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CORRELATION BETWEEN MALTESE AND EURO AREA SOVEREIGN BOND YIELDS

BOX 1: CORRELATION BETWEEN MALTESE AND EURO AREA SOVEREIGN BOND YIELDS¹

This Box summarises a study on government bond yields in Malta and their correlation with other euro area sovereign bond yields.² Yields on long-term sovereign bonds are a fundamental metric in financial markets, as they act as benchmarks in the pricing of long-term financial assets as well as in financial decision making. The relationship between long-term bond yields in Malta and in its euro area partners is important for monetary policy analysis, macro-prudential policymaking, financial stability considerations and public debt management.

The relationships between different European economies have been analysed frequently over the past decades. These studies have expanded to the inter-linkages among various European financial markets to investigate the nature of European economic integration. However, many of these studies tend to focus on economic convergence or stock exchange market movements, rather than bond market relationships. More recently, studies on sovereign bond yields have emerged but these tend to focus on larger economies, such as the United States, Japan and Germany.

The literature suggests that sovereign bond yields are determined by various factors, such as risk aversion (time-factor) and liquidity (country specific factor). Other important economic factors linked with underlying economic fundamentals include GDP growth rates, unemployment rates, inflation rates, debt-to-GDP ratios, public deficits and short-term interest rates.

General government debt in Malta stood at just over €5.7 billion euro as at end-2016. While the total outstanding debt of the Maltese government is comparable with the volume of a single debt issuance by a larger country, its efficient management is somewhat challenging. This is because there are no private market agents willing to act as a market maker for MGSs and consequently, the Central Bank of Malta has taken up this role and acts as a market maker for these securities since its foundation in 1968.

The market for MGSs reflects the characteristics of the Maltese economy. Factors such as the composition of the investor base, the relative small size of the market – particularly when compared with foreign public debt markets – may affect important bond market metrics, such as liquidity premia.

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² A more detailed discussion on the topic is available in Ellul, R. (2017), "Correlation between Maltese and euro area sovereign bond yields", Working Paper 03/2017, Central Bank of Malta. The author of this study had no access to the official methodology used by the Central Bank of Malta in its market making role and relied solely on observations available in the public domain. Moreover, the econometric modelling detailed in the paper is carried out for investigative purposes and does not purport to be the official method with which the Bank carries out its market making activity.

Simple, rolling correlations between Maltese and euro area sovereign bond yields suggest that MGS yields appear to move in line with euro area yields, returning strong correlations (see Table 1).

More complex dynamic conditional correlations (DCC) allow for a better understanding of the correlation between MGS yields and those of other euro area sovereign bond yields. These techniques are important for the analysis of interdependencies and contagion effects. As expected, this approach also points to correlation between MGS yields and those of other euro countries, with average pairwise-DCCs ranging from 0.2 with Greece to 0.4 with Italy.³ These correlation coefficients also suggest that MGS yields have been relatively insulated from negative shocks affecting southern Mediterranean countries in recent years, with swings to negative correlations around episodes of financial turmoil in these countries.

Ten-year MGSs in Malta can be modelled following two assumptions. On the one hand, yields can be seen to result from underlying economic fundamentals in the Maltese economy.⁴ Yields may also be thought of as a function of international sovereign bond yields.⁵

Table 1
SIMPLE ROLLING CORRELATIONS COMPUTED FOR SPREADS OVER THE GERMAN TEN-YEAR BOND BENCHMARK

	AT	BE	ES	FI	FR	GR	IR	IT	MT	NL	PT
AT	1.00										
BE	0.89	1.00									
ES	0.69	0.83	1.00								
FI	0.88	0.73	0.52	1.00							
FR	0.85	0.91	0.89	0.70	1.00						
GR	0.70	0.84	0.87	0.48	0.87	1.00					
IR	0.70	0.85	0.86	0.54	0.76	0.78	1.00				
IT	0.76	0.88	0.97	0.58	0.95	0.91	0.82	1.00			
MT	0.68	0.78	0.85	0.49	0.78	0.75	0.82	0.84	1.00		
NL	0.89	0.76	0.65	0.91	0.78	0.54	0.59	0.69	0.62	1.00	
PT	0.73	0.90	0.91	0.54	0.90	0.94	0.87	0.94	0.80	0.61	1.00

Source: Author's calculations.

³ Average pairwise-DCCs betray significant correlations in certain periods. Peaks in raw DCCs stood as high as almost 0.7 in some cases. Furthermore, such correlations on sovereign bonds were found to be much higher when compared with a separate study that focused on average DCCs of Malta's stock market with five other major stock exchanges. Further details on the latter study are available in: Ellul, R. (2015), "Analysis correlation between the MSE index and global stock markets", Xjenza Online, *Journal of the Malta Chamber of Scientists* (3), 174-182.

⁴ Modelled as: $MT_{10YR} = C + \Delta HICP + \Delta GDP + Unemployment\ Rate + German\ Bund + D2011 + D2012$, where MT_{10YR} is the ten-year MGS yield, $\Delta HICP$ is the annual inflation rate, ΔGDP is the GDP growth rate, and $D2011$ and $D2012$ are annual dummy variables.

