - 2012Q4	1	16.3126	16	0.43137
		2	13.8929	16	0.60669
Portugal	1997Q1 - 2013Q3	1	15.8403	16	0.46416
		2	19.4472	16	0.24616
	1997Q1 - 2012Q4	1	10.9733	16	0.81113
		2	16.3891	16	0.42615
Spain	1997Q1 - 2013Q3	1	21.9577	16	0.14456
		2	12.985	16	0.67385
	1997Q1 - 2012Q4	1	21.2973	16	0.16737
		2	13.6672	16	0.62349

Table 5: (B) Open Economy Lagrange Multiplier Test for Serial Autocorrelation
H0: no autocorrelation at lag order

		Lags	chi2	df	Prob > chi2
Cyprus	2001Q1 - 2013Q3	1	15.7746	25	0.92138
		2	19.5738	25	0.76881
	2001Q1 - 2011Q4	1	27.0366	25	0.35406
		2	23.2768	25	0.56140
France	1997Q1 - 2013Q3	1	18.9722	25	0.79845
		2	28.6208	25	0.28008
	1997Q1 - 2012Q4	1	12.6268	25	0.98076
		2	20.9786	25	0.69380
Germany	1997Q1 - 2013Q3	1	30.9896	25	0.18936
		2	37.9279	25	0.04702
	1997Q1 - 2012Q4	1	30.0772	25	0.22141
		2	36.7076	25	0.06153
Greece	2000Q1 - 2011Q1	1	17.2657	25	0.87193
		2	16.2112	25	0.90839
	2000Q1 - 2010Q4	1	11.3939	25	0.99081
		2	15.896	25	0.91789
Ireland	1997Q1 - 2013Q3	1	40.425	25	0.02636
		2	28.7056	25	0.27641
	1997Q1 - 2011Q4	1	33.0551	25	0.12970
		2	22.6321	25	0.59904
Italy	1997Q1 - 2013Q3	1	33.4026	25	0.12131
		2	24.9661	25	0.46427
	1997Q1 - 2012Q4	1	30.3564	25	0.21122
		2	29.2054	25	0.25542
Portugal	1997Q1 - 2013Q3	1	13.573	25	0.96867
		2	30.7055	25	0.19896
	1997Q1 - 2012Q4	1	46.5634	25	0.00552
		2	31.0601	25	0.18704
Spain	1997Q1 - 2013Q3	1	22.8872	25	0.58415
		2	37.5039	25	0.05168
	1997Q1 - 2012Q4	1	26.2023	25	0.39687
		2	36.5846	25	0.06319

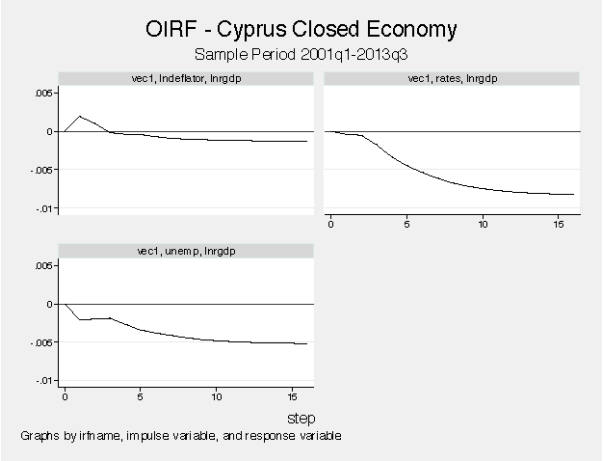
Table 6: (A) Jarque-Bera Test for Normality in the Residuals - Equation: D.LnGDP H0: Residual is normally Distributed

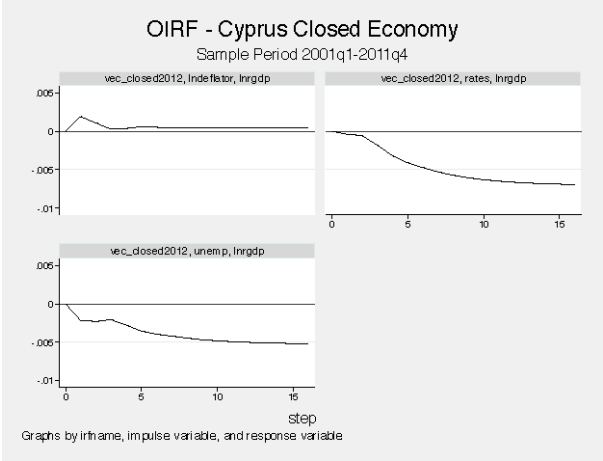
		Lags	chi2	df	Prob > chi2
Cyprus	2001Q1 - 2013Q3	2	0.322	2	0.85124
	2001Q1 - 2011Q4	2	0.563	2	0.75449
France	1997Q1 - 2013Q3	2	20.664	2	0.00003
	1997Q1 - 2012Q4	2	19.303	2	0.00006
Germany	1997Q1 - 2013Q3	2	48.087	2	0.00000
	1997Q1 - 2012Q4	2	39.172	2	0.00000
Greece	2000Q1 - 2011Q1	2	4.123	2	0.12729
	2000Q1 - 2010Q4	2	3.49	2	0.17469
Ireland	1997Q1 - 2013Q3	2	2.007	2	0.36659
	1997Q1 - 2011Q4	1	4.369	2	0.11253
Italy	1997Q1 - 2013Q3	2	156.377	2	0.00000
	1997Q1 - 2012Q4	2	130.7	2	0.00000
Portugal	1997Q1 - 2013Q3	2	1.553	2	0.46009
	1997Q1 - 2012Q4	2	1.698	2	0.42790
Spain	1997Q1 - 2013Q3	2	0.349	2	0.83995
	1997Q1 - 2012Q4	2	0.57	2	0.75203

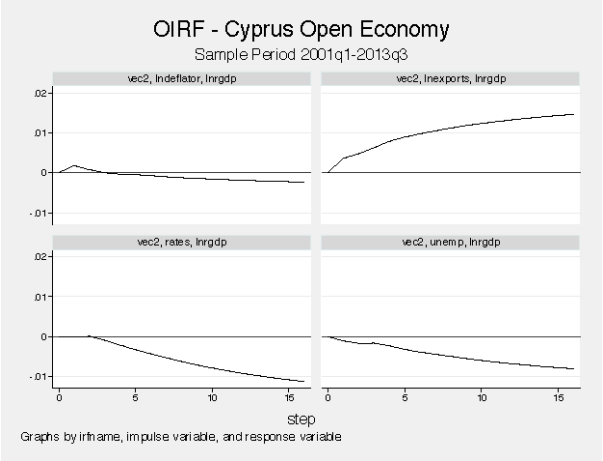
Table 6: (B) Jarque-Bera Test for Normality in the Residuals - Equation: D.LnGDP H0: Residual is normally Distributed

		Lags	chi2	df	Prob > chi2
Cyprus	2001Q1 - 2013Q3	2	2.063	2	0.35655
	2001Q1 - 2011Q4	2	0.048	2	0.97605
France	1997Q1 - 2013Q3	2	9.8	2	0.00744
	1997Q1 - 2012Q4	2	10.47	2	0.00533
Germany	1997Q1 - 2013Q3	2	50.134	2	0.00000
	1997Q1 - 2012Q4	2	48.484	2	0.00000
Greece	2000Q1 - 2011Q1	2	2.275	2	0.32059
	2000Q1 - 2010Q4	1	5.339	2	0.06929
Ireland	1997Q1 - 2013Q3	2	0.617	2	0.73467
	1997Q1 - 2011Q4	3	2.584	2	0.27472
Italy	1997Q1 - 2013Q3	2	129.85	2	0.00000
	1997Q1 - 2012Q4	2	55.764	2	0.00000
Portugal	1997Q1 - 2013Q3	2	1.966	2	0.37412
	1997Q1 - 2012Q4	1	2.672	2	0.26288
Spain	1997Q1 - 2013Q3	2	3.115	2	0.21070
	1997Q1 - 2012Q4	2	2.146	2	0.34196

Figure 1 (A): Cyprus OIRFs from Shocks to Variables in System (excl. GDP) on GDP







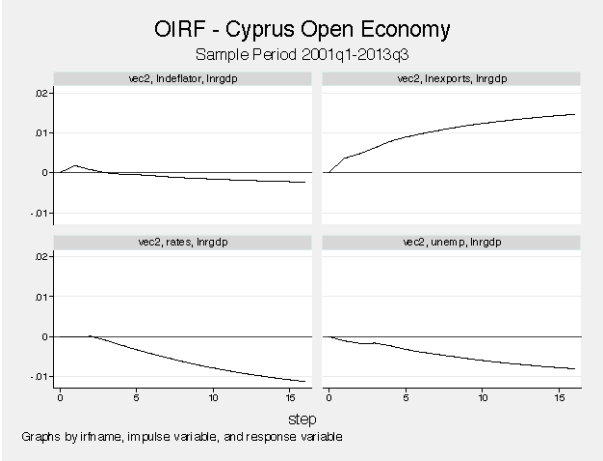
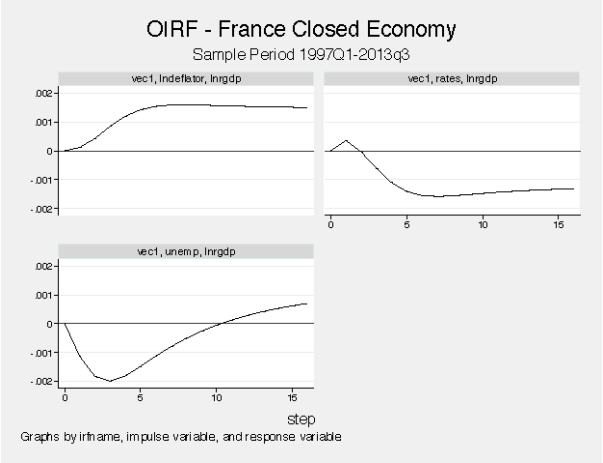
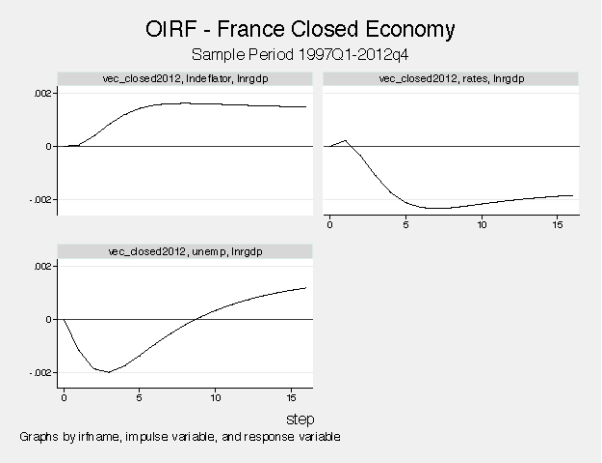
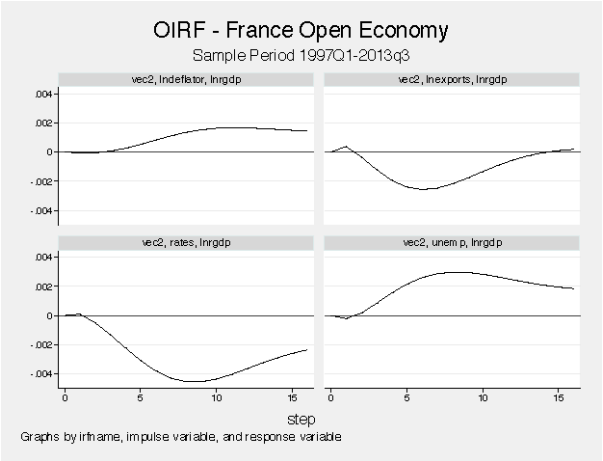


