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Determinants of the Portuguese GDP stagnation during the 2001-2014 period: an empirical investigation

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Abstract

The current paper aims at analysing the long Portuguese output stagnation during the period 2001-2014. Using a VEC model, the effect of exports, investment, public external liabilities and the country's risk premium on growth is analysed. Our study reveals that, in the long run, Portuguese GDP is determined by exports, the country's risk-premium and capital formation while in the short-run, growth is negatively affected by the country's risk premium and external public liabilities. Our findings also support the vulnerability of the Portuguese economy to external developments, in particular, we identified a negative effect of China's higher trade integration and the relevance of world market conditions.

JEL Classification: C32, H63 O47

Keywords: Portuguese Economy; Economic Stagnation; Growth Determinants; VEC model.

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1. Introduction:

In the second half of the 90s, Portuguese economic agents facing a large reduction of both nominal and real interest rates decreased their savings and increased both consumption and investment. As a result, a demand boom financed by a credit explosion sustained economic growth in Portugal during that period.

However, in the early 2000s, a long period of stagnation started and, since then, many explanations were proposed to explain Portugal's "Lost Decade". Since the entry in the euro did not lead to the expected income convergence, private agents revised downwards their expectations causing the end of the demand stimulus. At the same time, Portugal lost external competitiveness, as a result of new players entering the world export market with similar product specialization, and experienced an appreciation of its Real Effective Exchange Rate (REER). The ability of the country to counteract these external developments was prevented by Portugal's structural fragilities, namely, product and labour market rigidities, low human capital levels and a low capital-labour ratio. Furthermore, during this period, a pro-cyclical fiscal policy was followed contributing not only to amplify the early demand boom but also to deepen, the subsequent output stagnation, as a result of a fiscal consolidation process.

In April of 2011, following years of large external deficits and output stagnation, Portugal was forced to request financial aid. As a consequence of the agreed Economic Adjustment Programme, Portugal committed to a series of structural reforms and a difficult fiscal adjustment. Albeit, international authorities considered the program a success, Portugal continues to have several fragilities which constrain growth and thus, the agenda for policymakers is not finished.

The purpose of this study is to analyse the factors that contributed to the Portuguese output stagnation using a Vector Error Correction (VEC) model in which we include both endogenous and exogenous variables. Granger causality tests are performed to examine the causal relations between investment, exports, the country's risk premium, government external liabilities and economic growth. Additionally, we assess the relative importance of the different endogenous variables' shocks to the variation of the Portuguese GDP.

This paper is organized as follows: section 2 provides a literature review on some of the main causes for the Portuguese output stagnation. Section 3 presents the methodology and describes the data used. Section 4 discusses the empirical results. Section 5 contains some final remarks and discusses some policy implications based on the results of this study.

2. Literature Review:

The developments of the Portuguese economy over the last 30 years have attracted the attention of many economists since it was marked by a striking contrast between a period of real and nominal convergence until the turn of the century followed by a period of near-zero output growth. Many studies have been developed in order to understand the causes of the Portuguese anaemic growth, which started in 2001.

Reis (2013) proposes an explanation based on the misallocation of the large capital inflows that Portugal received since the mid-1990s. He argues that most of the capital inflows were channelled to unproductive firms in the non-tradable sector as a consequence of an underdeveloped domestic credit market which was unwilling to extend credit to existing productive firms due to their collateral constraints. This misallocation deviated funds away from the tradable sector originating a decline in productivity and a real exchange rate appreciation. This view is not shared by Blanchard (2007) who believes that even though higher capital flows indeed led to some mismanagement of resources, that was not one of the major causes of the Portuguese output stagnation. Instead, Blanchard argues that the bad performance of the Portuguese economy since 2001 could be explained by the private demand slowdown based on a revision of the private sector's expectations which would imply a price adjustment process. Due to pro-

cyclical fiscal policy and nominal wage and price rigidities, the required price adjustment did not materialize. Consequently, constant nominal wage growth ahead of productivity growth contributed to sustain the real appreciation and current account deficits.

Portugal's loss of competitiveness in the run-up to the Euro adoption referred by Blanchard (2007) is also documented in several other studies. Following a constant market share analysis, Amador, Cabral, and Opromolla (2009) found a declining market share of Portuguese exports as a result of the higher relative specialization in low-technology sectors (exposed to strong competition, see below) and of a higher share in Portuguese exports of countries which exhibited a poor growth performance since 1997. Moreover, the authors argue that this loss of competitiveness is partly due to Portugal's structural weaknesses ranging from poor endowment of productive factors, in particular a low human capital and a low capital-labour ratio, to product and labour market rigidities, which prevent the rapid and efficient sectoral reallocation of resources. Indeed, Almeida, Castro, and Félix (2008) using a dynamic general equilibrium model showed that increasing competition in the Portuguese non-tradable goods and labour markets can enhance international competitiveness and constitute valuable instruments in promoting necessary adjustments within the monetary union framework and in a context of higher international competition (especially, since 2001).

