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CHALLENGES AND OPPORTUNITIES OF SUSTAINABLE ECONOMIC GROWTH: THE CASE OF MALTA

Edited by

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GOVERNOR'S INTRODUCTION

Since its inception, the Central Bank of Malta has played a critical role in the country's economic development. The increasing sophistication, complexity and the rapid rate of change that have characterised the islands' economy over recent decades have surprised many observers. The Bank is committed to provide objective and in-depth analysis of these changes, to explain their underlying causes and to identify related issues. Our mission statement states quite clearly that the Bank has to "undertake economic and financial analysis and research […] and provide independent advice to Government on economic and financial policy issues."

This is the third detailed economic study that the Bank has published in less than two years. While Bank economists frequently publish research papers that deal with specific topics in a concise and technical manner, in 2015 senior management undertook to supplement these single topic papers with more holistic ad hoc publications addressing broader research questions. In the first two research publications,[1] both of which were highly appreciated by observers of our economy, the focus was on documenting its rapid evolution and the resulting changes in macroeconomic relationships. Successfully answering a question, however, inevitably generates other questions.

This publication aims to assess in detail the sustainability of Malta's growth model. Macroeconomists, particularly those in central banks, have faced major criticism since the financial crisis as they proved unable to notice the warning signs already present in the previous boom. The Central Bank of Malta is firmly resolved not to repeat the same mistake. This is why we have asked seven of our economists to study closely the economic boom this country is currently experiencing and to assess the balance between the challenges and the opportunities confronting us in the coming years.

The five articles contained in this publication offer a very comprehensive review. The publication starts with an analysis of Malta's medium-term growth prospects, which suggests a potential growth rate of 3.25%, significantly higher than our euro area peers. The following two articles look at the sustainability of recent trends in public debt and the current account surplus, finding that these are very likely to continue. The final two articles assess macro-financial conditions, which appear to be aligned to fundamentals.

The results of this analysis are quite reassuring. There is no evidence that the acceleration in economic activity is fuelled by growing imbalances in Malta's fiscal or external accounts. Credit conditions have also remained stable, while the property market has displayed relatively less exuberance than in previous booms. A large part of economic growth appears to be the result of improvements in our use of available factors of production, particularly our human resources. That said, this analysis shows that as a country we need to continue to focus on improving productivity if we are to continue benefitting from high growth. We will have to marshal our resources even more effectively than we have done so far, particularly as our labour supply now faces clear and pressing constraints. We have to find ways of utilising our high level of savings more optimally.

At the Central Bank of Malta, we are committed to do our part to promote the further and smarter development of our economy. We will continue to provide impartial assessments and to advocate good economic governance. We are determined to further enhance our reputation as the leading centre of excellence for economic research and economic policy review in Malta. This publication, we believe, is an indication of the high quality of our research product.

Dr Mario Vella

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[1] "The evolution of the Maltese economy since independence", available at https://www.centralbankmalta.org/file.aspx?f=31388 and "Understanding the Maltese economy", available at https://www.centralbankmalta.org/file.aspx?f=31385.

FOREWORD

The Maltese economy has been growing very rapidly, with an average annual rate of real gross domestic product (GDP) growth in the last five years at 5.6%, or five times that in the European Union (EU). This was more than double the pace of economic expansion in the previous ten years. It may appear somewhat counterintuitive that a small open economy like Malta prospered during a time when its main trading partners were going through challenging times. However, this acceleration is best interpreted within a wider economic narrative.

In 2015, the Central Bank of Malta published a study of the first fifty years of Malta's macroeconomic performance since independence. This indicated that in the four decades prior to 2000, Malta experienced an extraordinary rate of economic growth, with real GDP growing on average by 5.9% per annum. In the 1990s, for instance, the average annual rate of real GDP growth was of 5.0%. Viewed within this longer term perspective, the recent rates of growth of the Maltese economy do not appear as extraordinary, but rather as a return to past performance.

This line of thinking, however, raises at least three questions. The first one is why most of the 2000s was marked by a deceleration in economic activity. The second question is what made the Maltese economy accelerate again in recent years. The final query is the extent to which recent rates of growth can be sustained over the next decades.

The Central Bank of Malta's research publication "Understanding the Maltese economy" in 2016 addressed the first two questions. By focusing on economic developments since accession to the EU and studying how macroeconomic relationships changed accordingly, it documented how the Maltese economy matured exceedingly rapidly, with cycles of inflation and unemployment becoming much less pronounced and with a consistent marked downward trend. This process in part reflected the substantial restructuring that preceded EU accession, driven by the adoption of an array of more liberal market regulations, the removal of protectionist measures and wider access to the EU's single market, particularly in services. The country's economic structure changed dramatically, with a strong shift towards services, a large rise in female participation, a smaller role for the state and a more dynamic financial sector. Diversification, both towards new sectors as well as specific niches within established ones, increased the flexibility and the resilience of the Maltese economy, making it less subject to industry-specific disturbances. Besides rising female participation and education levels, the economy also benefitted from a strong influx of foreign workers, which complemented the changing structure of the economy and ensured an adequate supply of labour. This helped raise potential output growth and resulted in a surplus position in the external balance, fuelled by exports of services.

While studying these changes in macroeconomic relationships is helpful to understand the extent to which the recent acceleration in growth can be sustained, it still leaves scope for further investigation. This is the objective of this research publication, which brings together five articles authored by seven economists of the Central Bank of Malta. These articles assess whether recent growth was based on, or has led to, the development of macroeconomic imbalances. While there have been past assessments made by international organisations, such as the International Monetary Fund and the European Commission, this is the first time that such a comprehensive and holistic exercise is carried out by a team of Maltese economists.

In the first article of this publication, Micallef and Ellul review the performance of the Maltese economy from a longer term perspective, in order to provide an assessment of its medium-term growth potential. This is of key importance because living standards, measured by income per capita, are very closely tied to an economy's long-run growth. They estimate that the potential growth rate of the Maltese economy has more than doubled, from below 2.0% at the time of the global financial crisis to around 5.5% between 2014 and 2015. Going forward, their analysis suggests that Malta's potential growth rate will stabilise at around 3.25% between 2021 and 2025. This is above the country's historical growth rate recorded over the period between 2000 and 2015, and the authors note that this finding is robust to a number of different negative scenarios.

Thus a considerable part of the recent acceleration in growth appears to be of a permanent rather than transitory nature. The only caveat that this study makes is that going forward, growth will increasingly rely on higher productivity. This means that the business environment will need to continue to improve, including through sustained investment in infrastructure and human capital.

The following two articles look at the twin deficits or the strong link between a national economy's external accounts and its fiscal position. In a number of countries, fast economic growth before the great recession was preceded or accompanied by a strong widening of the twin deficits. For instance in Portugal and Estonia, the current account deficit hovered around 10% of GDP in the early 2000s; whereas in Greece and in Hungary the fiscal deficit touched in some years 9% of GDP. Once economic growth halted, all of these countries ended up having to address these imbalances, and in many cases this had a strong impact on their economic potential. Thus assessing trends in public finances and external accounts, and assessing their possible development, is vital in determining the sustainability of recent economic growth.

In this light, Farrugia and Grech examine government debt developments in Malta since the mid-1990s and try to gauge the possible evolution of Maltese government debt over the next decade. They assess whether government debt is sustainable in the short term by analysing its composition and the evolution of government bond yields. Secondly, they carry out conventional debt sustainability analysis to evaluate sustainability over the medium to long run, by means of three alternative scenarios which reveal how the government debt-to-GDP ratio might evolve between 2016 and 2025. For robustness, each scenario is subjected to a number of adverse shocks. Finally, they take into account other considerations relevant for sustainability in both the short run as well as the medium to long run by employing the signal approach for fiscal stress and examining recent policy measures targeted at enhancing sustainability. Their results suggest that Maltese government debt is broadly sustainable, and that it is highly likely that the recent decline in the public debt-to-GDP ratio will continue over the coming decades.

Besides registering a sharp improvement in public finances, Malta's current account balance has swung from a deficit to a considerable surplus. Grech and Rapa note that the current account balance as a per cent of GDP has improved by 12 percentage points since 2009, the largest change amongst euro area countries and about four times the change seen on average. They contend that cyclical demand factors did not cause this change, while lower oil prices and a better real exchange rate played only a minor part. Conversely, structural developments, such as improving energy intensity and falling import content, drove most of the improvement. Besides calculating estimates of Malta's cyclically adjusted current account position, Grech and Rapa note that the current account as a per cent of GDP is now stationary, that is, its time series reverts to a mean rather than displaying a negative trend. This is a necessary condition for avoiding sustainability problems in external accounts. Underpinning this improvement is a recovery in the national saving rate, driven by better fiscal performance, and rising corporate and household savings due to export-oriented services sectors. Conversely investment has declined, as these sectors rely more on human capital. Grech and Rapa argue that since it is likely that the current account surplus will persist, it would be beneficial for this to result in more emphasis on investment in education and infrastructure.

The final part of the publication looks at macro-financial developments. The 2008 financial crisis showed how even countries with relatively sound fiscal and external balances could face significant economic problems if they had asset price bubbles or went through a very rapid expansion of private sector debt. In Ireland and Spain, house price inflation was in double-digits while private sector debt grew by over 50% of GDP in just a few years in the early 2000s. The slowing down of economic growth in such conditions required substantial structural adjustment, including fiscal austerity measures and government support to the banking sector. Careful monitoring of macro-financial developments and addressing any growing imbalances is hence as important as keeping the twin deficits under check.

Given the very high home ownership rate in Malta, house price developments can play a crucial economic role. Micallef computes an aggregate 'misalignment' index using a multiple indicator approach to identify under or overvaluation of house prices in Malta based on fundamentals. A total of five indicators are used that capture demand, supply and banking system factors; namely the house price-to-RPI ratio, the price-

to-income ratio, price-to-construction costs ratio, dwelling investment-to-GDP ratio and the loan-to-income ratio. These indicators are studied in terms of the deviation from their trends or long-run averages. Looking at official measures of house price levels, the indicator shows a period of overvaluation in house prices that peaked in 2006-2007. This disequilibrium started to be corrected following the decline in house prices, reaching a trough in 2013. Starting in 2014, however, the index started to recover such that, by end-2015, house prices were broadly in equilibrium. Micallef concludes that with prudent bank lending policies, risks to financial stability from house price increases appear to be limited at the current juncture, especially since the ongoing recovery in house prices is not driven by rapid credit growth.