Figure 1 (B): France OIRFs from Shocks to Variables in System (excl. GDP) on GDP







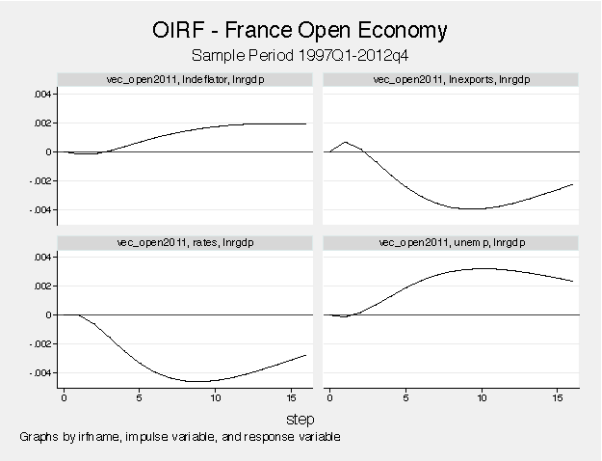
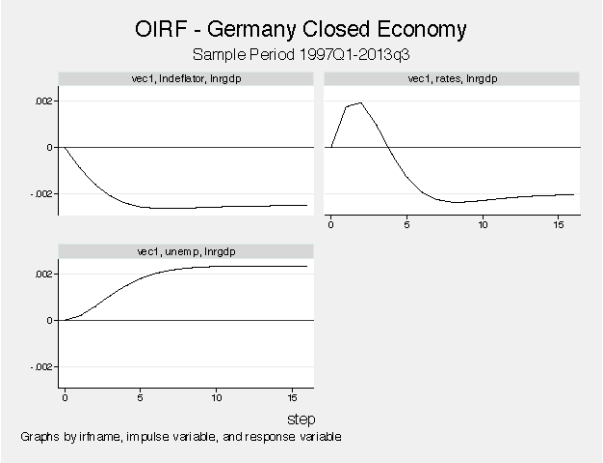
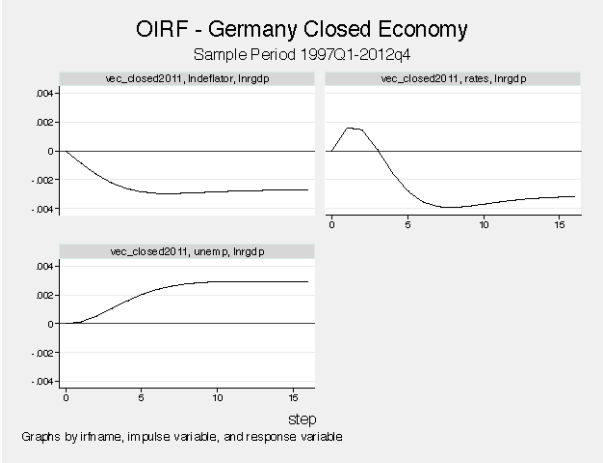
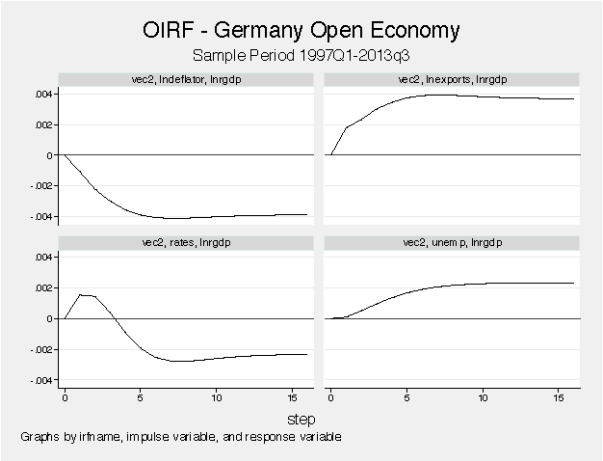


Figure 1 (C): Germany OIRFs from Shocks to Variables in System (excl. GDP) on GDP







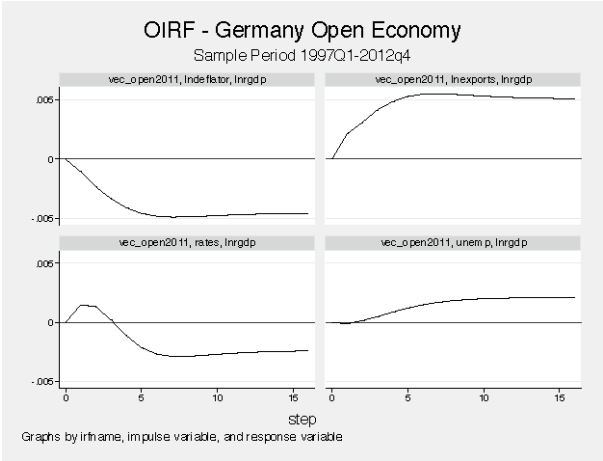
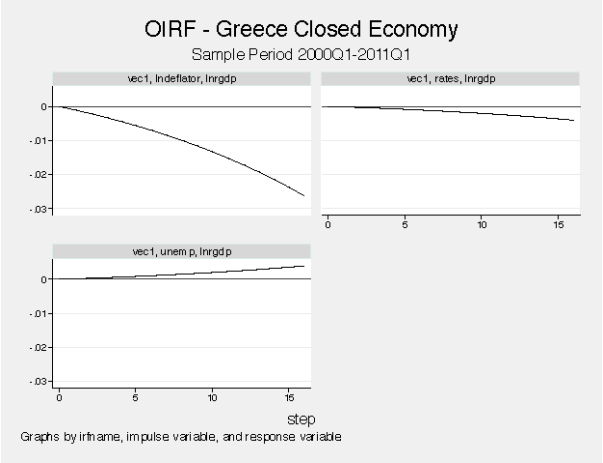
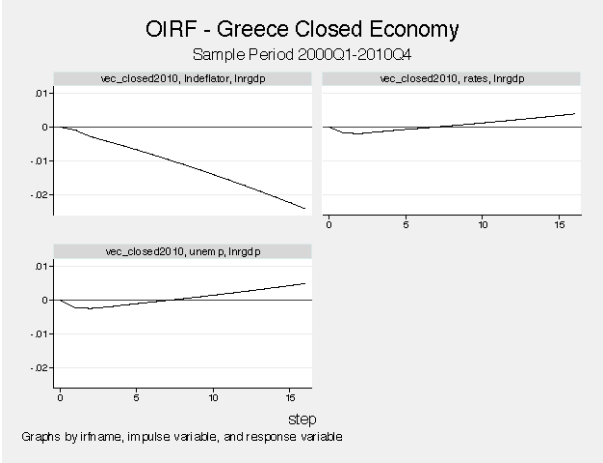
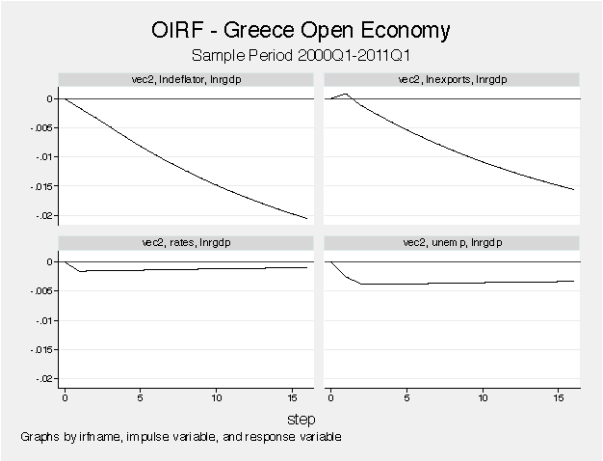