Along the same lines, Andrade and Duarte (2011) argue that the stagnant output growth is mostly the result of a lack of structural reforms, namely in the labour market, low levels of human capital, and the negative impact of globalization due to EU Eastern enlargement and Chinese accession to the WTO (World Trade Organization) in 2001. In this respect, Esteves and Cabral (2006) suggest that, in the last 20 years, China and Eastern Europe became fierce competitors of Portugal's traditional exports. Moreover, Andrade and Duarte contend that the Portuguese output stagnation is also caused by "a kind of Dutch disease", which was a consequence of monetary integration associated with poor policies. The fall in interest rates lead to very high levels of both public and private indebtedness, a decrease in the saving rate which dangerously trended negatively, and to a continuous deterioration of price competitiveness which reduced the rate of output growth. This Dutch Disease phenomenon was also identified by Campos e Cunha (2008) who showed using a simple model how this kind of Dutch Disease problem can be caused by external transfers (e.g. EU structural funds transfers), an interest rate decrease (wealth effect) or by public deficits. In that study, the author also shows that it was these current account (CA) deficits that lead to a real appreciation and so, "there is no room to claim a loss of competitiveness", challenging the prevailing explanation that the Portuguese external imbalance was caused by a real appreciation.

Along the same lines, it should be stressed that the evolution of interest rates is a key element to understand the developments of the Portuguese economy since 1995, as shown by Fagan and Gaspar (2005, 2007). As mentioned above, the developments of the Portuguese GDP were highly marked by the decline in both nominal and real interest rates (initially). This strong reduction was the result of a nominal convergence process and the existence of a strong political commitment of the Portuguese authorities to enter in the euro area - the "convergence plays" mentioned in Cunha and Silva (2004). The reduction of the country's risk premium and the lower interest rates, coming from expectations of participation in the euro area, together with the agents' prospects of higher output growth implied a demand boom financed by a credit explosion, which was mainly an adjustment process to a new steady state as rational agents decreased their savings and increased consumption since their wealth increased (Cunha and Silva, 2004), liquidity constraints were eased (Castro, 2006) and intertemporal consumption smoothing was implemented. In addition, investment increased to take advantage of higher growth prospects and lower cost of capital and thus, external deficits started being accumulated. Furthermore, the expansionary fiscal policy followed by the Portuguese government, which benefitted from the reduction in interest payments and better financing conditions, has contributed to amplify the demand boom and, consequently, output growth (Constâncio, 2005).

Since early 2000s, as the entry in the euro did not lead to the expected higher output and productivity growth (real convergence), households and firms revised their expectations and adjusted to their budget constraints causing a private demand slowdown (as referred by Blanchard, 2007). The end of this internal stimulus was reinforced by a decrease in external demand directed to the Portuguese economy (Constâncio, 2005), as a result of new players (China and Eastern Europe countries) entering the world export market and an appreciation of Portugal's REER (contributing to maintain high CA deficits), which helped to slowdown Portuguese GDP growth. Further, the economic activity slowdown contributed to unveil persistent fiscal imbalances and, as a consequence, the public debt ratio increased significantly. As a response, a fiscal consolidation process with further tax increases and expenditure cuts was implemented (Almeida, Castro, and Félix, 2009) during a period in which expansionary fiscal policy was needed to alleviate the output contraction.

The Portuguese situation was worsened with the outbreak of the financial crisis in 2008. The global financial crisis led investors to perform a more careful risk analysis which implied the resurgence of a risk premium and so, higher interest rates for countries like Portugal with high indebtedness levels. In this context of low growth and persistent external imbalances, leverage of private agents and public debt increased to excessive levels. This cumulative process was recognized as being unsustainable and, consequently, a crisis erupted in early 2011. Since then, a significant external adjustment is taking place as a consequence of the sudden stop in external financing which led private agents to increase savings and the government to pursue further fiscal consolidation so that creditors could be paid off. As a result, the economy went into severe recession as consumption, investment, and imports decreased significantly so that external balance could be restored (Gershenson et al., 2016).