⁵ In this study the author considers yields on bonds issued in the four largest euro area countries. The MGS yield is thus modelled as: $MT_{10YR} = C(1) + C(2) * DE_{10YR}(-1) + C(3) * FR_{10YR}(-1) + C(4) * ES_{10YR}(-1) + (1 - C(2) - C(3) - C(4)) * IT_{10YR}(-1)$, with the ten-year bond yields of Germany, France, Spain and Italy. The same equation was estimated over the full-time period ('fixed coefficients') and over a rolling time window. A subsidiary equation specified in daily changes returned significant coefficients for changes in MGS yields on Spanish, Italian and French bond yields. The aim of the equation presented above is not to assess the stationarity conditions of the series, but to check the hypothesis that MGS yields can be summarised as some linear combination of the previous trading day's euro area yields.

The aim of the study is not to uncover the actual methodology used to arrive at indicative MGS prices but to put forward “fitted” MGS yields based on the two methods discussed above and compare the resulting “benchmarked” yields with the actual yields.

The benchmark MGS yield based on euro area bond yields tracks closely the official MGS yield series (see Chart 1). The two are almost indistinguishable at first glance, with short-term deviations being rare. This is particularly evident when the benchmark is estimated using rolling-time windows. The fixed coefficients benchmark, which estimates the coefficients over the whole sample, does track the official series – although there are instances where the discrepancy is more pronounced. These can be explained either by volatilities affecting yields in the basket during specific periods, such as 2009 and 2010, or MGS composition effects – as may be the case from mid-2015 onwards.

The benchmark yield based on economic fundamentals also exhibits a similar pattern to the official MGS yield over an extended period. However, it shows more short-term volatility than the official measure, due to fluctuations present in Maltese macroeconomic datasets (see Chart 2). Moreover, actual MGS yields were higher, and MGS prices lower, than what true underlying economic conditions would have indicated during the global financial crisis of 2008 and again during the period of economic recovery in the following years.⁶ The analysis based on economic variables indicates that

Chart 1
MGS 10-YEAR YIELDS, ACTUAL AND BENCHMARKED ON EURO AREA YIELDS

(percentages per annum)

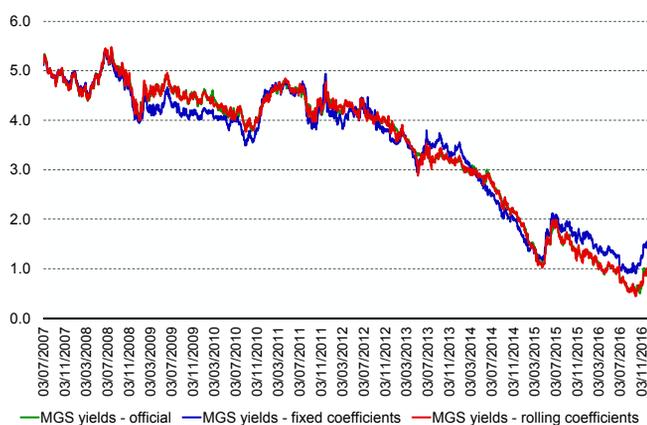
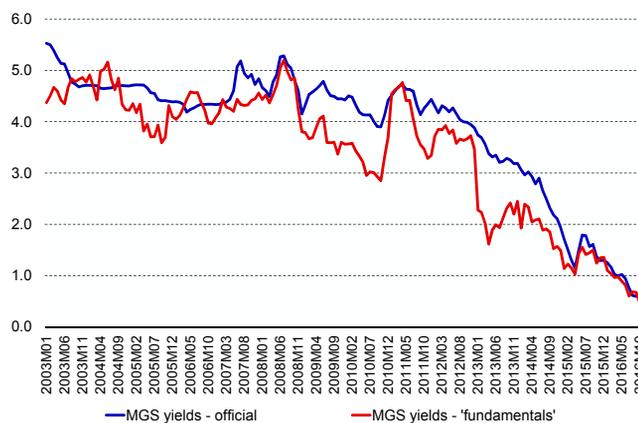


Chart 2
MGS 10-YEAR YIELDS, ACTUAL AND BENCHMARKED ON ECONOMIC FUNDAMENTALS

(percentages per annum)



⁶ A sensitivity analysis of the results based on different assumptions and modelling strategies may be found in Appendix 2 of Central Bank of Malta Working Paper 03/2017.

from mid-2015 onwards, official MGS yields follow closely a benchmark derived from underlying economic fundamentals.

This latter benchmark confirms the indications from the dynamic conditional correlations, which show that MGS yields are broadly insulated from shocks reflecting both euro area and events specific to other countries, such as bailout requests, political instability or speculation. While some volatility linked with specific international events does exist, swings are markedly less sharp. Additionally, factors linked with the limited size of the MGS market – such as yield basket, liquidity premia and composition effects – may be playing a role in the determination of MGS yields.

While the pricing appears to be consistent with euro area yields over the long-run, if the Maltese economy keeps growing substantially faster than its euro area partners, economic fundamentals might imply that a differential should begin to feature between these yields and those in Malta's euro area partners.⁷ However, considerations relating to market liquidity and other size constraints mentioned above may prove to be inhibiting factors for these fundamentals to be fully reflected in Malta's yields and, indirectly, in its sovereign ratings.

⁷ According to a recent study, Malta's medium-term estimate of potential GDP growth stood at 3.25%, which is significantly higher than growth estimates for the euro area. Further details are available in Micallef, B., & Ellul, R., "Medium term estimates of potential output growth in Malta", in Grech, A.G., & Zerafa, S. (eds.), *Challenges and Opportunities of Sustainable Economic Growth: the case of Malta*, Central Bank of Malta, 2017.