Figure 1 (D): Greece OIRFs From Shocks to Variables in System (excl. GDP) on GDP







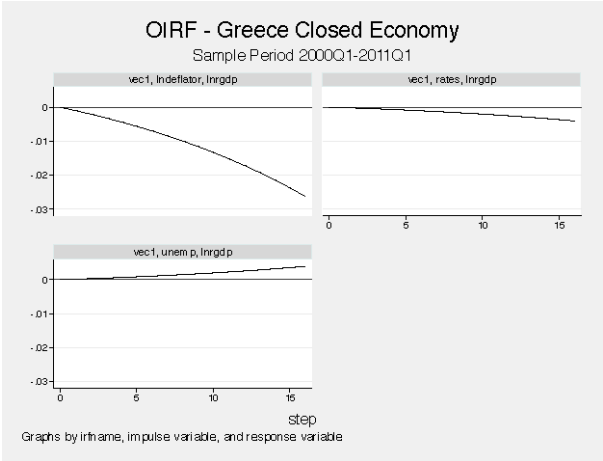
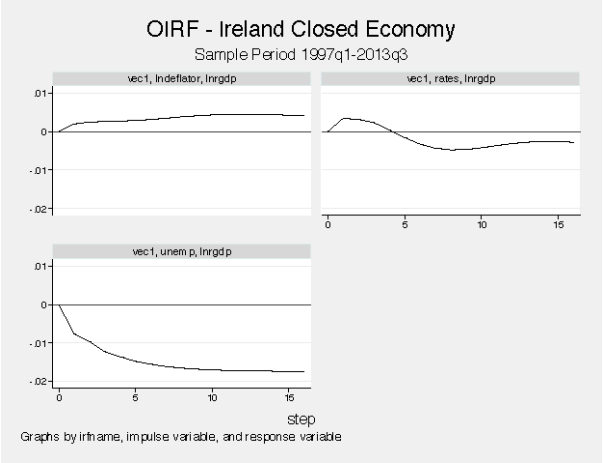
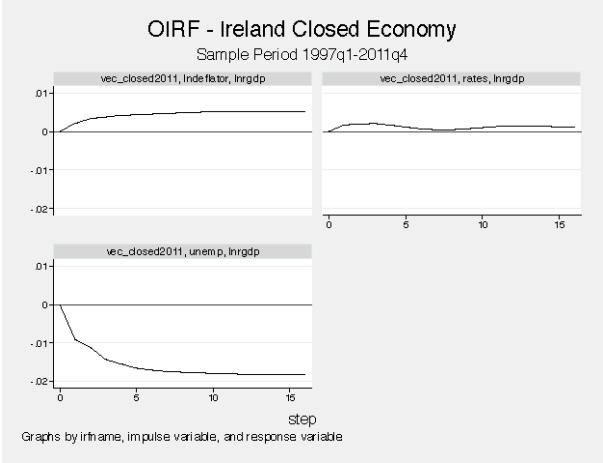
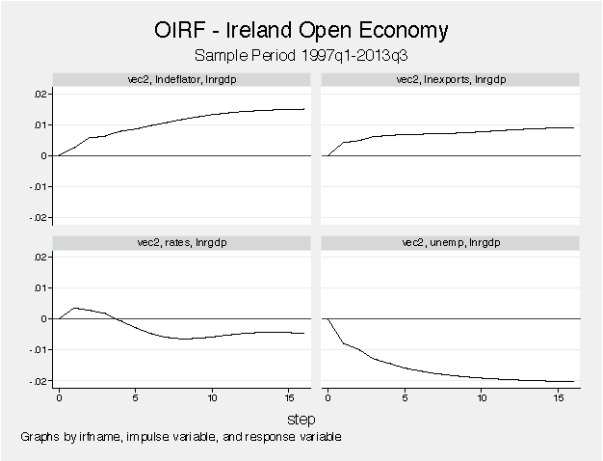


Figure 1 (E): Ireland OIRFs From Shocks to Variables in System (excl. GDP) on GDP







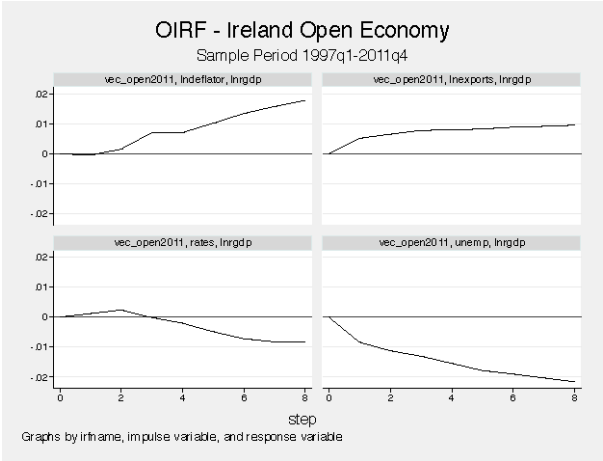
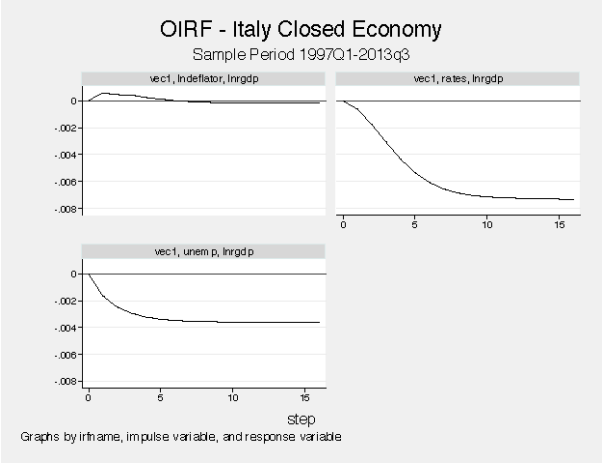
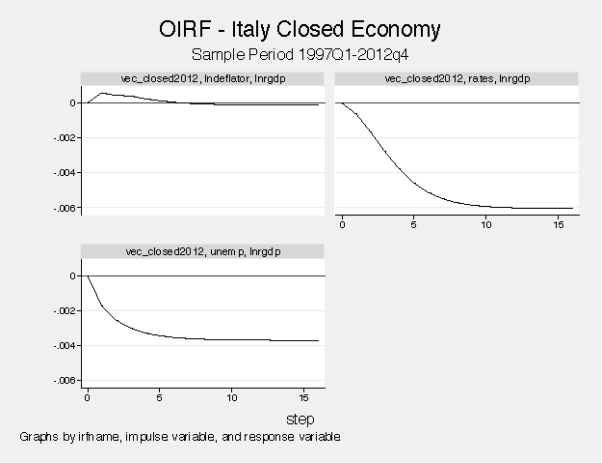
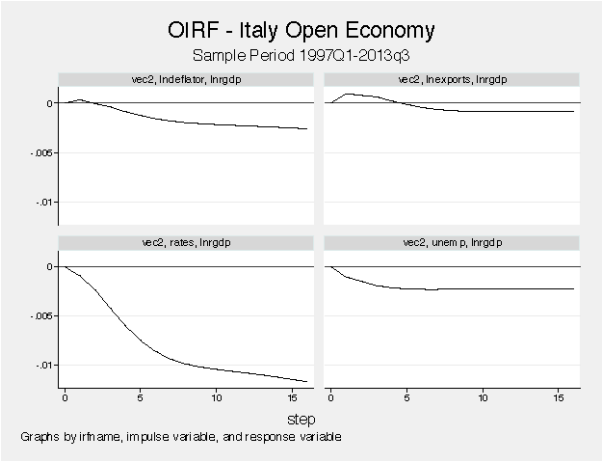


Figure 1 (F): Italy OIRFs From Shocks to Variables in System (excl. GDP) on GDP







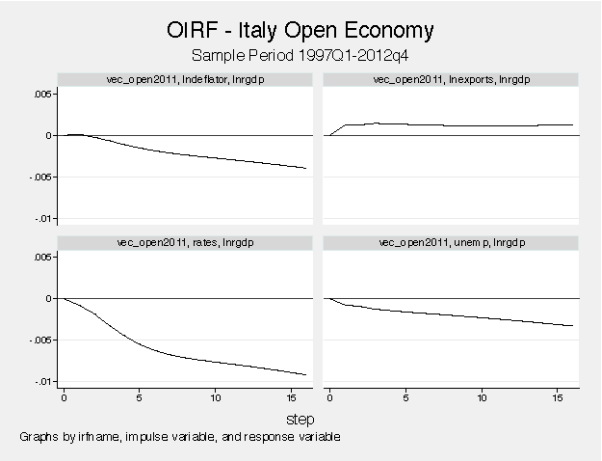
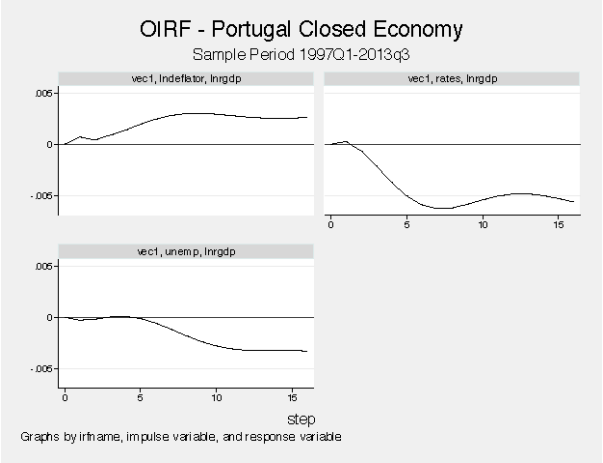
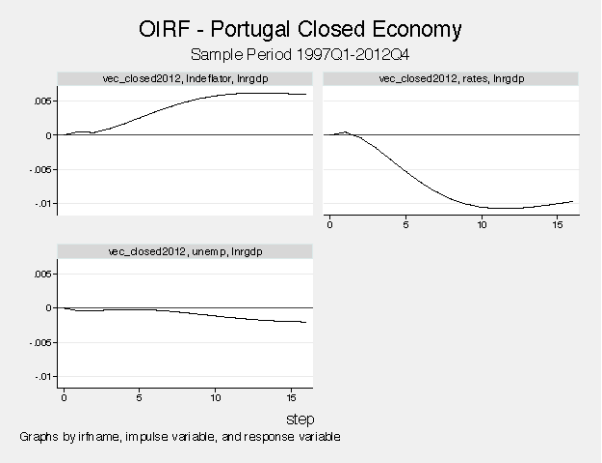
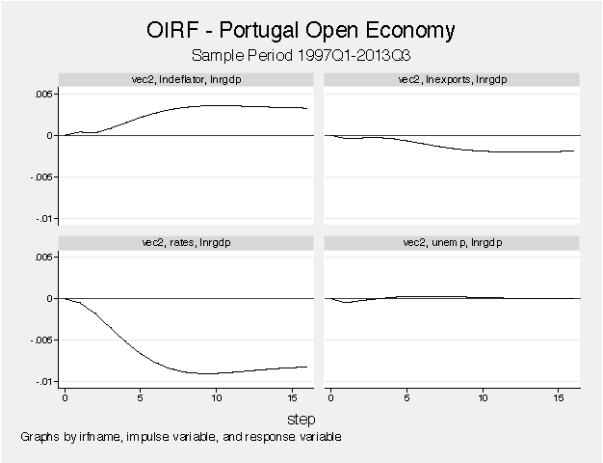