3. Methodology and Data:

The purpose of this research is to study the factors that contributed to the stagnation of Portuguese GDP since 2001. It is widely recognized in the literature that many growth determinants are endogenous, in particular, many of the variables used in empirical studies not only explain economic growth as they are also influenced by economic growth itself. One possible solution for this endogeneity problem is the use of Instrumental Variables. However, the difficulty of finding adequate instruments is also identified in the literature (Durlauf, Johnson, and Temple, 2004). In fact, because so many factors can plausibly influence growth, it is difficult to find a valid instrument. Strictly speaking, it is hard to find a variable which is correlated with the included growth determinant and, at the same time, it has an impact on GDP growth only through its impact on that endogenous growth determinant meaning that it would be uncorrelated with the residuals. As argued by Gobbin and Rayp (2008)**,** a vector auto-regressive (VAR) model is a suitable framework to address these problems since it imposes very few a priori restrictions, in particular, we do not have to specify which variables are endogenous or exogenous (all variables are modelled as endogenous) being the only exception the linearity assumption between the variables. Moreover, VAR models proved to be able to capture the rich dynamic inter-relations between economic variables which can be analysed by considering the existence of causal relationships between the variables (Granger causality), the effects of the different shocks on the variables in the model, summarized by the impulse response functions, and the relative importance of the different shocks to the variation in the variables included (variance decomposition).

When deciding the variables to include in the model, it is recommended to use economic theory since it is not possible to include all variables of potential interest (too many parameters would have to be estimated). Therefore, the variables included in our study are chosen according to the existing literature on the causes of the Portuguese GDP growth and, then, considering the fit of the econometric model. In particular, our study includes real GDP (GDP), real gross capital formation (GCF), real exports (EXP), a risk premium measure (RP) and the external government liabilities (IIPg), as endogenous variables. In

addition, the model includes, as exogenous variables, oil prices (OIL), the growth rate of Chinese exports to the Euro Area (CHINA_EXP) and a proxy for external demand (OECD_GDP), which can also represent the global economic context. More data and computational details are presented in Table 2.

The variable GCF is a measure of domestic investment expenditure which increases the productive capacity of an economy and so, contributes to faster output growth. Its inclusion in the model follows economic growth theory which, since the work of Solow, emphasizes the role of factor accumulation in causing economic growth. Moreover, as concluded by Coimbra and Amador (2007), the main cause of economic growth in Portugal has been capital accumulation.

The inclusion of the variable EXP is consistent with the work of Andraz and Rodrigues (2010). The authors, using a VEC model, found that exports foster long-run growth, supporting the export-led growth hypothesis which considers export growth as a main driver of economic growth.

The variable RP (the ratio between the Portuguese and the German 10-year yields), accounting for the Portuguese risk premium, was included based on the fact that its developments were crucial for the evolution of the Portuguese economy during both the period ranging from 1995 to the outset of the financial crisis (Fagan and Gaspar, 2005, 2007) and the period running from then on, in which as a response to the global financial crisis, the Portuguese sovereign bond yields spiked (resurgence of the country's specific risk premium) (Gershenson et al., 2016).

As regards IIPg, it was included in our model in order to study the effects of the higher public external indebtedness on Portuguese output growth (as debt securities account for most of the Portuguese government IIPg liabilities). The relevance of this variable stems from the fact that during the period under analysis the proportion of public debt held by non-residents increased notably so that at the end of 2008 around 80% of the Portuguese government debt was held by non-residents comparing with a value of 50% in 1999. This cumulative process was recognized as being unsustainable and so, Portugal experienced a sudden stop in capital inflows (not only to the public sector, but also to banks and corporations (Gershenson et al., 2016)) in 2011.

For a small open economy such as Portugal, economic growth is also sensitive to changes in external conditions. In fact, the stagnation of the Portuguese GDP is admitted to have been influenced by the international economic slowdown Constâncio (2005). To account for the impact of external developments, the variables OIL, OECD_GDP and CHINA_EXP were included. These variables are included in the model as exogenous variables since it is expected that Portugal, as a small open economy, cannot influence them. The inclusion of OIL is motivated by the fact that terms of trade developments were dominated by the evolution of oil prices (Cardoso and Esteves, 2008b). As to OECD_GDP, this variable is a reasonable external demand proxy since it accounts for more than 80% of Portugal's trading partners; Soukiazis et al. (2013). Lastly, CHINA_EXP aims to capture the effect of the higher competition faced by Portuguese exports since Chinese accession to the WTO in 2001 (Esteves and Cabral, 2006) which is expected to have contributed to the output's stagnation (Andrade and Duarte, 2011).

Since this study uses quarterly data from 1995q1 to 2014q4, the variables for which seasonally adjusted data was not available had to be seasonally adjusted using the Census X-13 method using Jdemetra+ software.

Stationarity of the series is required in order to avoid spurious regressions and misleading results. Thus, the stationarity of the series was tested using a modified Dickey-Fuller unit root test, DF-GLS test, proposed by Elliott, Rothenberg, and Stock (1996). It has been shown that this test has significantly greater power than previous versions of the augmented Dickey-Fuller test and consists of performing the usual augmented Dickey-Fuller test but using local GLS detrended data in the test regression.

