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EUROSISTEMA
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A FINANCIAL CONDITIONS INDEX FOR THE MALTESE ECONOMY

BOX 1: A FINANCIAL CONDITIONS INDEX FOR THE MALTESE ECONOMY¹

A financial conditions index (FCI) provides a summary measure of domestic financial conditions by combining several financial variables that influence economic activity. These financial variables comprise a wide array of interest rates, asset prices and bank balance sheet indicators that capture the various channels through which the monetary policy transmission mechanism affects economic activity and, ultimately, prices. Such an index is commonly used for financial surveillance and as a forecasting tool.

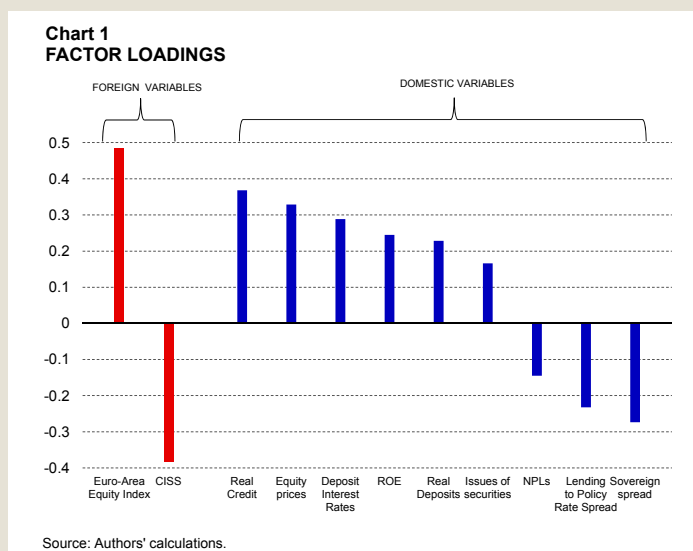
This Box updates the FCI developed in Micallef and Borg (2016) to evaluate recent developments in financial conditions in Malta until the second quarter of 2017. The index is constructed using interest rates, bank balance sheet indicators, asset prices, as well as external variables. The weights are derived applying the Principal Component Analysis (PCA), a statistical approach intended to collapse a large set of variables into a single indicator. In addition, the results are cross-checked using simulations from STREAM, the Central Bank of Malta's macro-econometric model.

Methodology

The importance of the various transmission channels depends, to a large extent, on the structure of the financial system. For instance, firms in Malta are relatively more dependent on bank financing than their counterparts in the euro area, where the corporate bond and equity markets play a more important role. According to the Survey on Access to Finance of Enterprises (SAFE), in 2015, around 75% of Maltese SMEs considered bank financing as the most relevant source of external financing compared to around 55% of European SMEs.² Domestic SMEs are also more dependent on bank overdrafts, credit lines and credit card facilities than their European counterparts.

The dataset utilised to construct the FCI attempts to replicate the primary features of the Maltese financial system, which in turn determines the state of financing conditions. The weights were derived using the principal component analysis.³

The weights include both domestic and foreign variables. Ten domestic variables are included in the index: real credit, real deposits, real equity prices, issues of securities and shares, the non-performing loans (NPL) ratio, real house prices, the retail interest rate on deposits, the spread between the lending rate and the policy rate, the spread between Malta's ten-year government bond yield and the ten-year bund yield (defined below as the 'Sovereign spread') and the



¹ Prepared by Brian Micallef and Ian Borg. Mr Micallef is Manager within the Research Department and Mr Borg is a Senior Economist in the Economic Analysis Department. Comments and suggestions by Dr Aaron G. Grech are gratefully acknowledged. Any errors, as well as the views expressed here, are the authors' sole responsibility.

² Zerafa, S. (2016), "Survey on access to finance (SAFE) in 2015", *Quarterly Review* 2016:1, pp. 80-88, Central Bank of Malta.