Figure 1 (G): Portugal OIRFs From Shocks to Variables in System (excl. GDP) on GDP







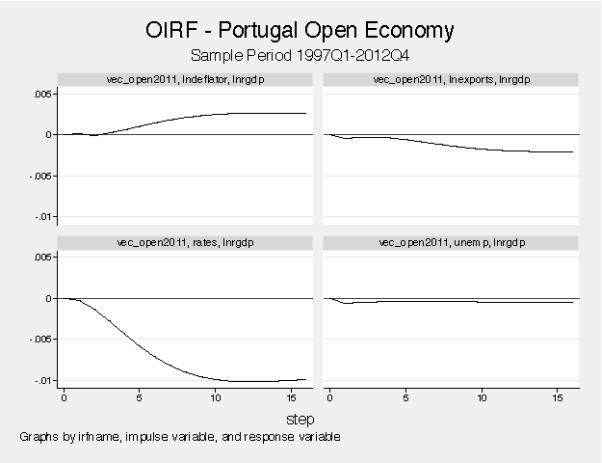
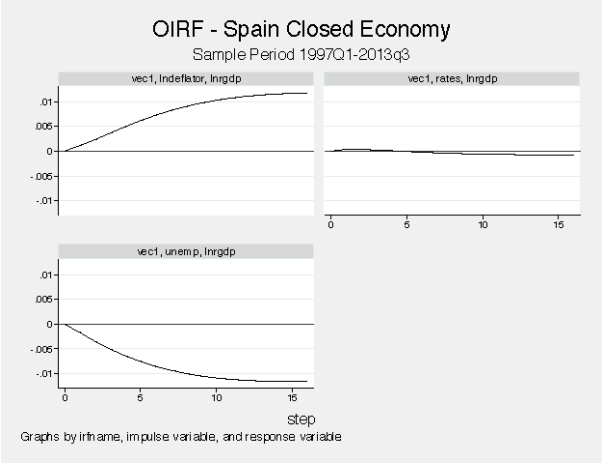
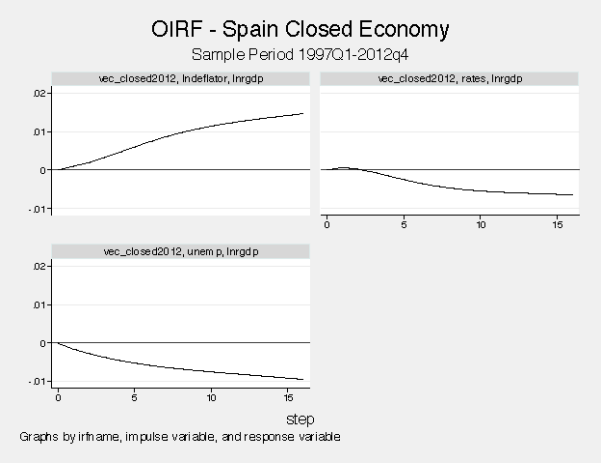
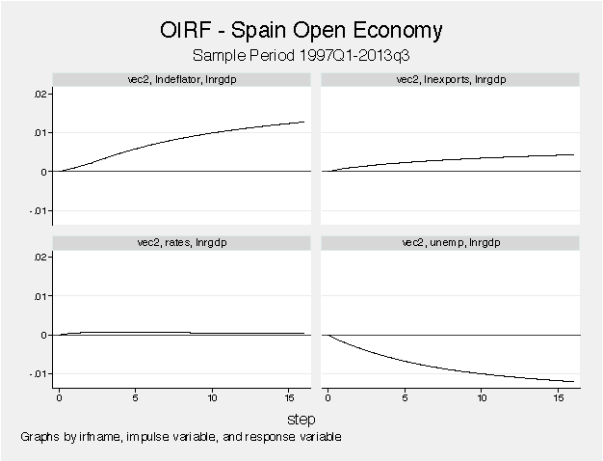