The unit root test results are presented in Appendix 2, Table 4. The results show that all the endogenous variables are non-stationary in log-levels and stationary in first-differences of the log-levels (except RP, which is in levels). Since all endogenous variables are *I(1)*, there is the possibility of

cointegrating relationships and, thus, the Johansen cointegration test should be performed. As the asymptotic distribution of the test statistic for cointegration depends on the deterministic components considered in the model, the Pantula principle (Pantula, 1989) is used to jointly decide the deterministic components and the cointegration rank. It can be observed from Table 5 (Appendix 2) that model 2 (includes an intercept in the cointegration equation and no intercept in the VAR model) with 2 cointegration equations is the first model accepted.[3] The test used is the trace test considering a lag length of one which was deduced from the results of three information criteria: Final Prediction Error, Akaike Information Criterion and Hannan and Quinn Information Criteria that indicated a lag length of 2 for the unrestricted VAR model (Lütkepohl, 1991). This model specification produces homoscedastic residuals as we fail to reject the null hypothesis of no heteroscedasticity for the White test (with cross terms). In addition, the null hypothesis of normality of the residuals could not be rejected in most cases (Jarque-Bera test). Lastly, the autocorrelation LM test gives evidence of no serial correlation.

The VEC model estimated in this study can be formalized as follows:

$$\Delta y_t = \beta ECT_{i,t-1} + \sum_{i=1}^{p-1} \Gamma_i \, \Delta y_{t-i} + \Theta X_t + e_t$$

where $y_t = [GDP_t, IIPg_t, GCF_t, EXP_t, RP_t]'$ is the vector of the endogenous variables, $X_t = [\Delta logOECD\_GDP_t, \Delta logOIL_t, CHINA\_EXP_t]'$ is the vector of exogenous variables, Γ_i is the coefficient matrix of the lagged endogenous variables, Θ is the 1x3 coefficient vector of the exogenous variables, p is the optimal lag number of the VAR in levels and e_t is the residuals vector. Additionally, the model includes an error-correction term $ECT_{i,t-1}$ which corrects short-term deviations from the long-run equilibrium. The estimation results are found in Table 1.

4. Empirical Results:

4.1. Long run equilibrium and adjustment coefficients:

As mentioned in the previous section, there are two long-run equilibrium relationships among the variables included in the model. We choose to normalize the two cointegration relations with respect to GDP and IIPg, respectively. The first cointegration equation is normalized with respect to GDP since the main purpose of this study is the analysis of its determinants. The second equation is normalized with respect to IIPg because when the model is estimated without this variable, only one cointegration relation is found and, by including IIPg, two cointegration relations are indicated by the Johansen test. Moreover, from an economic viewpoint, it is noteworthy to understand what influences the ability of the Portuguese government to maintain its creditors' confidence and continue financing its activity with external funds, which was one of the important factors explaining Portuguese output growth during the period of analysis.

The estimated cointegrated vectors describing the two long-run equilibrium relations are:

$$GDP_t = 12.68 + 0.21GCF_t + 0.3EXP_t - 0.017RP_t$$
(t-values) (16.42) (6.86) (17.94) (-4.57)

$$IIPg_t = -20.6 - 1.96GCF_t + 3.83EXP_t - 0.47RP_t$$
(t-values) (-1.39) (-3.36) (11.84) (-6.62)

In each of the two cointegrated vectors, the coefficients of all variables are statistically significant at a 1 per cent significance level confirming the existence of a causality link between the variables. The results for the first cointegration equation show that in the long run a 1% increase in capital formation will increase output by 0.21% and a 1% increase in exports would lead to a 0.3% increase in output. Similarly, a 1-unit

[3] In fact, the first model accepted is model 4 with one cointegration equation and thus, that model was the first model estimated. However, the coefficient of the linear trend in the cointegration equation would not be significant. As a result, we proceeded to the estimation of the following accepted model.

increase in the ratio between the Portuguese and the German 10-year yield (the country's risk premium) will decrease output by 1.7%.[4]

Regarding the second cointegrating vector, it can be concluded that, in the long run, higher investment would decrease the stock of public external liabilities. In particular, a 1% increase in GCF would cause a 2% decrease in IIPg. Conversely, a 1% increase in exports would cause a 3.8% increase in IIPg, which is a reasonable result since exporting more contributes to a lower external deficit and, so a lower total external debt. As such, public external liabilities would have room to increase. In addition, a 1-unit increase in the ratio between the Portuguese and the German 10-year yield (the country's risk premium) would produce a 47% decrease in public external debt, which was expected since the Portugal 10-year yield would be higher.