This is confirmed by the last article in this publication, in which Micallef and Borg develop a financial conditions index for Malta for the last two decades. This index provides a summary measure of domestic financial conditions by combining several financial variables that influence economic activity. These include interest rates, bank balance sheet indicators, asset prices, as well as external variables. Micallef and Borg find that financial conditions in Malta were relatively benign in the mid-to-late 1990s, followed by a period of tightening. During the pre-crisis period, financial conditions improved, before deteriorating again during the financial crisis. They remained tight until 2013, after which there was some recovery. However since 2009, private sector debt as a per cent of GDP has fallen by over 35 percentage points. This suggests that the economic growth observed in recent years was not fuelled by credit, and in fact there is evidence that many companies are increasingly financing their expansion by using retained earnings.

Taken together these five articles provide a reassuring answer to the question of whether recent rates of economic growth can be sustained in future years. Economic growth appears to have been driven by a significant increase in the economy's potential, through a boost in total factor productivity – possibly the result of the emergence of new high value-added sectors, and the unlocking of latent labour potential combined with an influx of foreign workers. The resulting rise in GDP instead of leading to a spike in consumption, both private and public, appears to have ended up mostly as higher savings. There is also no evidence that faster economic growth was fuelled by rising credit or has led to property prices deviating from fundamentals. Malta's recent economic performance appears largely to have been the result of structural change aided by the opportunities opened by membership of the single market.

Looking forward, the benefits of these factors could gradually dampen and Malta's growth should stabilise. The diversification of the economy has meant that whilst in the past Malta used to be quite reliant on imports of capital goods, in recent years it has become quite dependent on imports of labour. Services are more labour-intensive, and while some sectors, such as manufacturing, are becoming more productive and freeing up skilled labour for use elsewhere, the unfulfilled demand for labour is high. In the context of a rapid ageing transition, this means that in coming years there will need to be considerable investment to upskill the working age population and boost labour productivity. At the same time, the success of Malta's new economy depends on the country having the right infrastructure, particularly in the areas of digital networks and communications, links with the main trading partners and, increasingly, internal transit. Traditionally investment in human capital and infrastructure were the remit of the public sector. However, over coming decades the rise in social expenditure due to ageing may constrain this. It is therefore highly likely that the next economic transformation of Malta will involve a much more central role for the private sector in education, training and infrastructure.

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PART I

ASSESSING GROWTH PROSPECTS

MEDIUM-TERM ESTIMATES OF POTENTIAL OUTPUT GROWTH IN MALTA

Brian Micallef and Reuben Ellul[1]

This paper reviews the performance of the Maltese economy from a longer-term perspective and provides an assessment of its medium-term growth potential. This is of key importance to policy makers because living standards, measured by income per capita, are very closely tied to long-run growth. The objective is to assess whether the high growth rates seen in recent years are permanent or transitory in nature. We estimate that the potential growth rate of the Maltese economy has increased from below 2.00% at the time of the global financial crisis to around 5.50% between 2014 and 2015. Going forward, our analysis suggests that Malta's potential growth rate will stabilise at around 3.25% between 2021-2025, which is above the country's historical growth rate recorded over the period 2000-2015.

1. Introduction

This paper reviews the performance of the Maltese economy from a longer-term perspective and provides an assessment of its medium-term growth potential. In doing so, it focuses on the fundamental supply-side factors that drive economic growth in the long run, namely the accumulation of capital stock, developments in the labour input and advances in technological progress. This is of key importance to policy makers because living standards, measured by income per capita, are very closely tied to long-run growth.

From a long term perspective, the Maltese economy has undoubtedly been a success story. Grech (2015a) notes that GDP per capita improved by 11 times in real terms since Malta gained its independence from Britain in 1964. This success was not a foregone conclusion at the time and is a far cry from the predictions made by Stolper et al. (1964) in their United Nations report, more than half a century ago, that mass migration was "the only feasible solution in the long run." Indeed, the opposite phenomenon was observed in Malta, especially after the country's accession to the European Union (EU) in 2004, with the share of foreign workers increasing to around 13.6% of the workforce by 2015.

The Maltese economy's performance after the global financial crisis has been quite impressive. At the end of 2015, Malta's GDP stood more than 29% above its pre-crisis level in 2008, the best performance in the EU besides that of Ireland. This enabled the country to gradually narrow its income gap vis-à-vis the rest of the EU, from around 80% of the EU average at accession to 92.5% in 2015.

The diversification towards new services industries, as well as in specific niches in manufacturing, has increased the flexibility and resilience of the economy to foreign disturbances (Grech, 2015b). The tourism industry, a traditional pillar of the Maltese economy, benefitted from the introduction of low cost airlines in the mid-2000s, which increased the island's connectivity to mainland Europe and opened up new routes. The rise in the exports of services was in turn reflected in the current account balance, which in recent years turned positive after more than two decades of persistent deficits (Grech and Rapa, 2016). In part, the improvement in the current account is also attributed to the gradual reduction in the fiscal deficit.

The labour market facilitated these structural changes. Since the crisis, Malta registered the largest increase in its participation rate among EU countries, driven mostly by higher female labour market activity rates, while the unemployment rate declined sharply (Micallef, 2013). The country has also benefitted from an inflow of foreign workers, spread across the entire skill spectrum, which supported economic growth without leading to upward pressures on wages (Grech, 2015c). Indeed, the country's convergence process to higher EU income levels was driven mainly by a higher utilisation rate of labour.

This study's objective is to assess the medium-term sustainability of economic growth in Malta. This is especially important in the context of the high growth rates achieved over the past three years, which averaged 6.8% between 2013 and 2015, and which are unlikely to persist in the future. Within this context, our study estimates the Maltese economy's historical potential growth rate and then moves on to assess how much of the recent high growth rates are transitory or permanent in nature. Some of this growth is attributable to cyclical factors, such as the accommodative monetary policy stance by the European Central Bank, due to the prolonged period of low inflation in the euro area. Public investment has also been exceptionally strong due to high absorption of EU funds at the end of the 2007-2013 financing programme. The latter has both a transitory and a permanent element, as completed projects added to the country's capital stock. On the other hand, past structural reforms in the labour market and in the energy sectors, as well as the shift towards sectors which are more dynamic and productive, could imply an improvement in the economy's underlying potential growth rate in the medium term.

This paper extends the framework proposed by Grech and Micallef (2014) and provides growth projections for Malta out to 2025. The modelling framework consists of a constant returns to scale Cobb-Douglas production function with two factor inputs. Given the inevitable uncertainty surrounding such estimates, we also present a number of alternative scenarios. These relate to different assumptions about trend productivity growth, structural unemployment, migration and the investment-to-potential output ratio.

The key findings are the following. We estimate that the potential growth rate of the Maltese economy has more than doubled from below 2.00% at the time of the global financial crisis to around 5.50% between 2014 and 2015. All three components – total factor productivity, capital and labour – contributed to this increase. Going forward, our analysis suggests that Malta's potential growth rate will stabilise at around 3.25% in the medium term, which is above the country's historical growth rate recorded over the period 2000-2015.

The rest of the paper is organised as follows. Section 2 presents the supply-side modelling framework and discusses the evolution of the key macroeconomic variables over the period between 1985 and 2015. Section 3 provides historical estimates of potential output growth for Malta. Section 4 describes the medium-term scenario, while Section 5 provides some sensitivity analysis by changing some of the assumptions used in the baseline scenario. Section 6 concludes and provides policy recommendations based on the main findings.

2. Accounting for growth in Malta

The supply side of the economy is modelled using a Cobb-Douglas production function, which relates output to the level of technology and two factor inputs, capital and labour:

$$Y_t = A_t \cdot K_t^{\alpha} \cdot L_t^{1-\alpha} \tag{1}$$

where Y_t denotes output at time t, L_t the labour input, K_t the capital stock and A_t the total factor productivity (TFP). The latter is derived as the Hodrick-Prescott filter of the Solow residual, using the standard smoothing parameter of 100 for annual data. The 'Solow residual' is considered as that component of economic growth that cannot be explained through growth in the capital stock or in the labour supply and is a proxy for technological progress or productivity gains.

The share of labour income (1-α) is calibrated at 0.58, based on the share of compensation of employees in gross value added adjusted for the proportion of the labour force that consists of self-employed. The stock of capital is calculated using the perpetual inventory method:

$$K_t = (1 - \delta) \cdot K_{t-1} + \sum_{t=0}^{1} I_{t-i} \tag{2}$$

where K_t is level of the capital stock, I_t is real investment and δ represents the depreciation rate. We assume a depreciation rate of 6%, in line with Grech and Micallef (2014) and McQuinn and Whelan (2015). Following Grech (2004), an initial capital-output ratio value of 1.5 is used in 1980 in order to pin down the initial capital

stock, K_0. Dwelling investment is excluded from the measurement of the capital stock. The capital stock thus includes both public investment and non-housing investment by the private sector.