Figure 1 (H): Spain OIRFs From Shocks to Variables in System (excl. GDP) on GDP







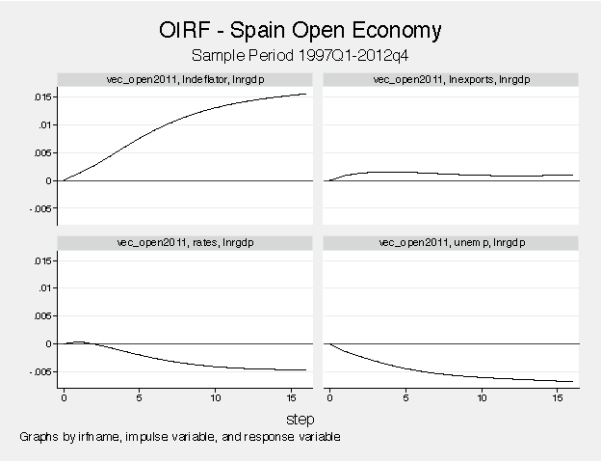


Figure 2(A.i.). Cyprus – GDP Forecast vs Actual GDP- 2001Q1-2013Q3

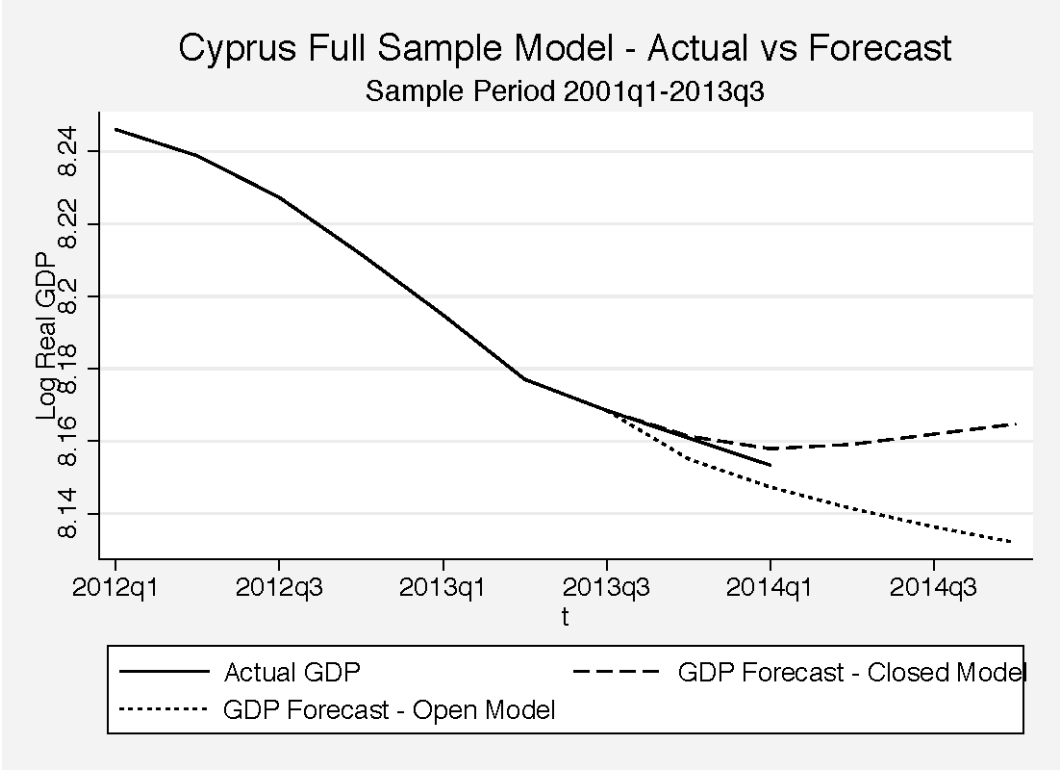


Figure 2(A.ii). Cyprus – GDP Forecasts vs Actual GDP - 2001Q1-2011Q4

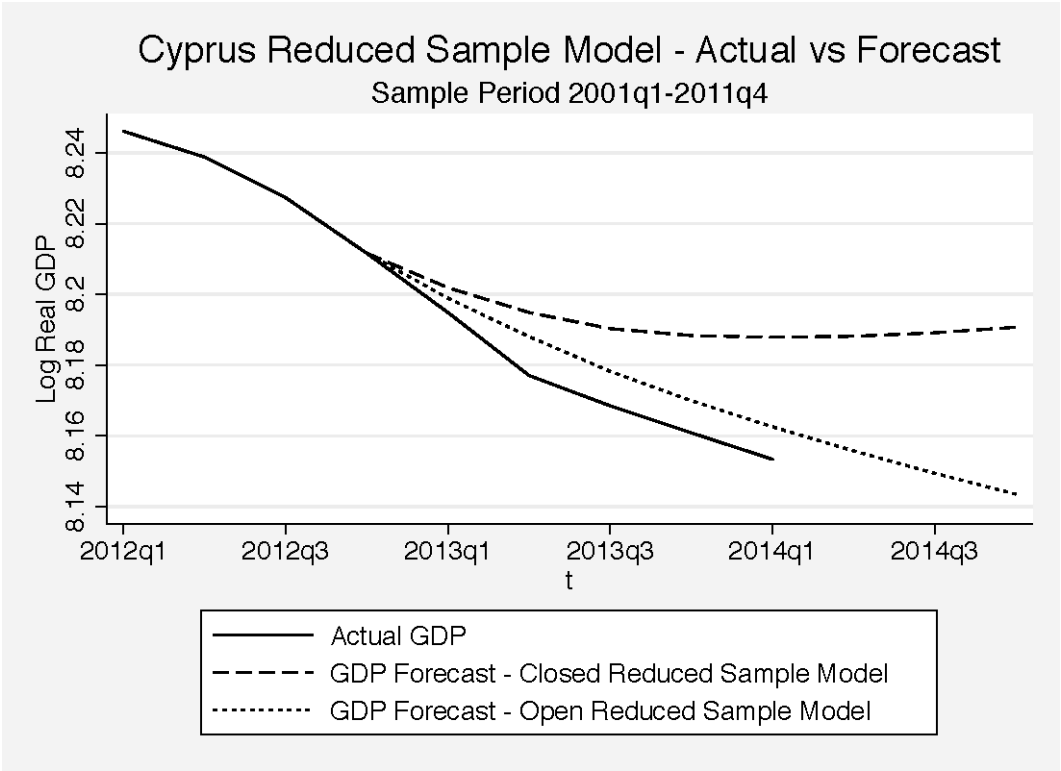


Figure 2(B.i). France – GDP Forecasts vs Actual GDP - 1997Q1-2013Q3

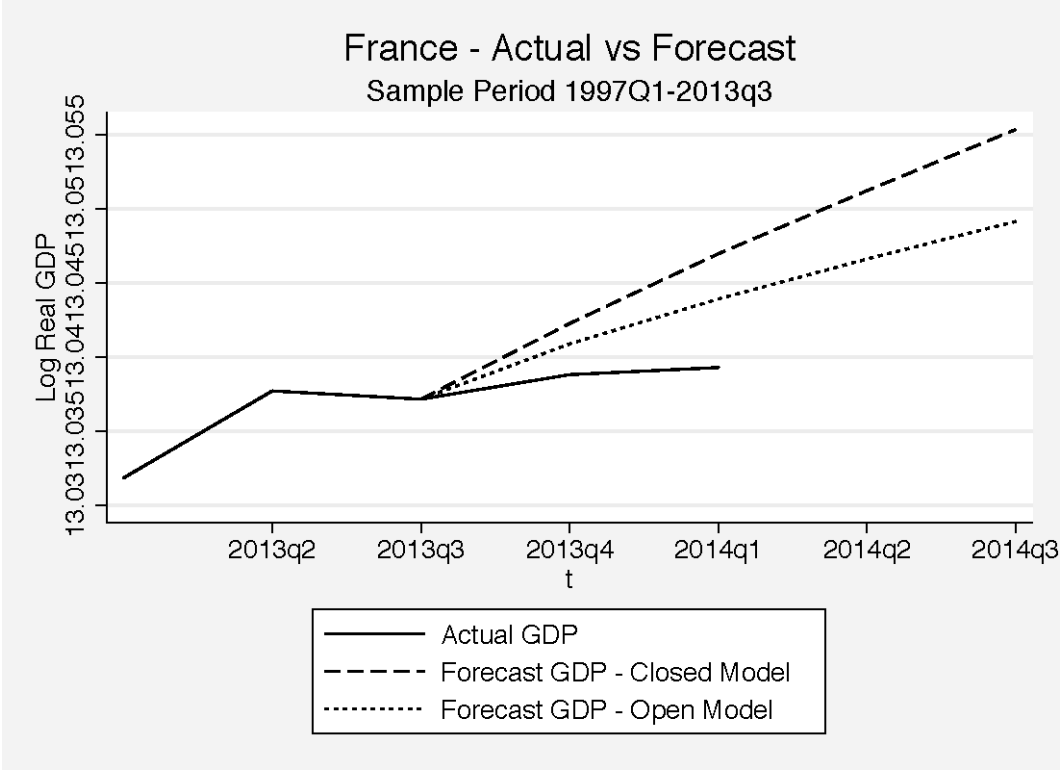


Figure 2(B.ii). France – GDP Forecasts vs Actual GDP - 1997Q1-2012Q4