³ As is typical in these exercises, we started with a fairly large dataset which was subsequently reduced using the two following criteria: (1) on the basis of economic theory the sign corresponding to the first principal component has to be meaningful; (2) the time span should start from the mid-1990s to capture the tight financial conditions of the early 2000s.

return on equity of the banking system. Foreign influences are captured through the Composite Indicator of Systemic Stress (CISS), which is intended to capture systemic stress in the euro area's financial system and the Eurostoxx 50 as a measure of equity prices in the euro area.⁴ Trending variables were transformed into stationary ones by taking the year-on-year growth rates. Additionally, all variables were standardised.

Chart 1 plots the updated factor loadings derived from the PCA. The foreign variables have a relatively large weight in Malta's FCI reflecting the open nature of the Maltese economy. In terms of the domestic variables, given the importance of bank financing in Malta's financial system, real credit has the largest positive weight, while interest rate spreads have the largest negative weight.

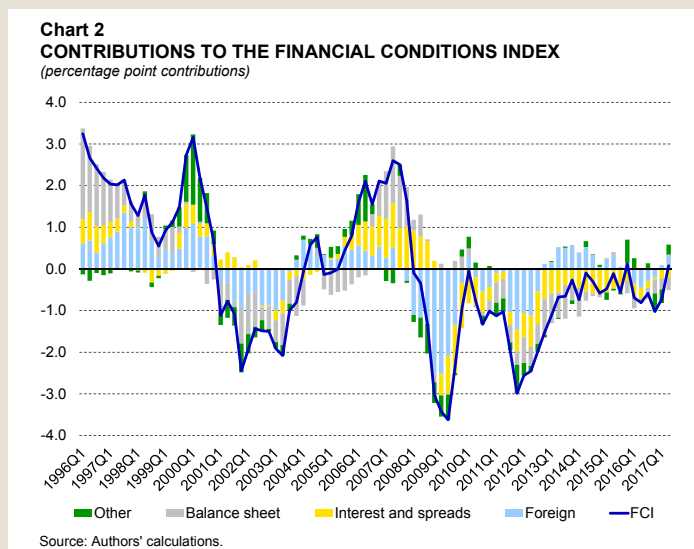
Financial conditions index based on PCA

Chart 2 plots the FCI and the contributions of the financial variables to the first principal component. The individual sub-indicators are grouped into four categories, covering the external variables (CISS and euro area equity prices), bank balance sheet indicators (bank credit and deposits, return on equity (ROE), and NPLs), interest rates and spreads (deposit interest rate, sovereign spread and the spread between the lending and the policy rate) and other indicators (equity prices and issues of NFC securities).

Financing conditions in the mid-to-late 1990s were accommodative, boosted by strong real credit growth and benign conditions from abroad. Buoyant equity prices played an important role at the turn of the millennium. The FCI tightened in the early 2000s as the economy was hit by a combination of demand and supply shocks, which resulted in a drop in credit growth and an increase in NPLs, also following the introduction of stricter regulatory requirements. Moreover, the external factors affecting financing conditions also tightened considerably during this period as the bursting of the dot-com bubble and the terrorist attacks of 9/11 heightened international financial stress, which in turn depressed equity markets, both locally and abroad.

Conditions started to improve again in the pre-crisis cyclical upswing before being tightened considerably in 2008, driven by the onset of the financial crisis, with heightened stress in international markets, as well as the drop in real credit growth and the rise in the risk premium.

After recovering in 2010, domestic financing conditions tightened again in 2012-2013 primarily due to the decline in credit growth, as well as the intensification of the sovereign debt crisis in the euro area. The decline in credit growth was not driven by demand-related factors since economic performance during this period was relatively robust. Focusing primarily on NFC credit, a study by the Central Bank



⁴ Hollo, D., Kremer, M., & Lo Duca, M. (2012), "CISS - a composite indicator of systemic stress in the financial system", *Working Paper* 1426, European Central Bank.