We focus on the total amount of hours worked as a measure of labour input. The latter comprises several key variables of the labour market:
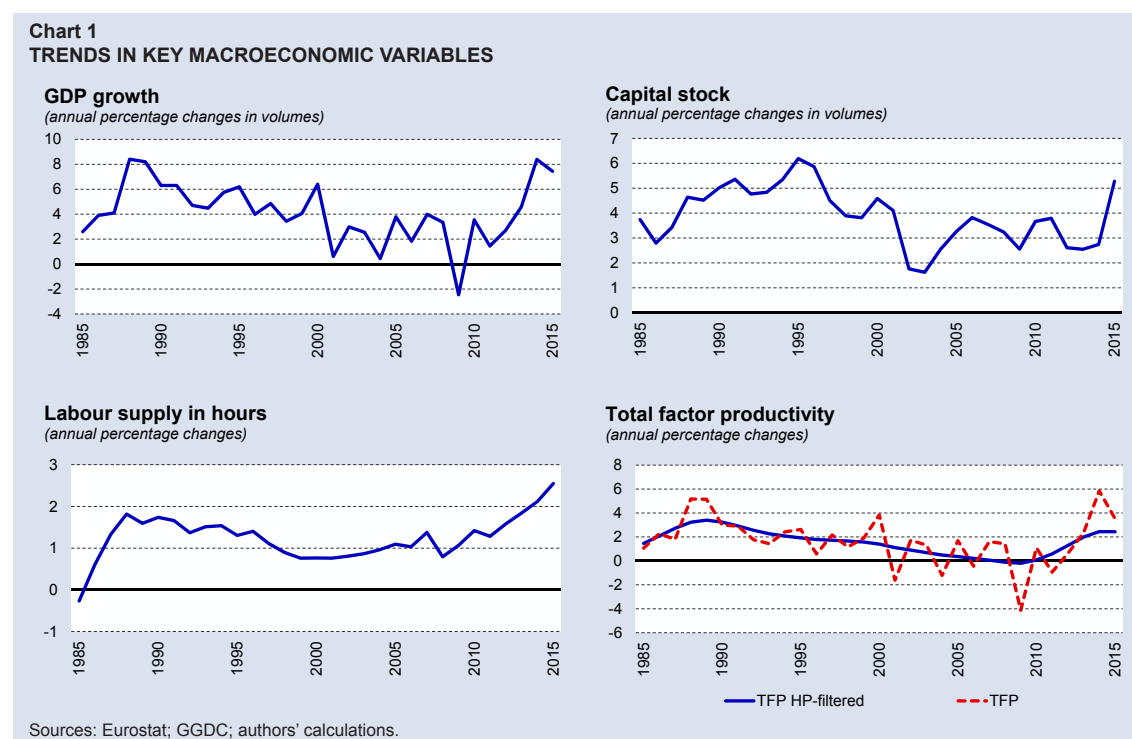
$$L_t = WAP_t \cdot PART_t \cdot (1 - NAIRU_t) \cdot HOURS_t \qquad (3)$$

where WAP_t denotes the working-age population, $PART_t$ the participation rate, $NAIRU_t$ the structural unemployment rate and $HOURS_t$ the average weekly hours worked. To derive potential labour utilisation, the trend participation rate, NAIRU and hours worked are obtained using the Hodrick-Prescott filter.

We use annual data covering the period 1980 to 2015, although trends and estimates are presented from 1985 onwards.[2] Data starting from 2000 are sourced from Eurostat, while we used the historical dataset documented in Grech (2015a) for pre-2000 data. Historical information on the average working week is taken from the Groningen Growth and Development Centre (GGDC).[3]

Chart 1 presents the main historical trends in the key macroeconomic variables.

GDP growth in Malta tends to be volatile as foreign disturbances and industry-specific shocks tend to have a pronounced effect on economic activity in small open economies. In the 1990s, the economy benefitted from a broad programme of structural adjustment that included price deregulation, privatisation, and financial and trade liberalisation, all of which encouraged greater private sector involvement in the economy (Ebejer, 2006). Growth slowed significantly in the early 2000s as the economy was hit by a combination of adverse demand and supply shocks. After a short-lived cyclical upswing, the economy was adversely affected by the recession of 2009. Contrary to other EU economies, however, economic activity quickly recovered after the

Chart 1
TRENDS IN KEY MACROECONOMIC VARIABLES

Sources: Eurostat; GGDC; authors' calculations.

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[2]   The use of the HP filter ought to exclude the inclusion of observations at the beginning and end of the sample, to avoid bias.
[3]   Available online at www.ggdc.net, as part of the Penn World Table release.

crisis, with the pre-crisis level reached by 2011. From a longer-term perspective, in addition to the regular business cycle fluctuations, GDP growth has been on a downward trend from the late 1980s until after the economic and financial crisis of 2009. Between 1985 and 2000, real GDP averaged 5.4% per annum but declined to 2.0% in the decade between 2001 and 2011. The last three years saw a reversal of this downward trend, with GDP growth rates reaching levels last seen in the early 1990s, averaging 6.8% between 2013 and 2015.

The rate of TFP growth followed the pattern set by GDP growth. Growth in TFP was running at 2.0% in the 1980s and 1990s, before falling to 0.4% in the 2000s. Similar to the trend in GDP growth, TFP growth has recovered strongly after the 2009 crisis, with growth rates similar to those recorded in the early 1990s.

Capital stock is estimated to have grown by 4.1% on average in the 1980s, accelerating to an average growth rate of 4.9% per year in the 1990s. Growth moderated sharply in the ensuing decade, averaging 3.0% in the decade to 2010. In recent years, however, there was an increase in the investment share of GDP, with Maltese capital stock growing at an annual rate of 3.4%, surging to 5.3% in 2015. The increase in recent years was driven, to an extent, by investment in the energy sector and a higher absorption of EU funds following the end of the 2007-2013 financing programme.[4]

Labour supply in hours worked in Malta has shown remarkable cyclical trends since 1980. The recession of the early 1980s had an adverse impact on the labour supply, which recovered in the latter half of the 1980s (Grech, 2015a). In the following decade, the labour supply in hours worked increased on average by 1.2% per annum. This moderated marginally to 1.0% in the 2000s before surging to 1.9% in the five years to 2015. In order to better understand the evolution of labour supply, Chart 2 decomposes the underlying trends of the variables considered in this component.
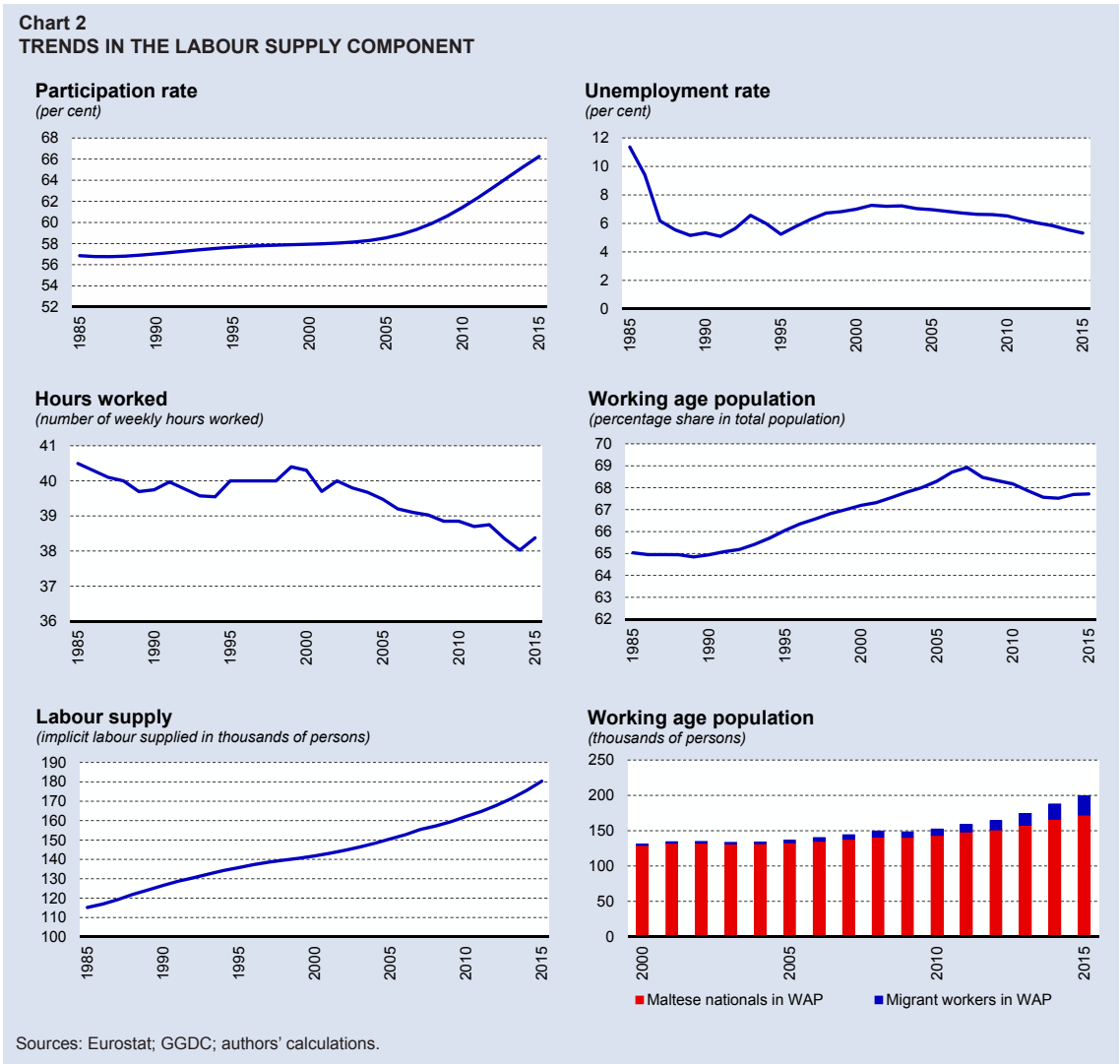
Chart 2 shows that the labour supply in Malta has increased steadily over the past three decades, from around 115,000 in 1985 to 180,000 in 2015. The fraction of the total population that was of working age in Malta remained stable in the 1980s but started to increase gradually in the early 1990s, then reaching a peak of 68.9% in 2008. This fraction has declined since then, due to an ageing population, although it has stabilised over the last four years reflecting the increased inflow of foreign workers. The latter are concentrated at both ends of the skill spectrum, at the higher end where skills are scarce and at the lower end where jobs are no longer attractive for the Maltese workers. Administrative data show that the proportion of foreign workers rose from 1.3% of the total workforce in 2000 to 10.1% in 2014 (Grech, 2015c). In the absence of immigration in Malta, the working age population would have shrunk slightly, instead of rising by 3.0% since EU accession. In this study, the migrant worker component in the working age population stands at around 30,000 individuals in 2015.