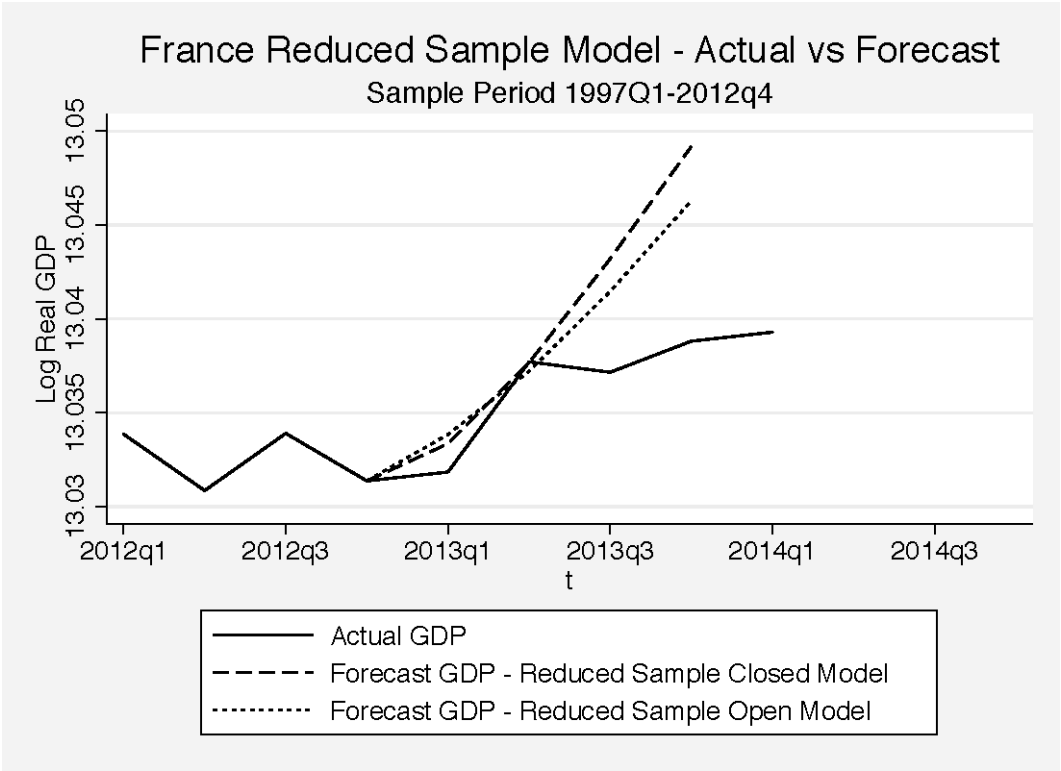


Figure 2(B.iii). France – GDP Forecasts vs Actual GDP - 1997Q1-2012Q4

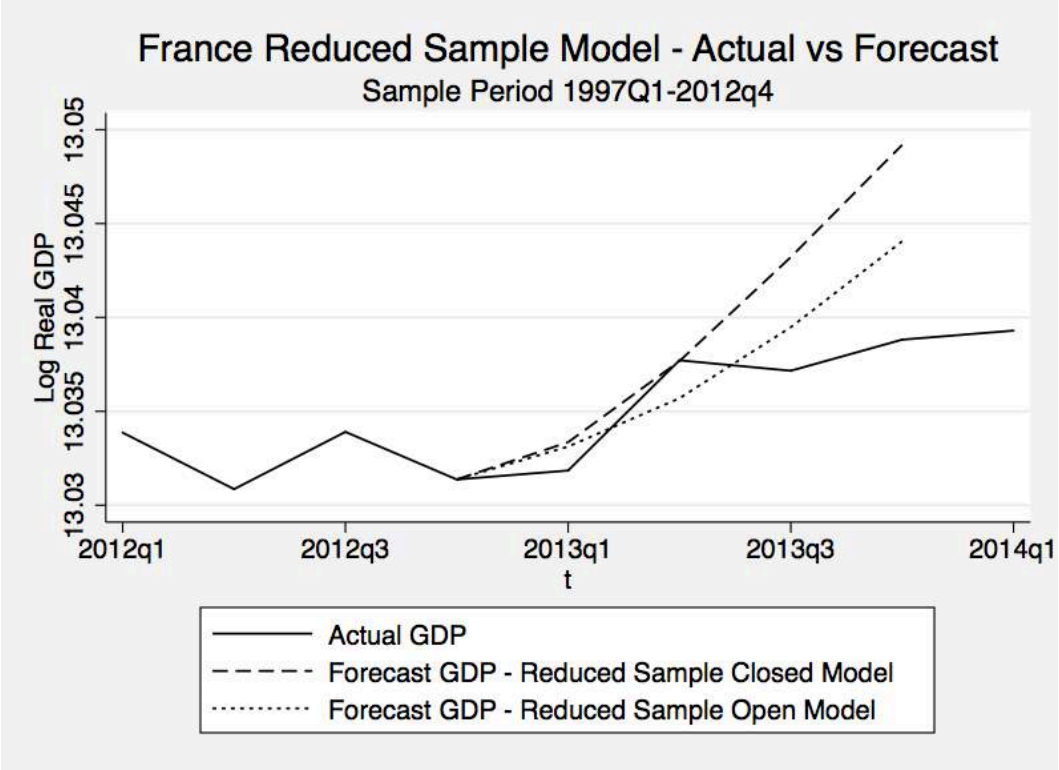


Figure 2(B.iv). France – GDP Forecasts vs Actual GDP - 1997Q1-2013Q3

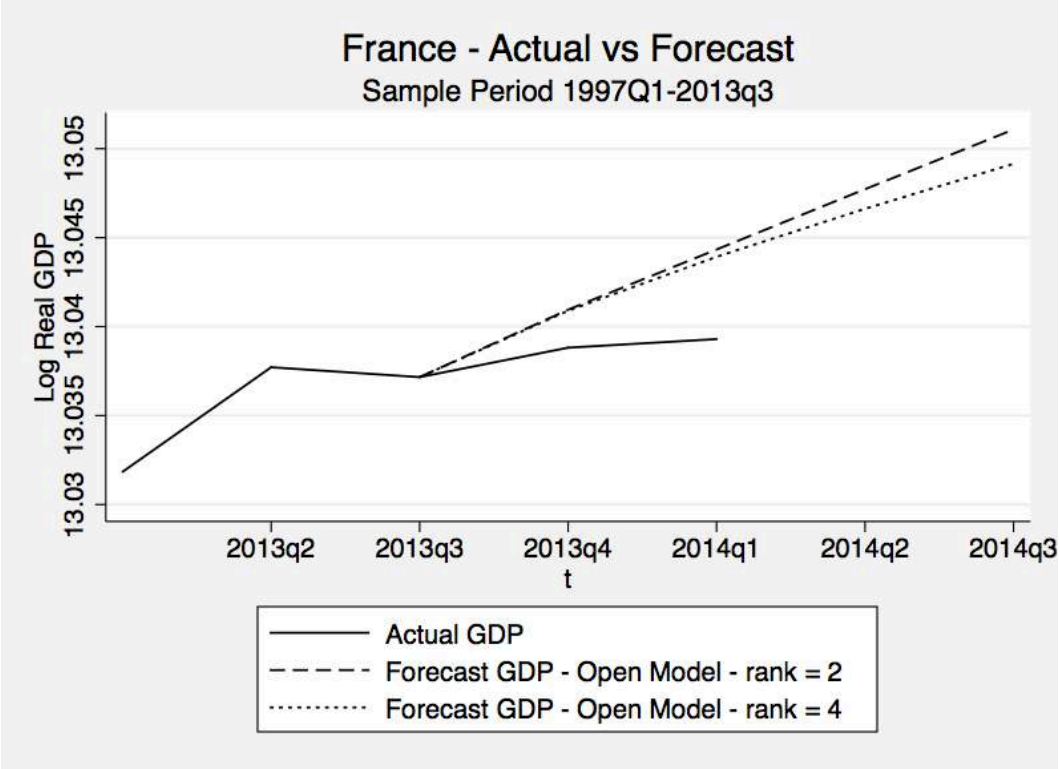


Figure 2(C.i). Germany – GDP Forecasts vs Actual GDP - 1997Q1-2013Q3

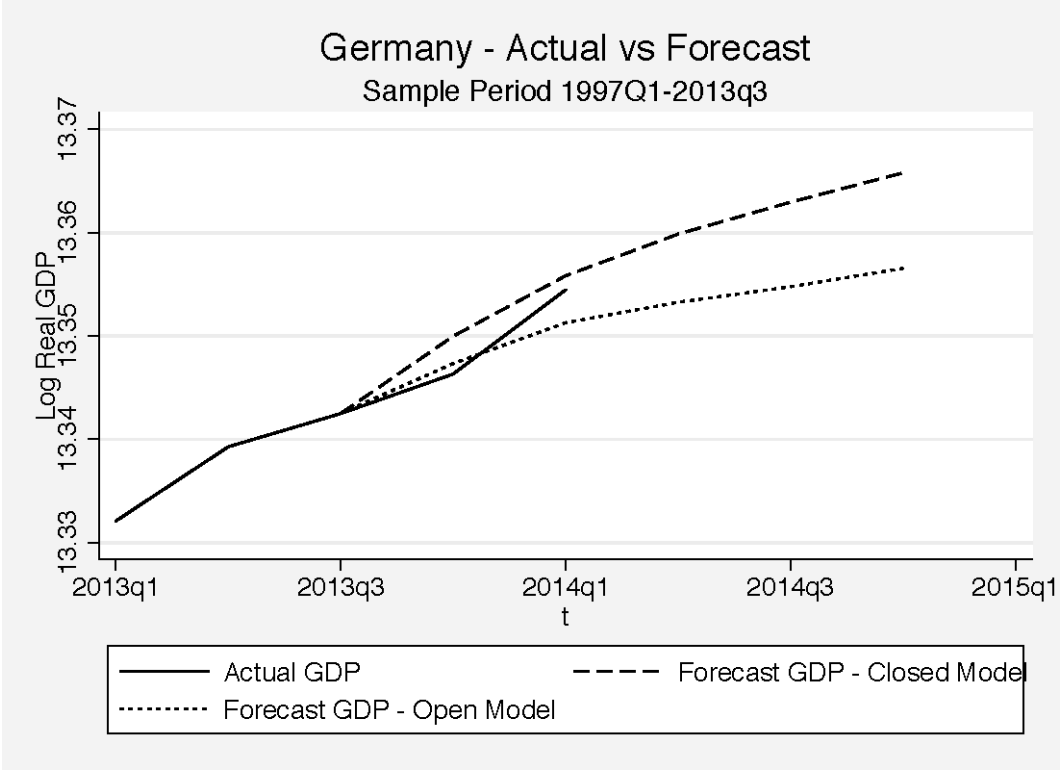


Figure 2(C.ii). Germany – GDP Forecasts vs Actual GDP - 1997Q1-2012Q4

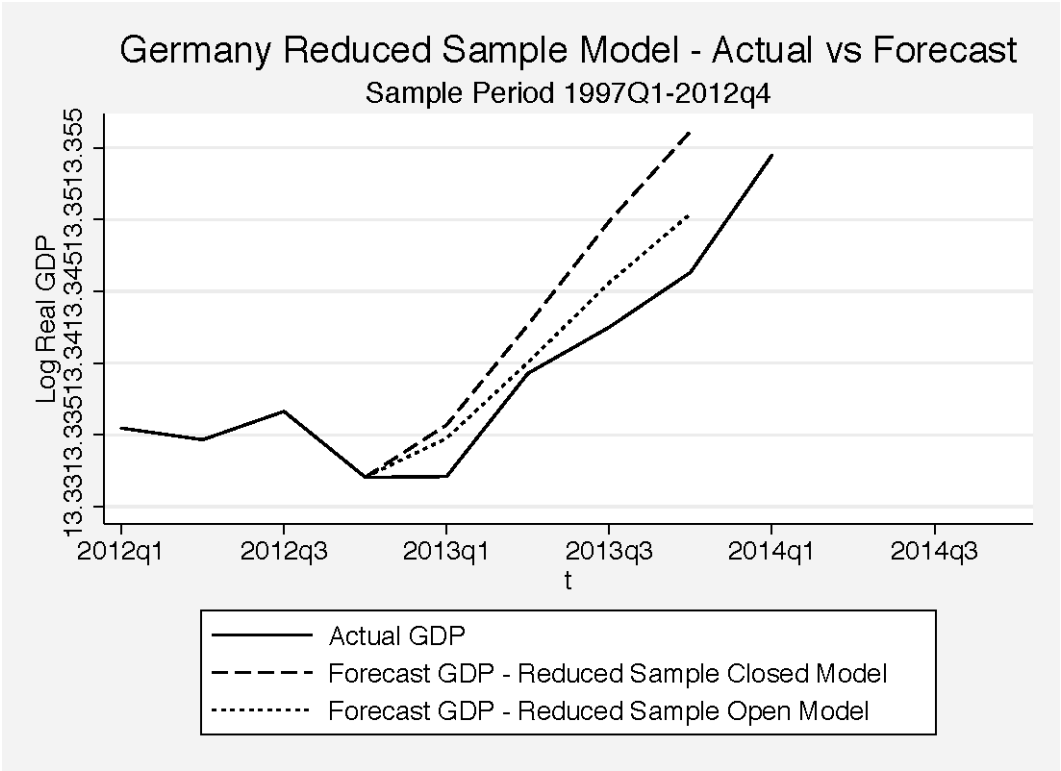