Considering the coefficients on the lagged error-correction terms of the first cointegration equation, the results show that only the coefficients in the $\Delta logGDP_t$ and the $\Delta logIIP_t$ equations are statistically significant, at a 1% significance level. The error-correction term coefficient in the $\Delta logGDP_t$ equation equals -0.28 which means that when GDP is above its equilibrium level in the current period, that deviation would be corrected by 28% in the next period. Additionally, when GDP is above its equilibrium level during the current period, IIPg would have a large decrease in the next period, as government borrowing needs would be lower.

As concerns the coefficients on the lagged error-correction terms of the second cointegration equation, the adjustment coefficient of IIPg is significant, at a 1% significance level. Thus, if IIPg grows above its equilibrium level in the current period, the next period's IIPg value would increase by 16% implying an even larger divergence from the long-run equilibrium relation. On the contrary, when IIPg is above its equilibrium value, investment would decrease by 4% during the next period. Lastly, the value of GDP would increase by 0.8%, one period after IIPg being above its long-run equilibrium value.

Table 1. VEC model

	Dependent variable				
	$\Delta logGDP$	$\Delta logIIPg$	$\Delta logGCF$	$\Delta logEXP$	ΔRP
$ECT_{1,t-1}$	-0.275*	-2.629*	0.372	-0.161	0.667
$ECT_{2,t-1}$	0.008**	0.162*	-0.041**	0.013	-0.288
$\Delta logGDP_{t-1}$	-0.025	0.182	2.16*	-0.172	-7.07
$\Delta logIIPg_{t-1}$	-0.049*	-0.377*	-0.01	-0.136*	-0.336
$\Delta logGCF_{t-1}$	-0.023	-0.406**	-0.408*	-0.062	-0.584
$\Delta logEXP_{t-1}$	-0.032	0.046	-0.183	-0.136	2.214
ΔRP_{t-1}	-0.003***	-0.016	-0.021**	-0.007	0.67*
$\Delta logOECD\_GDP$	0.837*	-0.142	2.067**	3.401*	13.55
$\Delta logOIL$	-0.003	-0.032	0.013	-0.0137	-0.62***
$CHINA\_EXP$	-0.011**	-0.048	-0.029	-0.022	0.101

Notes: * indicate significance at the 1% level; ** indicate significance at the 5% level; *** indicate significance at the 10% level.

[4] The interpretation of all model estimates follows the ceteris paribus assumption and, according to the OLS methodology, the figures presented are on average values.

All the other adjustment coefficients are not statistically significant. That could occur when estimating a VEC model because the short-run dynamics partially offsets the adjustment effects (Andraz and Rodrigues, 2010).

4.2 Granger Causality and Variance Decomposition

In order to understand both the short-run and the long-run determinants of Portuguese GDP growth, Granger causality tests were performed and are presented in Table 3. As aforementioned, the first error-correction term in the $\Delta logGDP_t$ equation is statistically significant implying important long-run effects stemming from investment, exports and the country's risk premium to GDP. As a result, it is possible to conclude from the model estimates that capital formation, exports and the country's risk premium are long-run determinants of the Portuguese GDP. Based on the previous cointegration analysis we expect that the effects from the country's risk premium would be the strongest.

In terms of short-run analysis, it is possible to conclude that, during the period of analysis, the main determinants of Portuguese economic growth were the evolution of the country's risk premium and the external government liabilities (considering just the endogenous variables for now). Both variables have a negative impact on GDP.

The significant negative effect on GDP stemming from an increase in the country's risk premium confirms the importance of the developments of this variable for the Portuguese economic performance, as previously mentioned. During the period between 1995 and the outset of the financial crisis, Portugal has benefitted from a decline in its idiosyncratic risk premium which, ultimately, led to a surge in both consumption and investment due to the strong reduction of both nominal and real interest rates (Fagan and Gaspar, 2005, 2007). The financial crisis elevated investors risk sentiment causing the reappearance of a risk premium which, in turn, triggered the debt crisis that had accentuated the Portuguese output stagnation (Gershenson et al., 2016). Furthermore, there is a unidirectional relationship stemming from RP to GFC, which confirms what happened in Portugal after 1995. In particular, the VEC estimates also show that a higher risk premium reduces investment confirming that when investors perceive the country as less risky, they would invest more contributing to higher capital formation. Therefore, it is possible to conclude that RP also influences growth indirectly via GCF. A lower risk premium by stimulating capital formation would contribute to higher production capacity which, in turn, would allow higher future output growth.

Similarly, the significant negative effect of higher external government liabilities on output growth is consistent with the fact that the build-up of external liabilities contributed to an expansionary fiscal policy which in a context of low growth led, ultimately, the government to increase taxes and cut its expenditures reinforcing the output slowdown. Additionally, as external debt accumulated and the vulnerability of the country to interest rate movements increased, the burden with interest rate payment, other things equal, also contributed to the need for fiscal consolidation. Finally, high external government liabilities imply high capital inflows which increase domestic demand and so, imply a lower exporting capacity, as shown by Campos e Cunha (2008). The decrease in exports would contribute to the Portuguese output stagnation and thus, to the negative effect of IIPg on GDP (proving the endogeneity of the variables and so, confirming that the use of a VAR model is the appropriate econometric approach).