The unemployment rate mirrors the cyclical position of the economy. The unemployment rose sharply during the 1980s recession. This was then followed by a decade-long drop until 1995, after which unemployment rose slightly during the economic restructuring which preceded EU accession. Since the early 2000s, however, the unemployment rate has been on a downward trend, with the increase in unemployment during the crisis being short-lived, in stark contrast with developments in the rest of the euro area. Reforms introduced in recent years were specifically targeted to reduce the share of long-term unemployed in the economy and, consequently, could have a permanent effect on structural unemployment.[5]

The average working week remained broadly stable in the two decades until the turn of the millennium after which it started to steadily decline. The latter trend is a common phenomenon among European countries (Blanchard, 2004). The reduction in the average working week reflects the increase in part-time work and more modern flexible work arrangements, such as family friendly measures, intended to attract more

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[4]   In 2015, gross fixed capital formation was also affected by a new capital intensive company in the aviation sector.

[5]   For example, the tapering of social benefits was introduced to attract individuals hitherto dependent uniquely on transfer payments to the labour market. The tapering of social benefits is given for a three-year period to beneficiaries who become engaged in employment, or are self-employed, as long as they earn the national minimum wage or more. Other reforms focused on training initiatives within the context of life-long learning and re-training.

Chart 2
TRENDS IN THE LABOUR SUPPLY COMPONENT

Participation rate
(per cent)

Unemployment rate
(per cent)

Hours worked
(number of weekly hours worked)

Working age population
(percentage share in total population)

Labour supply
(implicit labour supplied in thousands of persons)

Working age population
(thousands of persons)

■ Maltese nationals in WAP   ■ Migrant workers in WAP

Sources: Eurostat; GGDC; authors' calculations.

females in the labour market. The rise in part-time work is also a reflection of demographic trends, with older workers being more likely to engage in part-time activities. More generally, however, the reduction in the average weekly hours is also related to the structural changes taking place in the Maltese economy. As economies develop, employment shifts away from types of work that rely on long working hours, with investment in additional capital substituting for long labour hours to services industries. This decrease may not necessarily lead to lower levels of productivity. In fact, Shepard et al. (1996) suggest that more flexible hours worked may, in certain industries, contribute to significant improvements in productivity.

Despite being gradually low compared to the EU average, the participation rate increased only gradually in the 1980s, 1990s and early 2000s. This trend has changed drastically starting from the mid-2000s mainly due to the steady increase in the female participation rate. In the decade between 2005 and 2015, the overall and female participation rates increased by 10.0 and 17.4 percentage points, respectively, by far the highest increase registered among the EU countries.[6] Despite this improvement, however, the female participation rates at 53.8% in 2015, still remains one of the lowest in the EU and hence, there is still ample room for catching up in the future. On the contrary, the participation rate of males increased by 2.3 percentage points during this period and, at 80.8% in 2015, remains higher than the EU average.

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[6]   Micallef (2015) finds that slightly less than half of the increase in the female participation rate between 2008 and 2014 may be attributed to labour market reforms. These reforms are calculated to have augmented the economy's potential output growth by 0.3 percentage point per annum over the six years to 2015.
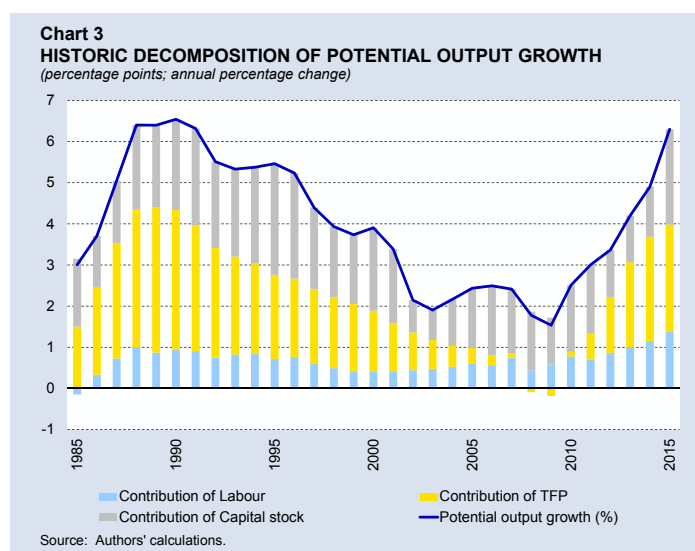
In addition to the number of government initiatives aimed at attracting more women to the labour force, the increased female participation rate is also related to the transformation in the role of women in society, with rising education levels combined with changing social norms (Micallef, 2015; Grech, 2015a). Traditionally, the female participation rate in Malta tended to peak in the early 20s and decrease sharply thereafter as women dropped out of the labour force completely after child birth. More recently, however, the female participation rate started to peak in the late 20s and, after the dip in later years due to the child-bearing effects, remain much higher compared to a decade ago. This could reflect easier access to child care, as well as the impact of higher education attainment levels, which generally lead to a quicker return to work after childbirth. Changes in labour force participation could also be influenced by developments in the housing market. The rise in house prices and, more generally, the increase in household indebtedness may have both reflected and reinforced the trend towards higher female participation rates. On the contrary, the participation rate among the young cohorts has declined reflecting higher enrolment rates in higher education. The latter trend applies to both genders.

Going forward, one expects that the societal trends outlined above – higher enrolment in education, the re-entry of females into the labour force after childbirth, and longer participation in the labour market – will continue in the medium to long run. For instance, the pension reform, in conjunction with increased life expectancy and changes in the type of work people do are likely to continue to increase the participation rate among the older cohorts (Grech, 2016). Expected trends will be discussed when describing this paper's medium-term baseline scenario.

3. Historical estimates of potential output growth

Chart 3 presents the contribution of labour, capital and TFP to potential GDP growth in Malta between 1985 and 2015. The decomposition points to significant changes in potential GDP growth over the past three decades. According to our calculations, potential growth accelerated to above 6.0% in the late 1980s and early 1990s, after which it started a phase of gradual trend decline, reaching a trough of less than 2.0% in 2009. However, in sharp contrast to the experience in other European countries, the Maltese economy recovered strongly after the 2009 recession, with this growth being also reflected in the economy's supply potential. Our estimates of potential GDP growth exceeded 6.0% in 2015 pushing the growth rate to levels last seen in the early 1990s.

The trend decline in potential GDP growth from the early 1990s until 2009 was mainly attributable to the slowdown in TFP growth. From a contribution of around 3 percentage points to potential output growth in the late 1980s, trend TFP declined steadily in the subsequent two decades, with its contribution even turning negative during the crisis.[7] As reported in Grech and Micallef (2016), a striking feature of the evolution of TFP in Malta is the absence of pro-cyclicality, which is normally observed in other economies (Basu and Fernald, 2001). However, TFP growth recovered strongly after the crisis, contributing on average 1.8 percentage points per annum

Chart 3
HISTORIC DECOMPOSITION OF POTENTIAL OUTPUT GROWTH
(percentage points; annual percentage change)

Contribution of Labour | Contribution of TFP
Contribution of Capital stock | Potential output growth (%)
Source: Authors' calculations.

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[7]   This is in line with what happened in many economies, as discussed in Dabla-Norris et al. (2015). The authors contend that there may have been declines in productivity growth within sectors which increasingly account for the bulk of employment and economic activity. The shift to services industries, which in some countries are still relatively protected and closed to competition, acted as a drag for TFP growth (OECD, 2014).

between 2010 and 2015. TFP growth was especially strong in 2014 and 2015, with its contribution to potential output growth being similar to that observed in the early 1990s.

Developments in the capital stock also contributed to the decline in potential GDP growth in the 2000s. The contribution of capital to potential output growth declined from an average of 2.2 percentage points per annum in the 1990s to 1.3 percentage points in the 2000s, before recovering to around 1.5 percentage points between 2010 and 2015. Estimates of the contribution of capital increased substantially in

Chart 4
HISTORIC DECOMPOSITION OF LABOUR COMPONENT
(percentage points; annual percentage change)

Legend: Trend participation rate; Working age population; NAIRU; Hours worked; Labour component contribution

Source: Authors' calculations.

2015 following the significant investment in the energy sector and the high absorption of EU funds at the end of the 2007-2013 financing programme.
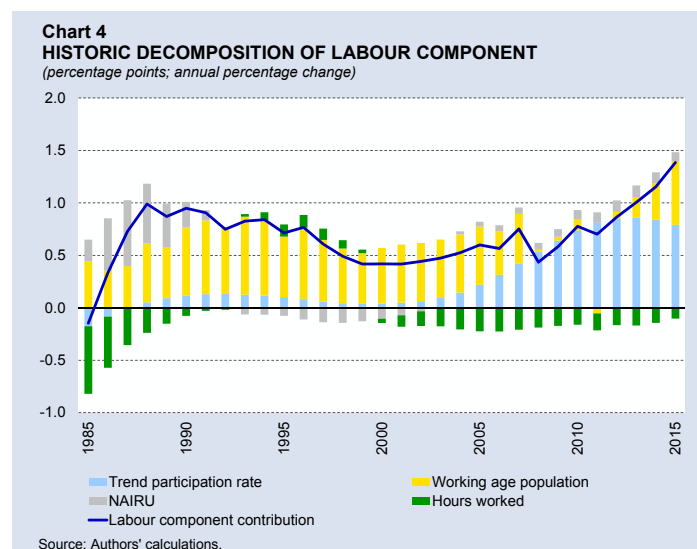
Chart 4 decomposes the contribution of the labour component to potential output growth. Historically, trends in the labour component have reflected demographic shifts in the country's population, with the trend labour supply being positively affected by the increase in the working-age population for most of the period. Since 2009, however, the unfavourable effects of an ageing population began to weigh, with a gradual decline in the contribution of the working-age population. In recent years, the inflow of foreign workers has reversed the trend decline in the contribution of the working-age population, as the migrant flow rose from a few hundred in the early 2000s to more than 5,000 per year towards 2015.