of Malta finds that a significant negative 'credit gap' opened up between 2012 and 2014.⁵ In this regard, a number of important policy initiatives have been put in place, including the introduction of a Central Credit Register (CRR) to address information asymmetries in the banking sector, and the setting up of a Development Bank which is expected to focus on large-scale infrastructural projects and lending to SMEs. Moreover, the relatively tight financing conditions experienced in 2013 were in part also related to the impaired transmission mechanism of monetary policy, reflected in wider spreads.⁶

Financial conditions improved significantly since 2012 driven by the reduction in foreign stress, and facilitated by additional monetary easing by the European Central Bank. On the other hand, domestic variables generally continued to weigh down as the negative contribution of credit growth, the increase in NPLs and wider credit spreads persisted, and were only partly offset by improvements in real deposit growth.

The improvements in the FCI have generally stalled in 2016, mirroring negative developments in each of the categories. In particular, foreign financing conditions were weighed down by growth concerns in China and uncertainty related to the UK referendum. In the second half of 2016, foreign financing conditions improved as uncertainty related to China and the United Kingdom receded, while the outlook for the euro area improved. Moreover, domestic financing conditions also contributed to the tightening in 2016. In particular, despite the improvement in NPLs, which have declined considerably during the year, credit growth to NFCs remained negative. Furthermore, despite some declines in lending rates in 2016, these were offset by even stronger declines in short-term rates, thus leading to wider spreads.

Financing conditions recovered considerably in the first half of 2017, ending the second quarter at neutral levels. In particular, international markets continued to improve substantially during the first half of 2017, reflecting positive macroeconomic developments in the euro area. On the other hand, domestic financing conditions remained in negative territory due to continued declines in credit growth to NFCs, which were only partially offset by declines in NPLs.

The derived first principal component reflects both the impact of demand and supply on the evolution of the financial variables. However, financing conditions should be interpreted as a representation of financial shocks and therefore, the FCI should be stripped from the feedback of economic activity. This endogeneity problem is addressed in the second stage of the estimation, when we purge the first principal component of this feedback by regressing it on current GDP growth in Malta and the euro area.⁷ The residual of this regression is taken as our estimated FCI measure for Malta. As a result, the 'purged' FCI reflects only the exogenous shifts in the financial conditions.

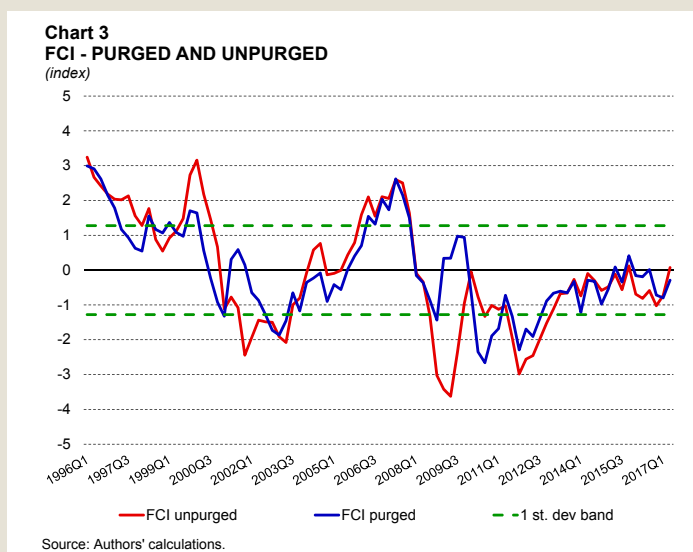
Chart 3 plots the unpurged and purged FCI. The differences between the two series are minimal in most instances, except in two periods. In 2001-2002, the unpurged FCI goes into negative territory, signalling tight financing conditions, while the FCI purged from macro-economic influences remains broadly neutral. Similarly, in 2009, the unpurged FCI drops very strongly, but the decline in the purged FCI is much more muted. The main reason behind these differences is that some of the decline experienced in these two periods is explained by deterioration in economic activity, both domestic and abroad. Hence, the decline in the unpurged FCI in these two instances is partly demand-related rather than driven by financial supply shocks.