The VEC estimates also suggest that higher external government debt today will cause a decrease in next period's exports. This result is in accordance with the just mentioned real appreciation caused by the high capital inflows which hampered the country's exports performance, as domestic absorption increased.

Additionally, it was possible to find unidirectional Granger-causality running from GCF to IIPg. A higher investment growth rate would lead to a contraction in external public liabilities. In fact, the government might need to borrow less when higher investment is stimulating the economy since there is lower need to revive economic activity through public intervention.

Two less clear Granger-causality relations identified are, first, the capital accumulation slowdown caused by a higher capital formation rate in the previous period and the deceleration of external government indebtedness resulting from its previous period's higher growth. With regard to the first result, it might be explained by the fact that GCF is significantly influenced by EU funds. When the country benefits from these transfers in a given quarter, GCF accelerates and, if in the following quarter the country does not receive those EU transfers, capital formation would be delayed and thus, there is a decrease in its growth rate. As to the second result, it should be the consequence of the public debt management performed by the Portuguese Treasury and Debt Management Agency. In particular, if in a given quarter there is a higher public debt issue, it is expected that the need for issuance is lower in the next quarter.

On the contrary, some expected relations are not supported by the VEC estimates. A priori, a bidirectional relation between RP and IIPg would be anticipated. Firstly, it was expected that a higher risk premium would imply a deceleration in external government liabilities since it is expected that the government facing a higher risk premium would be more cautious in using fiscal policy. Even though the short-run coefficient of ΔRP_{t-1} in the $\Delta logIIPg_t$ is indeed negative, it is not statistically significant contrasting with what was found for the long-run, where a higher risk-premium causes a decrease on public external debt. The lagged effect of the country's risk premium on the level of public external debt might be due to the fact that our sample includes the adjustment programme period, 2011-2014. During this period, despite the increase in Portugal's risk premium, the country could get off-market financing provided jointly by the EU European Financial Stability Mechanism (EFSM), the European Financial Stability Facility (EFSF) and the International Monetary Fund (IMF) ("troika").

Secondly, we anticipated a negative effect of IIPg on RP since higher public external liabilities are expected to deteriorate creditors' confidence and thus, rising the country's risk premium. However, the $\Delta logIIPg_{t-1}$ coefficient is not significant in the ΔRP_t equation. The absence of this negative link could be due to the fact that creditors confidence would only be deteriorated above a given level of total public indebtedness. Additionally, creditors confidence also depends on many other factors such as, whether debt follows a persistent increasing path or the general policy followed by the government.

Furthermore, it was not possible to find a short-run positive effect of exports on economic growth. The absence of direct effects running from exports to growth was also found by Andraz and Rodrigues (2010). The authors found that it was an increase in Foreign Direct Investment (FDI) that by reinforcing the country's production capacity would increase its external competitiveness which, in turn, would stimulate economic growth. Along these lines, our VEC estimates show that public external liabilities also have an indirect effect on growth since IIPg also influences growth via exports. As previously referred, high official capital inflows are able to cause a real appreciation (Campos e Cunha, 2008) which would, ultimately, hamper exports (through an increase in absorption) and, consequently, decrease future growth.

Similarly, our estimates do not support the existence of a short-run positive impact of capital formation on economic growth. It was expected that by increasing the country's production capacity, investment would contribute to increase GDP, however, this effect could take some time to materialize. Indeed, it is possible that investment's short-run impact on GDP is not significant or even negative since it could originate two contradictory effects. On the one hand, investment increases GDP but, on the other hand, it could require importing machinery, which would offset (or even outweigh) the previous positive impact. Nevertheless, as the variance decomposition presented below will show, investment shocks will have an increasingly relative importance to explain GDP fluctuations, as we go further into the future.

Focusing now in the exogenous variables of the model, the variable used as proxy for both the state of the global economy and Portuguese external demand (OECD_GDP) leads to an increase in the output, capital formation and exports growth rates (two of the long-run determinants of Portuguese GDP), which proves that world developments were important for the Portuguese growth performance (Constâncio,

2005). Conversely, the variable $\Delta logOIL$ does not have the expected effect on the GDP growth rate. It was anticipated that higher oil prices' growth rates would be hindering Portuguese output growth through its negative effect on the Portuguese terms-of-trade (Cardoso and Esteves, 2008b), however, its negative coefficient is not statistically significant. Finally, as concerns CHINA_EXP, its coefficient is negative and significant in the $\Delta logGDP_t$ equation supporting the argument that Chinese accession to the WTO in 2001 contributed to the Portuguese output stagnation. Furthermore, a negative effect from CHINA_EXP on Portuguese exports was anticipated given the identical product specialization (Esteves and Cabral, 2006). Even though its coefficient has the expected sign in the $\Delta logEXP_t$ equation, it is not significant.