The effects of an ageing population have been offset by the rising participation rate, which has contributed, on average, 0.6 percentage point per annum to potential output growth between 2005 and 2015. This was mainly driven by the increase in the female participation rate, which went up by 17.4 percentage points since 2005, by far the largest increase among EU countries (Micallef, 2015). The surge in the participation rate is the main driver underpinning the resilience of the labour contribution to potential output growth. Albeit to a much lesser extent, developments in NAIRU have also contributed positively to potential output growth after the crisis as the increase in the unemployment rate during the recession proved to be temporary and has since declined to near historical lows. On the contrary, the trend decline in average hours worked contributed negatively to potential growth, averaging around 0.2 percentage point per annum between 2005 and 2015.

4. Medium-term baseline scenario

The trends discussed above provide reasons for optimism on growth prospects in Malta over the coming years. Trend growth in TFP has recovered after the crisis, after declining for much of the 2000s and should benefit from reforms in the energy sector, as well as from higher education levels. In addition, there is still room for catching-up in terms of the female participation rate, which remains low compared to our European peers. On the contrary, an ageing population, in conjunction with the trend decline in hours worked and possibly a slowdown in the number of foreign workers, could have an adverse effect on the contribution of labour.

Some features of the Maltese economy may also revert back to a lower 'normal' from their current favourable position. For example, the unemployment rate may rise from its current historically low level of under 5% over the course of the business cycle although, the reforms undertaken in recent years to reduce the long-term unemployed, such as the tapering of benefits, are likely to have reduced the structural rate of

unemployment. Similarly, the positive supply-side impact of the recent high rates of investment in areas like energy and infrastructure is likely to continue to affect positively the economy over time even if economic growth slows down.

The key question is how these trends will interact to shape economic growth in Malta over the medium term. This section reports the results from a simulation of a supply-side model that projects growth using trends in TFP, demographic projections as well as other assumptions regarding investment and other variables.

The baseline scenario for the period 2016-2025 is simulated using the following model:

$$Y_t = A_t \cdot K_t^{\alpha} \cdot L_t^{1-\alpha} \tag{4}$$

$$K_t = (1 - \delta) \cdot K_{t-1} + \sum_{t=0}^{1} I_{t-i} \tag{5}$$

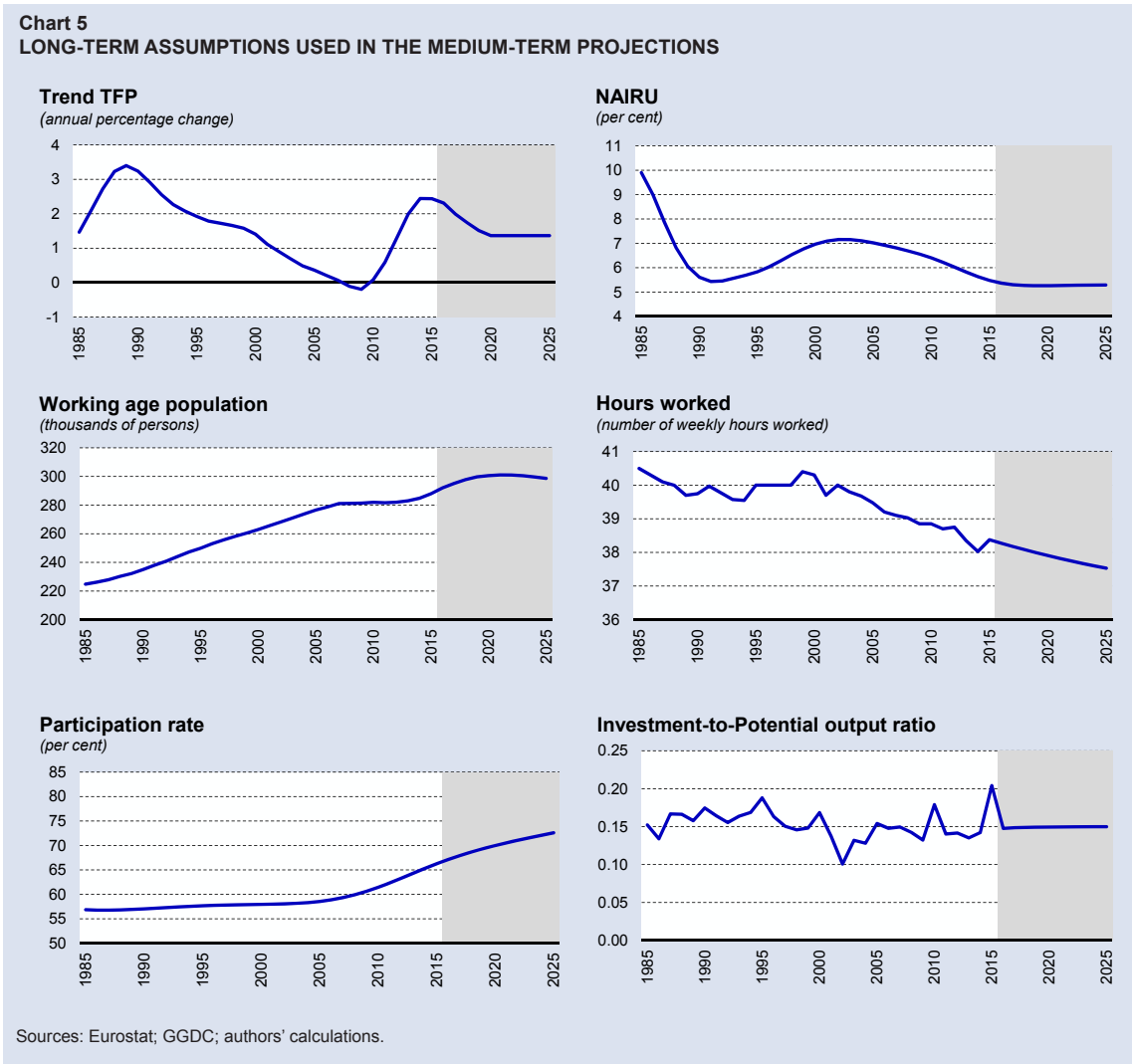$$L_t = WAP_t \cdot PART_t \cdot (1 - NAIRU_t) \cdot HOURS_t \tag{6}$$

$$I_t = s \cdot Y_t \tag{7}$$

$$\Delta log A_t = g \tag{8}$$

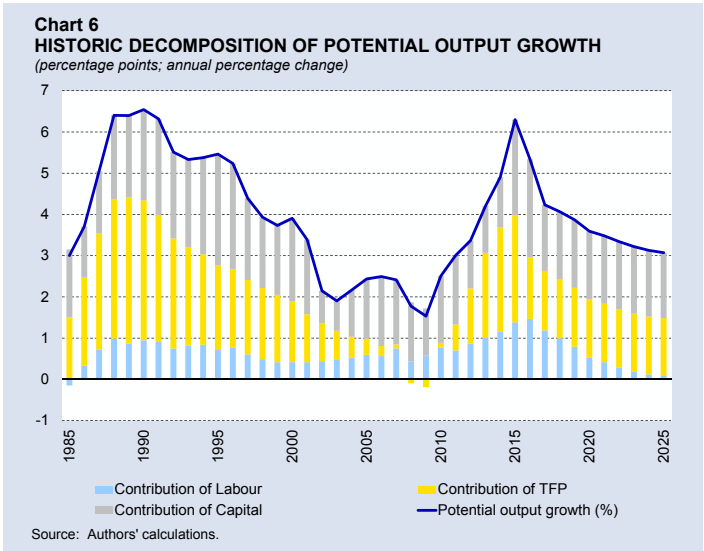The assumptions underlying the simulation are the following:

- TFP is assumed to grow at 1.4% per annum, which is the average growth rate observed between 1985 and 2015. This represents the middle ground between the high rates seen in the early 1990s and the lows observed in the late 2000s. This growth rate is assumed to be realistic in the context of the structural changes observed in the economy, including reforms in the energy sector which has the potential to lower energy costs for households and business, as well as trends in educational attainment.

- The ratio of investment-to-potential GDP is assumed to stabilise to its 1985-2015 average of 15.3% and remain constant thereafter.

- The structural unemployment rate is seen to stay constant at 5.3% from 2015 onwards.

- The working-age population is taken from Eurostat's EUROPOP2013 projections and adjusted for the existing migrant workers, as depicted in Chart 2. Migrant flows are assumed to remain closer to the higher figures seen in recent years, before slowly stabilising at the lower EUROPOP2013 migrant assumptions. The decelerating migrant flow figures included in the projections offset the decline in the working-age population cohort for the first few years of the projections. However, by the early 2020s, the working-age population begins to decline as the migrant flow decelerates to below that needed to replace the ageing cohort. Moreover, the working-age population is further adjusted, following Grech (2016), to include the impact of the pension reform going out to 2025.

- The trend in average hours worked by employees is extended over the baseline projections. This is based on the assumption that the share of part-time workers in Malta, which are inversely related with the average weekly hours, will gradually converge to the higher share observed in the EU.

- The Maltese government's current EU2020 target aims to reach an employment rate of 70.0% by 2020. The original target of 63% was achieved in 2011, with government revising the target upwards to 70% thereafter. Recent statistics indicate that Malta is well on track to meet this goal.[8] In setting out the projections for the participation rate in this study, these positive trends in the labour market were incorporated in the baseline view. The participation rate of the labour force is calculated using age-cohort projections from Eurostat's EUROPOP2013 exercise. Malta's participation rate is seen to reach around 75.0% by 2025. This is comparable with, but more conservative than projections found in IMF (2016). These assume a participation rate of roughly 75.0% by 2020.

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[8] For further discussion on the bases, guidelines and conditions found in the original Europe 2020 agenda, see European Commission (2010).

Chart 5
LONG-TERM ASSUMPTIONS USED IN THE MEDIUM-TERM PROJECTIONS

Sources: Eurostat; GGDC; authors' calculations.

All data up to 2015 refer to histori-cal aggregates, with 2016 being the first year of the simulation. Where applicable, internal estimates by the Central Bank of Malta are used for the period 2016-2019, for instance, to avoid the end-of-sample bias in the HP filter. TFP growth is assumed to gradually return to the targeted path by 2020 and remain constant until 2025. The assumptions used in the medium-term projections are depicted in Chart 5.