Figure 2(D.i). Greece – GDP Forecasts vs Actual GDP - 2000Q1-2011Q1

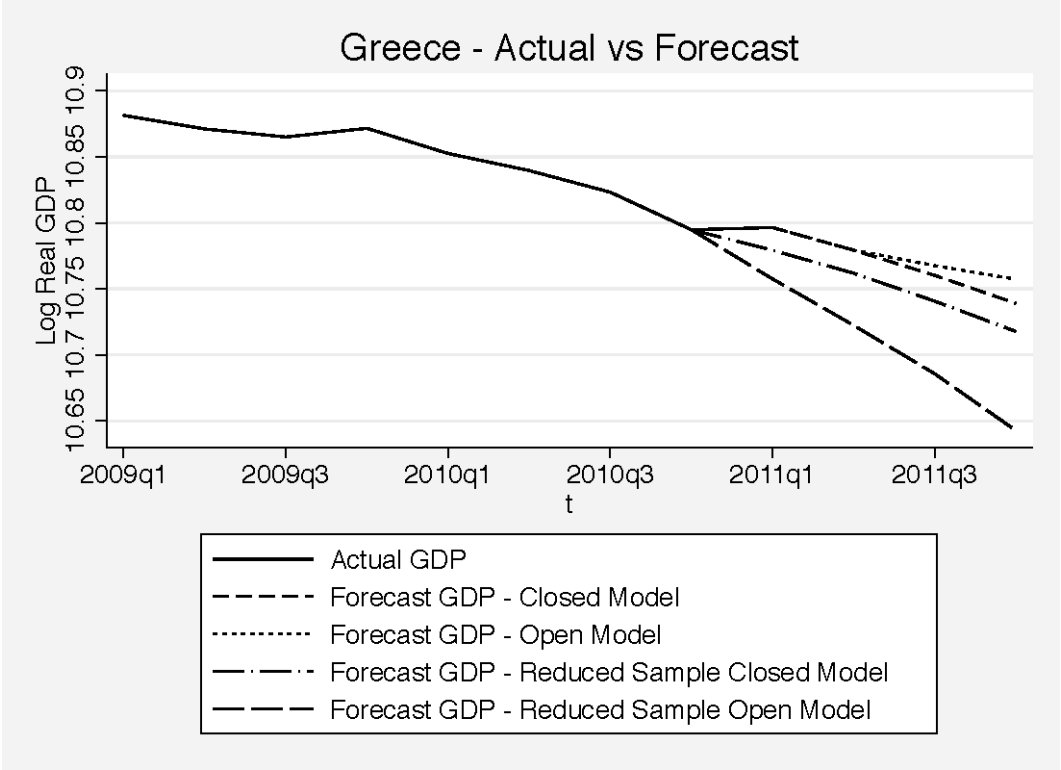


Figure 2(D.ii). Greece – GDP Forecasts vs Actual GDP - 2000Q1-2010Q4

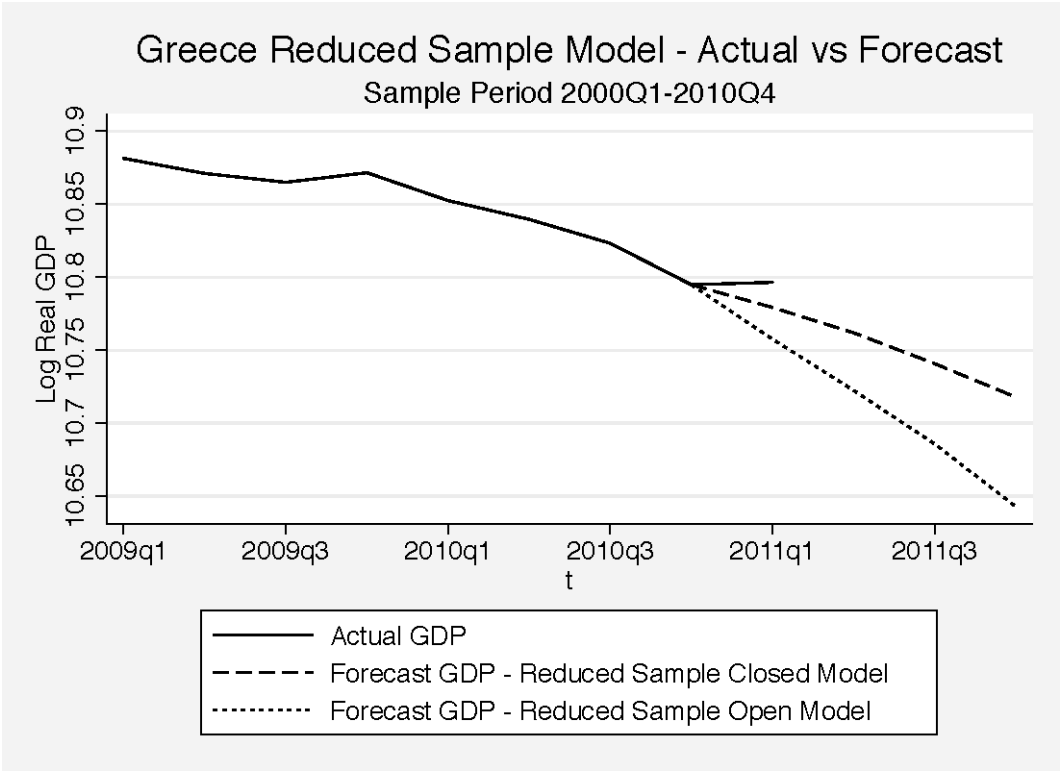


Figure 2(E.i). Ireland – GDP Forecasts vs Actual GDP - 1997Q1-2013Q3

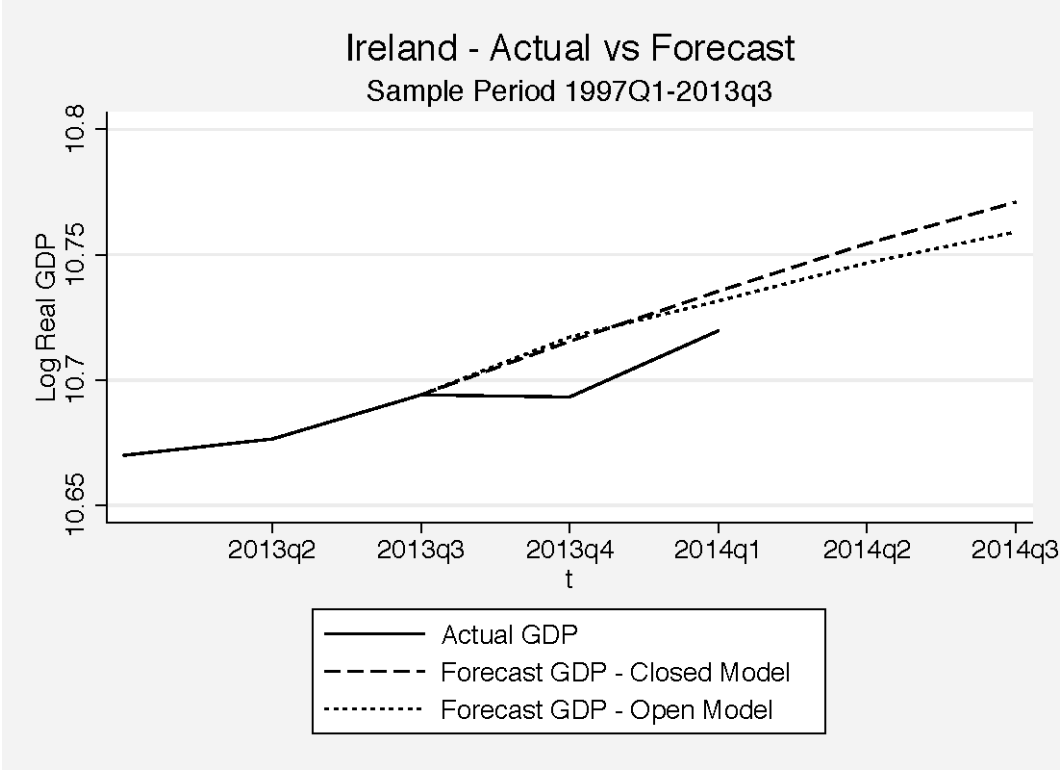


Figure 2(E.ii). Ireland – GDP Forecasts vs Actual GDP - 1997Q1-2011Q4

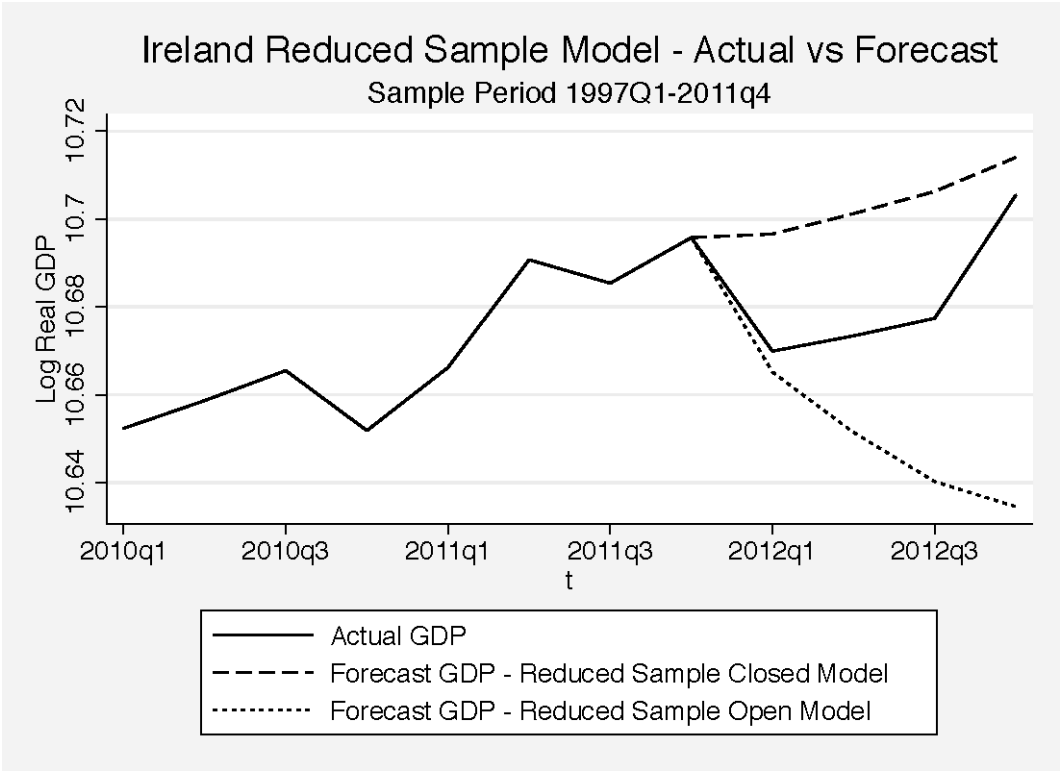


Figure 2(F.i). Italy – GDP Forecasts vs Actual GDP - 1997Q1-2013Q3

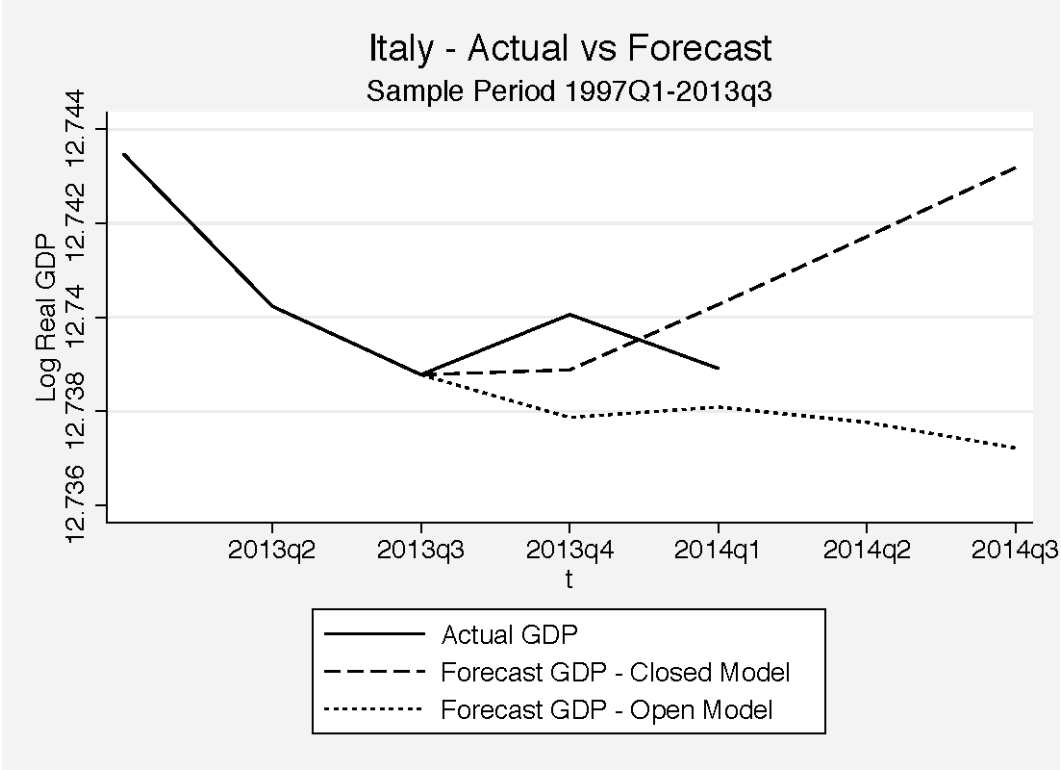