As our main purpose is to investigate the factors that contributed to the Portuguese output stagnation, we proceeded to the analysis of the relative importance of the different shocks to the Portuguese GDP variation (variance decomposition). In order to make this analysis we used a Cholesky decomposition of the residuals covariance matrix. We ordered IIPg first followed by exports, then GDP and, the last two variables are GCF and RP, respectively. This ordering implies that a shock in IIPg affects all the other variables contemporaneously and is not, in turn, affected by shocks to the remaining variables in the period they occur. In fact, IIPg is not expected to be contemporaneously affected by shocks to the remaining variables since the issue of debt securities (the most relevant IIPg component) evolves accordingly to what was planned in advanced by the government and the Portuguese Treasury and Debt Management Agency.

Furthermore, this ordering places exports before GDP because, as it is known, exports are one of the GDP components and thus, it is expected that a shock in exports will have a contemporaneous effect on GDP[5]. As concerns GCF, even though this variable is also one of the GDP components, as explained before, its effect on GDP is expected to be more relevant in future periods and not in the same period. As a result, and following the Granger Causality results, we decided to order GCF after GDP.

Lastly, the risk premium is placed in the end since it changes as a result of shocks to all the other variables. In fact, the variables included are carefully analysed by Portugal's creditors when assessing the country creditworthiness and thus, they determine the evolution of the country's risk premium. However, the effect of those shocks might not be contemporaneous, as implied by this ordering. Indeed, this is one shortcoming of using a Cholesky decomposition.

As we can observe from Table 6 in Appendix 2, after 4 quarters, the forecast error of Portuguese GDP is similarly influenced by the shocks in the other four variables and, as expected, the shocks to GDP itself are the most relevant in explaining its own forecast error variance. However, considering a 2-years lag period, the variance of GDP is mostly explained by GCF and risk premium shocks, which together account for approximately 51% of the variation in the Portuguese GDP. Therefore, we can conclude that the most important determinants of the Portuguese GDP evolution are capital accumulation and the developments concerning the country's risk-premium. This conclusion supports the fact that the evolution of the Portuguese idiosyncratic risk premium was crucial in explaining the Portuguese growth performance and also, as found in Coimbra and Amador (2007), that economic growth in Portugal has been mostly the result of capital accumulation.

5. Final remarks and policy implications:

The aim of this study was to analyse the main determinants of the Portuguese output stagnation. For that purpose, we used a VEC model which enables us to examine both short and long-run determinants of Portuguese GDP. The results suggest that the evolution of the country's risk premium and public external debt developments are the main short-run output growth drivers in Portugal. Additionally, we also found that Portugal was significantly affected by the developments in the world market which shows how a small

[5] The Granger causality tests presented previously showed no causal link running from exports to GDP. However, our model estimates the effects of the lagged endogenous variables and not their contemporaneous effects on GDP.

open economy like Portugal is extremely sensitive also to external conditions. In particular, a significant negative effect of China's higher trade integration and a positive effect of better world market conditions, which is associated with higher external demand, were identified.

Our results also provide important insights into the main long-run determinants of the Portuguese GDP, in particular, there is evidence of positive effects stemming from both higher capital formation and export levels whereas a higher risk-premium is found to deteriorate Portuguese GDP in the long-run. Furthermore, considering the GDP variance decomposition results, we conclude that capital formation is crucial for growth not only in the long run but also in the medium run (after 1 year).

Important policy implications can be drawn from our results. It is suggested that capital formation is the most relevant growth determinant (since it is relevant both in the medium and long-run) and thus, Portugal needs to encourage productive investment, both from domestic and foreign agents. Many are the structural reforms suggested in order to make Portugal a more investment-friendly country. Reforms in both the labour and goods market, in its education and justice system, and even public administration reforms are usually pointed as crucial to attract investment. As capital formation is a key element for Portuguese economic growth, assessing the importance of those reforms in determining investment is a matter for further research.

Moreover, our results show that increasing exports does not ensure growth in the short-run since its content matters. Indeed, Portugal has to continue its structural transformation towards specialization in high-tech products and, also, towards products with high domestic value-added. The aforementioned reforms should facilitate this process by increasing the country's external competitiveness and further contributing to stabilize or even decrease the country's risk premium, which our study suggests as relevant for growth both in the short and long-run. Lastly, we also found negative effects on growth from a higher public external debt (which contributes to higher total public debt) and thus, we should stress that the still excessively high level of public indebtedness requires further fiscal adjustment to accelerate the decreasing public debt course. However, policymakers need to balance that need with its potentially negative implications for growth, as the recovery is projected to be modest; see Gershenson et al. (2016).