Chart 6 presents the results of the long-run simulation. Using the above assumptions, potential output

Chart 6
HISTORIC DECOMPOSITION OF POTENTIAL OUTPUT GROWTH
(percentage points; annual percentage change)

Source: Authors' calculations.

growth is expected to moderate from the high rates seen over the last few years. On average potential output growth is expected to average 3.25% over the period 2021-2025, around 1 percentage point less than the average for the period 2016-2020.

It is worth emphasising that these projections do not represent a forecast of year-by-year growth in the Maltese economy. These are based on a set of assumptions in which key parameters are held either constant or converge towards constant historical averages.

Chart 7
HISTORIC DECOMPOSITION OF LABOUR COMPONENT
(percentage points; annual percentage change)

Source: Authors' calculations.
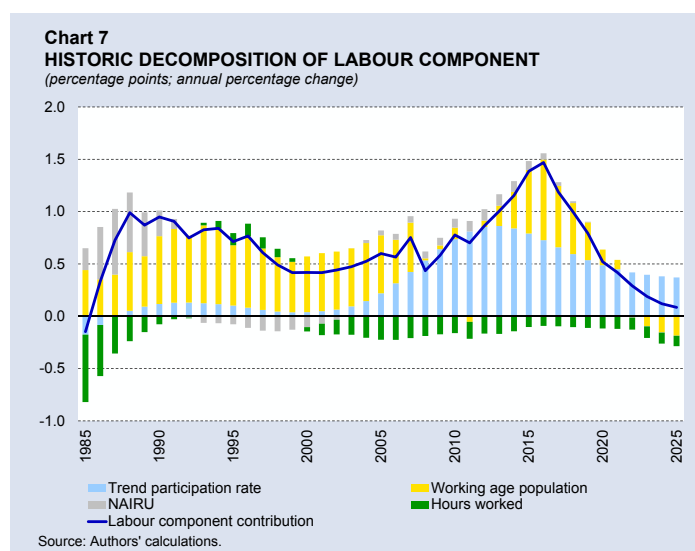
TFP and the capital stock are the two main contributors to potential output growth, especially after 2020. TFP growth is expected to contribute around 1.4 percentage points to potential output growth over the projection horizon. The capital stock is expected to contribute on average 1.8 percentage points to potential output growth between 2016-2020, before easing to 1.6 percentage points on average between 2021-2025.

The most striking aspect of the simulation is the deceleration in the contribution of labour in medium term (see Chart 7).[9] Going forward, this component has the weakest outlook in terms of contributions to potential output as it is negatively impacted by future demographic trends. In recent years, the downward trend in the Maltese working age population was only offset by exceptional migration flows, which are gradually expected to moderate over the projection horizon.[10] Furthermore, the full benefit from legislated pension reforms, which will raise the retirement age for both genders to 65 years by 2026, will be felt after the end of our projection horizon (Grech, 2016). This reform will stabilise the employment-to-population ratio until the early 2020s after which it declines. The increase in the labour market participation rate remains an important factor supporting potential output growth but its contribution will gradually slow down as Malta closes the participation gap with the EU. Furthermore, estimates of the structural unemployment rate are already very low and amongst the lowest in the EU. Thus, there is limited scope for further growth via this channel.

5. Sensitivity analysis

Estimates of potential output growth are surrounded by a considerable degree of uncertainty. This stems from a number of factors, such as the unobservable nature of this variable and the assumptions surrounding the projected path of the trend components. The uncertainty surrounding the estimates of potential output is especially pronounced during a period of structural change in the economy or in abnormal circumstances, such as the high growth rates experienced by the Maltese economy in recent years, when it is difficult to disentangle transitory effects from permanent ones.

Perhaps the highest uncertainty relates to the future prospects for productivity and innovation. In fact, the trend slowdown in productivity in advanced economies over the past two decades led to an ongoing debate, both in academia and policy circles, about the outlook for future productivity growth, with two opposing views.

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[9]   Similar concern regarding labour market and trend demographic developments are discussed in detail for the United States by Fernald (2016).
[10]   The implicit assumption on the productivity of migrant workers being equal to the residents' productivity in turn depends on the nature of future jobs to be filled by migrants.

The pessimistic view, proposed by US economist Robert Gordon, assumes that the slowdown in productivity is a permanent phenomenon since the type of innovations that took place in the first half of the 20th century, like electrification, are more significant than the more recent technological innovations. Furthermore, there are also several headwinds that could potentially further slowdown productivity growth in the US, such as an ageing population, growing inequality, globalisation, sustainability and the overhang of consumer and government debt (Gordon, 2014). While some of these factors are more applicable to the US, many are also applicable to other economies.

The opposing view is favoured by technological optimists who claim that the information revolution will continue to dramatically transform frontier economies. According to Brynjolfsson and McAfee (2011), the increasing digitalisation of economic activities has unleashed a number of innovative trends, such as faster and easier business experimentation, easier sharing of ideas and the ability to replicate innovations with greater speed. However, it is increasingly recognised that the full benefits of new technologies for productivity can only be fully realised if accompanied by significant changes in organisational structures.

Beyond this uncertainty on the outlook of productivity growth, the introduction of new technologies and new industries may lead to statistical difficulties in the accurate measurement of both GDP and productivity. This stems from difficulties in adequately capturing improvements in the quality of products or in the entry and exit of different market competitors. For this reason, national accounts measures tend to overestimate price effects and underestimate production. A noteworthy example is the production of high-end computer components, which is not properly taken into account, even in advanced economies such as the United States (Byrne, Fernald and Reinsdorf, 2016). The difficulties in the measurement of growth and productivity in these industries are therefore a source of serious concern going forward, especially for an economy that is specialising in a number of services industries. However, as the ascent of new industries cannot be projected *ex ante*, these concerns can only appear as caveats to long-term growth analysis.

One way to quantify this uncertainty is by comparing the baseline results with alternative assumptions on key parameters. In this regard, we will test the sensitivity of the results by changing key parameters or assumptions associated with the three components of potential output growth.

The first assumption relates to TFP growth with two alternative scenarios being proposed. The first assumes a more pessimistic TFP scenario, with TFP growth returning gradually to its 2000-2015 average (instead of 1985-2015 as in the baseline scenario). The second scenario assumes a more favourable TFP growth, averaging 2.0% per annum from 2020 onwards. This could be due to, for instance, the past reforms in the energy sector, which would lower the cost structure of firms, thereby leading to an increase in productivity and competitiveness.

The second assumption relates to the accumulation of the capital stock. More specifically, we will assume that the investment-to-potential output ratio is one percentage point lower compared with the baseline scenario. The could be due to the changing structure of the economy, with services being generally less capital intensive compared to the manufacturing industry.

Finally, we will also assess the sensitivity of medium-term growth to changes in key labour components. Again, we focus on two alternative assumptions. The first relates to a higher structural unemployment compared to the baseline. The underlying assumption in this case would be that the recent decline in the unemployment rate is mostly cyclical rather than permanent, with the estimate of structural unemployment gradually returning to 6.0% by 2020 as the economy slows down. The second assumption relates to higher migration flows compared to the rather conservative estimates in the EUROPOP2013 exercise. In the baseline scenario, migrant flows are expected to settle at roughly 1,100 individuals per year by 2025 – in line with the EUROPOP2013 migrant assumption. In the alternative scenario, the flow of migrants in the working age population will settle at 3,100 individuals annually.

Chart 8 compares the baseline sce-
nario with the alternate scenarios.
All scenarios exhibit a correction
from the exceptionally high growth
rates in potential output seen in the
recent years. However, even in the
most pessimistic scenario, potential
output growth remains above 2.0%,
which is substantially higher than
growth prospects in other advanced
European countries (McQuinn and
Whelan, 2015).

The importance of TFP in the deter-
mination of potential output growth
is apparent in the parallel paths of
potential output in the TFP-related
scenarios. The pessimistic scenar-
io lowers growth to 2.5% by 2025,

Chart 8
SENSITIVITY ANALYSIS SCENARIOS
(annual percentage change)

Series7	Baseline scenario
Lower TFP scenario	Higher TFP scenario
Lower capital accumulation scenario	Higher unemployment scenario
Higher migrant scenario	

Source: Authors' calculations.

while the higher TFP growth case raises it to 3.9%. These scenarios confirm that future TFP growth plays a key role in driving potential output growth in the coming years.
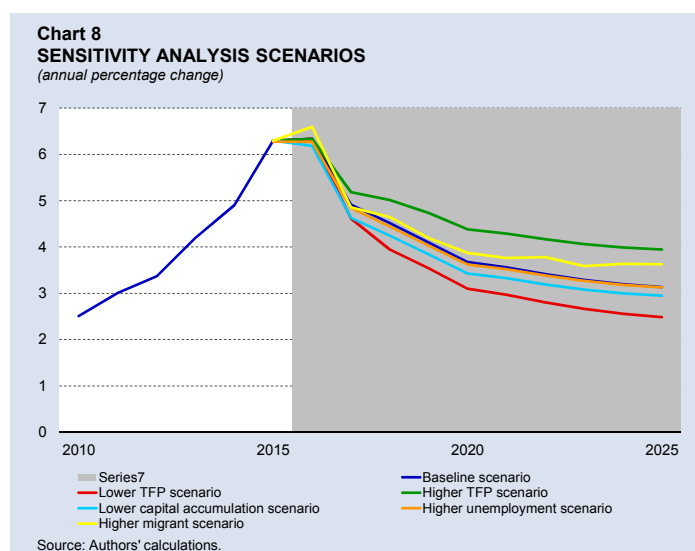
The other three scenarios considered appear to cluster around the baseline case. The higher unemployment scenario is the closest to the baseline. The lower investment scenario, which leads to a slower accumulation of capital, lowers potential GDP growth by around 0.2 percentage point per annum between 2021 and 2025. However, if the decline in investment reflects firms' anticipation of lower demand as a result of a slowdown in labour force growth, due for instance to an ageing population, the impact on potential output growth may be more pronounced than implied in this scenario. Finally, the outlook for growth improves over the baseline by assuming higher migratory flows towards Malta. Increased migration raises the working age population and the supply of labour. These findings are in line with Grech (2015c), who notes positive historic contribution of migrants to the Maltese economy. In this scenario, potential output growth will average around 0.4 percent-age point per annum higher between 2021-2025 compared to the baseline.