⁵ Micallef, B. (2015), "Estimating a Credit Gap for Non-Financial Corporations in Malta", *Working Paper 04/2015*, Central Bank of Malta.

⁶ Micallef, B., Rapa, N., & Gauci, T. (2016), "The role of asymmetries and banking sector indicators in the interest rate pass-through in Malta", *Journal of Advanced Studies in Finance, Volume VII*, Issue 1(13), Summer 2016.

⁷ Gumata, N., Klein, N., & Ndou, E. (2012), "A financial conditions index for South Africa", *Working Paper 12/196*, International Monetary Fund.

Moreover, Chart 3 plots the two FCIs within a one standard deviation range to assess historical episodes in which financial conditions deviated substantially from its mean. Among these episodes, the mid-1990s as well as the period 2006-2007 were clearly characterised by accommodative financial conditions. On the contrary, financial conditions were tight after the financial crisis and, to a lesser extent, in the early 2000s. The period after 2013 is characterised by generally normal financing conditions, albeit biased towards the low end of the distribution.



Financial conditions index based on STREAM

The PCA is only a statistical technique intended to capture variations among a large set of variables, and therefore it is not always clear whether the derived weights are consistent with what one would expect for a particular economy. In addition, some variables may be statistically significant but display an incorrect sign to that expected on the basis of economic theory and would therefore have to be excluded.

As a sensitivity analysis, we develop an alternative index using simulations from STREAM, the Central Bank of Malta's macro-econometric model of the Maltese economy, which in recent years has been enriched with detailed fiscal and financial blocks.⁸ STREAM can thus be characterized as a medium-scale model, which strikes a reasonable balance between containing sufficient detail to capture the key economic relationships underpinning the domestic economy, and being tractable and manageable.

The weights were derived from the response of real GDP growth after four to six quarters following a one standard deviation shock to each variable. The main difference with respect to the PCA method outlined above is the inclusion of the real effective exchange rate, which was excluded from the PCA as it did not display the correct sign. The following variables (with weights in brackets) were used: real credit to the private sector (25%), the real effective exchange rate (17%), real house prices (12%), real deposits (5%), real equity prices (5%), interest rates (6%) and the NPL ratio (5%). These variables are intended to capture the various channels – interest rates, exchange rate, asset prices, lending conditions – through which financing conditions affect the real economy. One limitation of STREAM is the absence of foreign financial variables, which are usually found to exert an important influence on domestic financing conditions in open economies. Given the small and open economy characteristics of the Maltese economy, we introduce CISS to capture systemic stress in the euro area, with its weight calibrated to 25%.

Chart 4 illustrates the range between the results obtained from the PCA (purged and unpurged) and the version from STREAM, together with the one-standard deviation bands. The FCI using STREAM broadly follows the dynamics from the PCA. The divergence in the period 2014-2015 is mostly

⁸ Grech, O., & Rapa, N. (2016), "STREAM: a structural macro-econometric model of the Maltese economy", *Working Paper WP/01/2016*, Central Bank of Malta.

explained by the depreciation of the exchange rate, which is excluded from the PCA approach. The exchange rate then appreciated in 2016 and the first half of 2017, which contributed negatively to the FCI. Similar to the FCI using PCA, it indicates broadly neutral financing conditions by the second quarter of 2017.

Conclusion

This Box has updated indicators of financial conditions in Malta until the second quarter of 2017. The indices were computed using two approaches, principal components and simulations using STREAM, the Bank's macro-econometric model. Both indicators include a mix of domestic and foreign variables, reflecting the open nature of the Maltese economy.

Financial conditions were relatively tight in the aftermath of the financial crisis, initially due to international factors but subsequently mainly reflecting domestic ones. All the methods indicate that financing conditions have improved since 2013, though to different degrees, reflecting differences in the indicators and weights used in these indices. Since last year, domestic factors have continued to somewhat dampen financing conditions, while the declines related to foreign factors have been largely reversed in the first half of 2017. As financial conditions do affect economic activity, addressing the relatively domestic-induced tightening could be beneficial to growth.