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Appendix

Table 2. Data description and sources

Variable	Description
GDP	Real GDP was calculated deflating the Portuguese Gross Domestic Product series (in euros) by its deflator (2010 = 100). *Source: Eurostat*
GCF	Real GCF was calculated deflating Portugal's Gross Capital Formation series (in euros) by its deflator (2010 = 100). *Source: Eurostat*
EXP	Real Exports was calculated deflating the Portuguese exports series (in euros) by its deflator (2010 = 100). *Source: Eurostat*
RP	The risk premium measure was computed as the ratio between Portugal long-term interest rate for convergence purposes (10 years maturity debt securities) and the corresponding German long-term interest rate. *Source: European Central Bank*
IIPg	General Government Liabilities in its International Investment Position. Since the series retrieved from Bank of Portugal's database starts only in 1996, values for the year of 1995 were interpolated using the TRAMOSEATS procedure available in Eviews software. *Source: Bank of Portugal*
OIL	Quarterly oil prices (in euros) were calculated from the retrieved monthly data using a simple average. *Source: Bank of Portugal*
CHINA_EXP	Year-on-year growth rate of Euro Area 19 (fixed composition) imports from China, Import, Value (Community concept, ECU/Euro). Since data was only available from 1999, the TRAMOSEATS procedure available in Eviews software was used to obtain interpolated data for the period 1995q1-1998q4. *Source: European Central Bank*
OECD_GDP	Real OECD GDP was calculated deflating OECD gross domestic product at current prices (US dollars) by its price deflator (index, 2010). The GDP was subtracted to the obtained series to ensure exogeneity. *Source: OECD Database*

Table 3. VEC Granger Causality / Block Exogeneity Wald tests

	Dependent variable				
	$\Delta logGDP$	$\Delta logIIPg$	$\Delta logGCF$	$\Delta logEXP$	ΔRP
t-statistic for $ECT_{1,t-1}$	-4.72*	-4.96*	1.02	-0.78	0.18
t-statistic for $ECT_{2,t-1}$	2.57**	5.98*	-2.23**	1.2	-1.48
$\Delta logGDP_{t-1}$	-	0.03	7.65*	0.15	0.75
$\Delta logIIPg_{t-1}$	11.96*	-	0.01	7.3*	0.13
$\Delta logGCF_{t-1}$	1.31	4.62**	-	0.7	0.19
$\Delta logEXP_{t-1}$	0.96	0.02	0.81	-	1.07
ΔRP_{t-1}	3.75**	1.35	5.02**	1.54	-
ALL	15.58*	5.61	12.82*	9.93**	1.83

Notes: The last column reports the Wald statistic for the joint significance of all explanatory variables. * indicate significance at the 1% level; ** indicate significance at the 5% level; *** indicate significance at the 10% level.

Appendix

Table 4. Dickey-Fuller GLS unit root tests

Variables	GDP	IIPg	EXP	GCF	RP	OECD_GDP	OIL	CHINA_EXP
Levels	-0.28	0.94	2.1	-0.99	-1.29	0.65	-0.67	-2.85*
First differences	-2.62*	-10.14*	-5.14*	-2.51**	-2.22**	-4.3*	-6.5*	-

Notes: All series with the exception of RP are in log-levels. * indicate significance at the 1% level; ** indicate significance at the 5% level

Table 5. Trace tests for model selection (cointegration tests)

	Trace test statistic			**Critical Values (95%)**		
r	model 2	model 3	model 4	model 2	model 3	model 4
0	116.61*	95.94*	107.54*	76.97	69.82	88.8
1	60.64*	48.34*	59.92	54.08	47.86	63.88
2	19.67	10.82	20.12	35.19	29.8	42.92

Notes: There are 5 different models depending on the deterministic components included: model 1 – no deterministic components; model 2 – intercept in the cointegration relation; model 3 – trend in the levels; model 4 – trend in the cointegration relation; and model 5 – quadratic trends in the level. Models 1 and 5 do not produce sensible models for standard economic time-series data and thus, they are excluded in advance. Additionally, as referred in note 1, model 4 with 1 cointegration equation would have a not significant coefficient for the trend component. Therefore, we proceeded to the following accepted model. * indicates significance at a 5% level

Table 6. Variance Decomposition of *logGDP*

Quarter	S.E.	logGDP	logIIPg	logGCF	logEXP	RP
1	0.005	80.29	0.18	0	19.53	0
2	0.008	68.47	11.19	4.69	13.3	2.34
4	0.014	57.25	9.29	12.53	7.57	13.37
8	0.028	40.6	6.36	22.65	2.36	28.03

Notes: Values are in %