6. Conclusion

This paper reviews the performance of the Maltese economy from a longer-term perspective and provides an assessment of its medium-term growth potential. The objective is to assess whether the high growth rates seen in recent years are permanent or transitory in nature. We estimate that the potential growth rate of the Maltese economy has increased from below 2.00% at the time of the global financial crisis to around 5.50% between 2014 and 2015. Our medium-term baseline scenario suggests that Malta's potential growth rate will stabilise at around 3.25% between 2021-2025, which is above the country's historical growth rate recorded over the period 2000-2015.

The medium-term economic outlook of the Maltese economy is brighter compared to that of the euro area, which bodes well for the country's convergence prospects to the EU's higher income levels. Economic growth is also important to ensure the sustainability of public debt, especially in the context of the budgetary challenges associated with the demographic outlook, with its implications for public spending on pensions and health care. This topic will be addressed in more detail in a separate article in this publication.

Going forward, future growth will have to increasingly rely on higher productivity. Technology absorption must be facilitated by the creation of a better business environment in order to attract new businesses to Malta, while also creating the right conditions to incentivise more start-ups. Improvements in productivity will require considerable investment to up-skill the Maltese workforce and to address existing skill mismatches. Malta still has a considerable gap in educational attainment compared with the EU, while, at the same time, the increas-ingly diversified economic base makes the task of adequately fulfilling industry demands more difficult. The

new sectors are also creating challenges for the country's infrastructure. To ensure they remain competitive, there will be a need to constantly invest, in order to ensure Malta remains a leader in areas like digital technologies and networks, connections with our main trading partners and, increasingly, internal transit of workers to their workplace. This need for public investment comes at a time when it is increasingly likely that Malta will be less eligible for EU funding beyond 2020, a development that could prove challenging. That said, the rapid economic growth of recent years has brought with it a sharp rise in the national saving rate, which now stands at nearly 30% of GDP, a level last observed in the early 1990s (Grech and Rapa, 2016). Policymakers, similarly to what had happened in that period, need to find the appropriate ways to leverage this stock of internal savings so that it translates in investment which sustains Malta's potential growth.

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PART II

DEVELOPMENTS IN THE TWIN DEFICITS

THE SUSTAINABILITY OF MALTESE GOVERNMENT DEBT REVISITED

John Farrugia and Owen Grech[1]

This study gauges the sustainability of Maltese government debt over the next decade. This exercise is divided into three parts. First, we assess whether government debt is sustainable in the short term by analysing the composition of debt and the evolution of government bond yields. Second, we conduct scenario analysis to evaluate whether government debt is sustainable over the medium to long run. This consists of three alternative scenarios which reveal how the government debt-to-GDP ratio might evolve between 2016 and 2025. For robustness, each scenario is subjected to a number of adverse shocks. Finally, we take into account other considerations relevant for sustainability in both the short run as well as the medium to long run by employing the signal approach for fiscal stress and examining recent policy measures targeted at enhancing sustainability. The results suggest that Maltese government debt is sustainable, but this comes with a number of caveats.

1. Introduction

The global financial and economic crisis, as well as the European sovereign debt crisis, have placed a significant strain on public finances in many advanced economies. Concerns over countries' ability to finance their rising debt commitments have led to an increased level of attention directed towards public debt sustainability, especially since sound public finances are a crucial foundation for price stability, financial stability and economic growth.

This study assesses the sustainability of Maltese government debt over the next decade. Although the government debt-to-GDP ratio in Malta is currently at its lowest level since the late 1990s, the study of debt sustainability remains highly relevant – regular sustainability assessments are imperative since this allows any vulnerabilities to be identified in a timely manner.

The rest of this study is structured as follows. Section 2 explains the concept of fiscal sustainability and, by so doing, sheds light on government debt dynamics, while section 3 examines government debt developments in Malta since the mid-1990s. In section 4, we gauge whether Maltese government debt is sustainable in both the short run as well as in the medium to long run. Section 5 discusses a number of policy implications that emerge from this analysis and concludes.

2. The concept of fiscal sustainability

The starting point for assessing debt sustainability is the government budget constraint – an equation that governs the evolution of government debt. It can be expressed as:

$$d_t = \frac{1 + r_t}{1 + g_t} d_{t-1} - pb_t + dda_t$$

and shows that the debt-to-GDP ratio (d_t) is equal to the debt ratio inherited from the previous period (d_{t-1}) multiplied by the "snowball effect" – which captures the joint impact of the real effective interest rate (r_t) and the real gross domestic product (GDP) growth rate (g_t) – less the primary balance-to-GDP ratio (pb_t), plus the deficit-debt adjustment-to-GDP ratio (dda_t).

Looking at the individual elements of the government budget constraint, the real effective interest rate, which is the nominal effective interest rate net of inflation, raises the debt ratio since it represents interest paid on past accumulated debt.[2] Although the inflation rate does not feature explicitly in the government budget constraint above, it nonetheless influences the debt-to-GDP ratio. Inflation reduces the debt ratio by eroding the real value of debt. Since debt is expressed as a fraction of GDP, real GDP growth raises the denominator of the debt ratio and reduces the debt burden. The primary balance is the overall balance (that is, revenue less expenditure) excluding interest payments. A positive primary balance-to-GDP ratio lowers the debt ratio since a primary surplus allows the government to pay off some of the existing debt. Conversely, the debt ratio will increase if the primary balance-to-GDP ratio is negative, because a primary deficit has to be financed through further borrowing. The deficit-debt adjustment, also referred to as the stock-flow adjustment, captures those transactions or factors that influence the outstanding debt but are not reflected in the primary balance. Examples include privatisation receipts, the purchase of assets, the granting of loans and changes in deposit holdings. A positive deficit-debt adjustment-to-GDP ratio is recorded when the net effect of such transactions is an increase in the outstanding debt. Hence, if this ratio is positive, the debt-to-GDP ratio will rise and vice versa.

If the government budget constraint is solved forward, one can derive a condition for debt sustainability, known as the inter-temporal budget constraint:

$$d_0 \leq \sum_{i=1}^{\infty} \rho_i \, (pb_i)$$

where d_0 is the initial debt ratio, ρ_i is the discount factor that depends on future values of the real GDP growth rate and the real interest rate, and pb_i is the primary balance ratio.[3,4] The inter-temporal budget constraint reveals that, for debt to be sustainable, the net present value of all future primary balances must be large enough to repay the initial debt. In other words, the original debt and the interest accumulated over time will eventually have to be paid through sufficiently large surplus primary balances.[5]

This facet of sustainability, referred to as solvency, is a medium- to long-term concept. There is, however, another side to sustainability. As was highlighted by the recent European sovereign debt crisis, to be in a sustainable position, governments must also be liquid. Liquidity measures the government's ability to access financial markets, allowing it to meet all upcoming obligations in the short-term. These two dimensions of sustainability are both necessary and are closely interconnected.

3. Government debt developments in Malta

Chart 1 shows the evolution of the government debt-to-GDP ratio in Malta, along with that for the euro area, since the mid-1990s.[6] In the case of Malta, it is possible to distinguish between four distinct periods. Between 1995 and 2004, the debt ratio more than doubled, rising sharply from 34.4% to 72.0%. In the following three-year period, the debt ratio witnessed a substantial improvement, declining to 62.4% by 2007. However, it deteriorated once again over the 2008 to 2011 period, climbing to 70.4%. Between 2012 and 2015, government finances entered another phase of consolidation, with the debt ratio falling considerably to a level only marginally above the 60% threshold established by the Maastricht Treaty.

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[2] The real interest rate is given by $r = \dfrac{i - \pi}{1 + \pi}$, where r is the real interest rate, i is the nominal interest rate and π is the inflation rate. However, it can be approximated by $r \approx i - \pi$, provided i and π are not large, say smaller than 10%.

[3] The discount factor is calculated as $\rho_i = \dfrac{(1 + g_i)}{(1 + r_i)} \rho_{i-1}$, where g_i is the real GDP growth rate and r_i is the real effective interest rate.

[4] For simplicity, here the deficit-debt adjustment is assumed to be equal to zero.
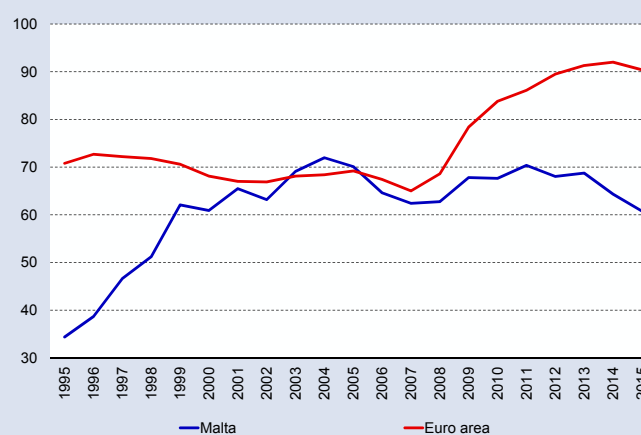
[5] For further details on government debt dynamics and fiscal sustainability, see Escolano (2010) and Ley (2010).

[6] This study uses the 2016Q3 vintage of national accounts and general government statistics, published in December 2016 and January 2017, respectively.