Figure 2(F.ii). Italy – GDP Forecasts vs Actual GDP - 1997Q1-2012Q4

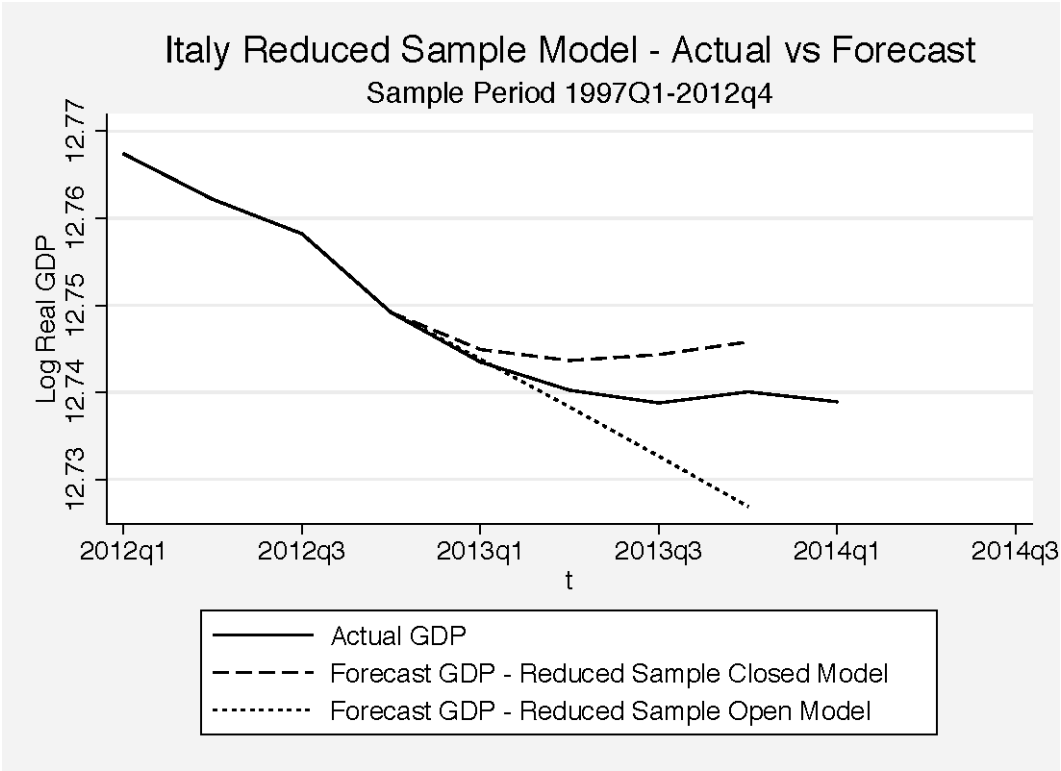


Figure 2(G.i). Portugal – GDP Forecasts vs Actual GDP - 1997Q1-2013Q3

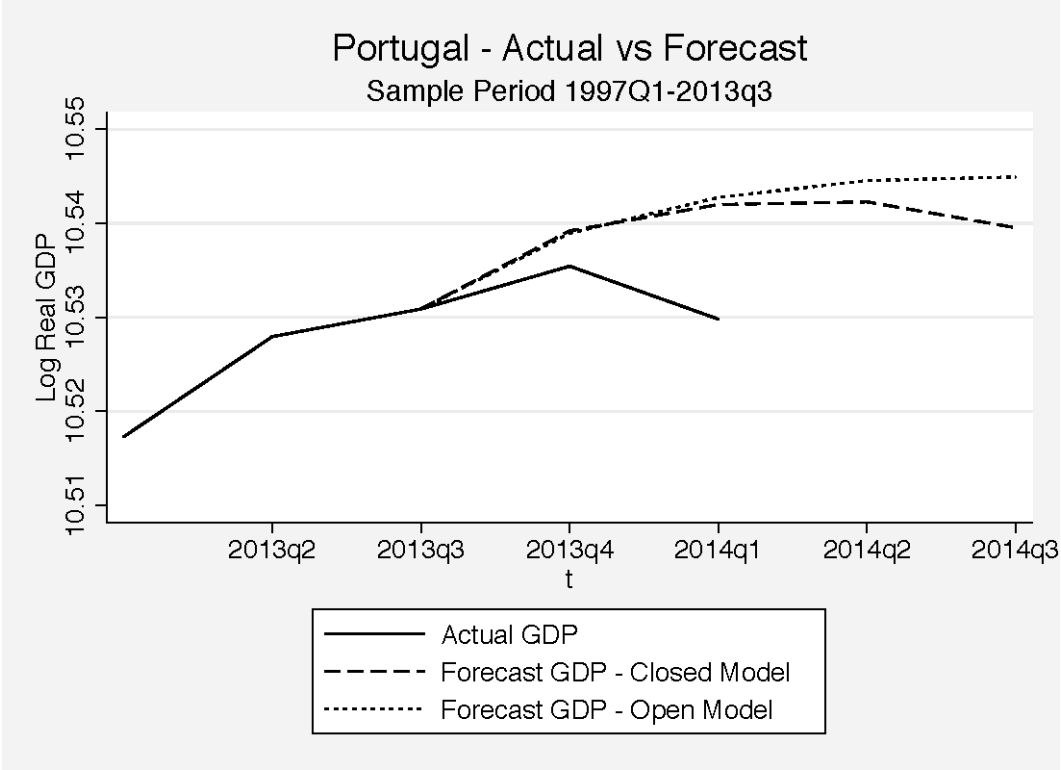


Figure 2(G.ii). Portugal – GDP Forecasts vs Actual GDP - 1997Q1-2012Q4

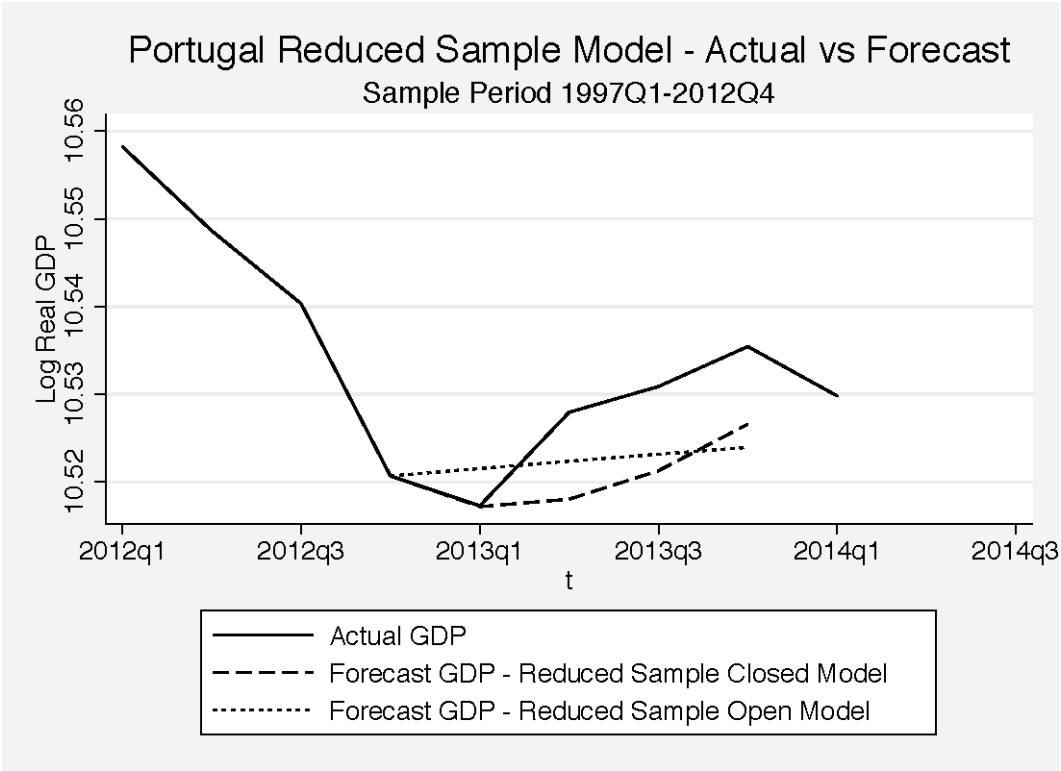


Figure 2(H.i). Spain – GDP Forecasts vs Actual GDP - 1997Q1-2013Q3

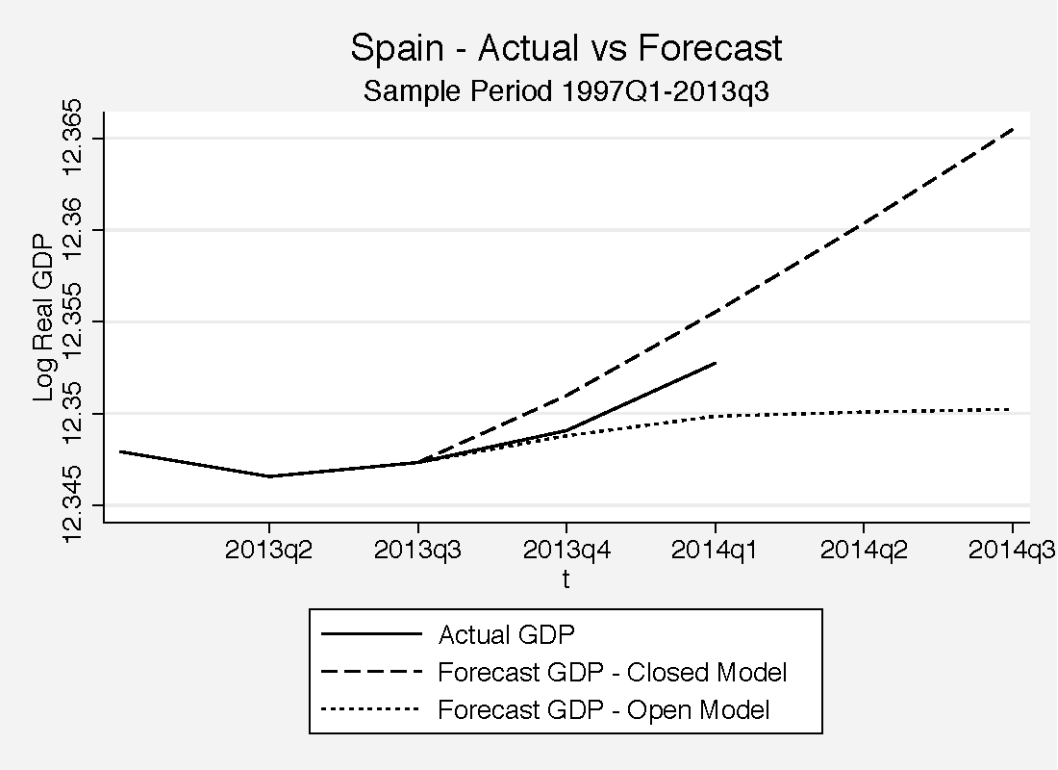


Figure 2(H.ii). Spain – GDP Forecasts vs Actual GDP - 1997Q1-2012Q4