As outlined previously, changes in the debt-to-GDP ratio can be traced to movements in four variables: the real effective interest rate, real GDP growth, the primary balance-to-GDP ratio and the deficit-debt adjustment-to-GDP ratio. Chart 2 displays the contribution of these four factors to the annual changes in Malta's debt ratio. Real GDP growth was the main contributor, accounting for 27% of movements in the debt ratio. Between 1995 and 2015, real GDP grew by 3.4% per annum, on average. It contributed to a lower debt ratio in all years, except for 2009 when real GDP declined, largely as a result of the global economic crisis.[7] Strong economic growth in 2014 and 2015 implied a particularly high contribution in these years. The second largest contributor was the primary balance-to-GDP ratio, which explains 25% of the changes in the debt ratio. On average, Malta recorded a primary deficit of 1.4%. The primary balance contributed to a higher debt ratio in all years, except for those years when a surplus was registered, namely 2005-2007, 2011 and 2013-2015. The contribution was notably high between 1996 and 1998, since low tax revenue growth coincided with high capital spending, and in 2003, mirroring one-off measures relating to the restructuring of the

Chart 1
GOVERNMENT DEBT RATIOS IN MALTA AND THE EURO AREA
(per cent of GDP)

Sources: NSO; Eurostat.

Chart 2
CONTRIBUTIONS TO CHANGES IN THE MALTESE GOVERNMENT DEBT RATIO
(percentage points)

Sources: NSO; authors' calculations.

dockyards. The real effective interest rate and the deficit-debt adjustment-to-GDP ratio each contributed to 24% of the changes in the debt ratio. The real effective interest rate stood at 3.4%, while the deficit-debt adjustment ratio amounted to 0.1%, on average.[8] The contribution of the deficit-debt adjustment ratio was particularly pronounced in 1999, due to the reclassification of Malta Freeport as part of general government, as well as in 2002 and 2006, as a result of privatisation receipts relating to Malta International Airport and Maltacom, respectively.
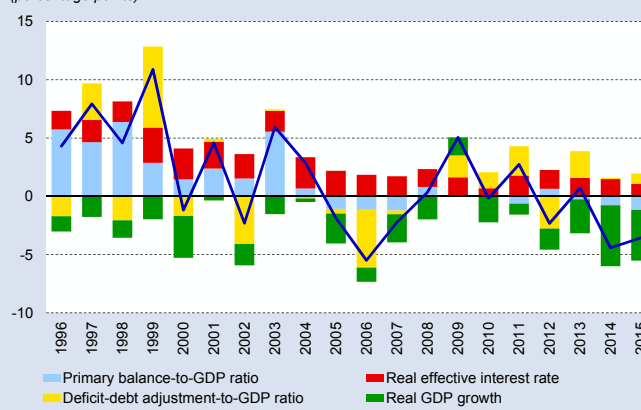
Over the past two decades, Malta's debt-to-GDP ratio was persistently below that recorded for the euro area, except for a brief period spanning from 2003 to 2005 (see Chart 1). On average, Malta's debt ratio was 13.7 percentage points lower than that for the euro area. As at 2015, Malta had the sixth lowest

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[7] GDP data for the 1995-1999 period are based on the Bank's estimates since official ESA 2010 data are unavailable for these years.
[8] This figure, however, masks the magnitude of the deficit-debt adjustments since adjustments that raised the debt ratio were largely offset by others that had the opposite effect. In absolute terms, the average deficit-debt adjustment-to-GDP ratio was 1.9%.

debt ratio out of all 19 euro area countries (see Chart 3), which was nearly 30 percentage points lower than the euro area ratio.

4. Debt sustainability analysis for Malta

The main scope of this study is to assess the sustainability of Maltese government debt over the next decade. In light of the theoretical framework discussed above, and in line with the International Monetary Fund's (IMF) definition, sovereign debt is sustainable if the country is able to finance its policy objectives and service the resulting debt without having to resort to unduly large adjustments, which could otherwise compromise its stability.

Chart 3
GOVERNMENT DEBT RATIOS IN EURO AREA COUNTRIES
(per cent of GDP; as at 2015)

Source: Eurostat.
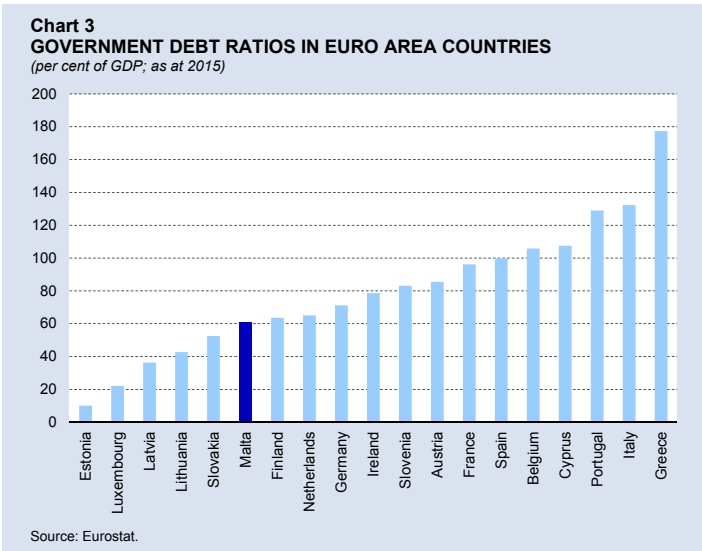
We divide the debt sustainability exercise into three parts. First, we assess the government's liquidity position, that is, whether its debt is sustainable in the short term. Second, we examine its solvency position, namely whether government debt is sustainable over the medium to long run. Finally, we take into account other considerations relevant for sustainability in both the short run as well as the medium to long run.[9,10]

4.1 Short-term sustainability: liquidity

4.1.1 The composition of debt and the evolution of government bond yields

To assess short-term sustainability, we examine the composition of government debt along various dimensions and the evolution of government bond yields.[11] Charts 4-7 decompose Maltese government debt by maturity (short-term vs. long-term), by holder (resident vs. non-resident), by currency (domestic currency vs. foreign currency) and by instrument (fixed interest rate vs. floating interest rate), respectively, while Chart 8 shows the evolution of government bond yields for a number of euro area countries.

Chart 4
DEBT BY MATURITY
(per cent of total)

Source: Eurostat.

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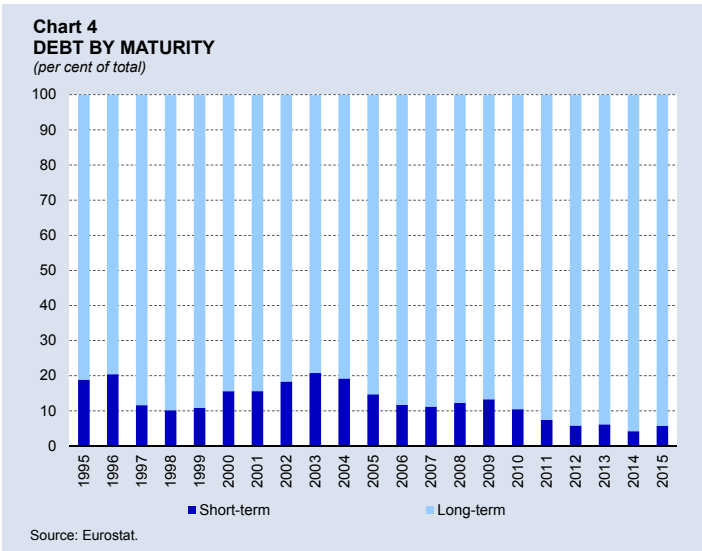
[9] For an overview of the alternative methodologies employed in the literature to assess government debt sustainability, see European Commission (2011) and Amador et al. (2016).
[10] Relatively recent assessments of the sustainability of Maltese government debt include IMF (2016) and European Commission (2015a). This study, however, relies on more recent data.
[11] Hartwig Lojsch, Rodríguez-Vives and Slavík (2011) argue that the composition of government debt is a key factor behind fiscal vulnerabilities in the euro area.
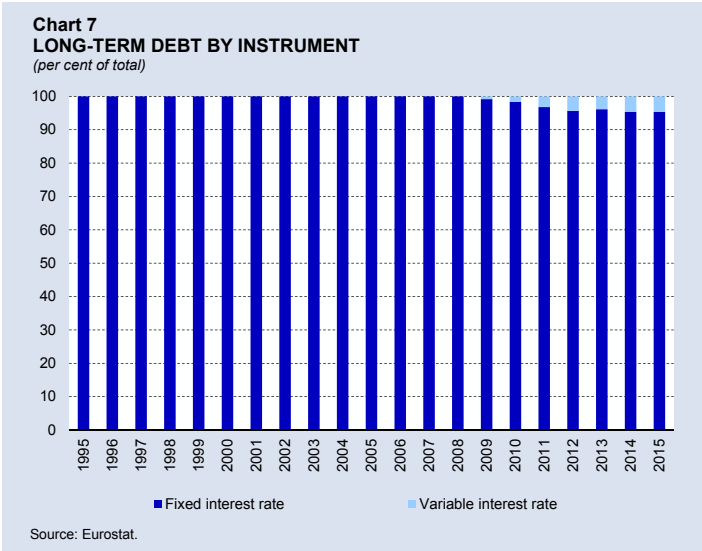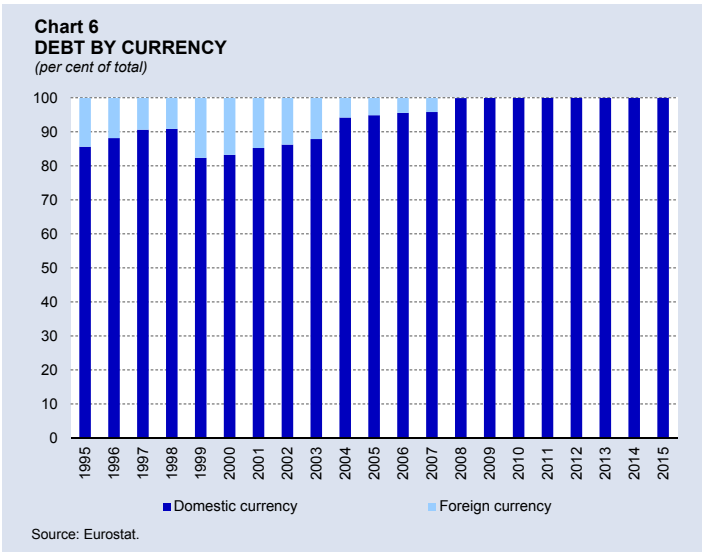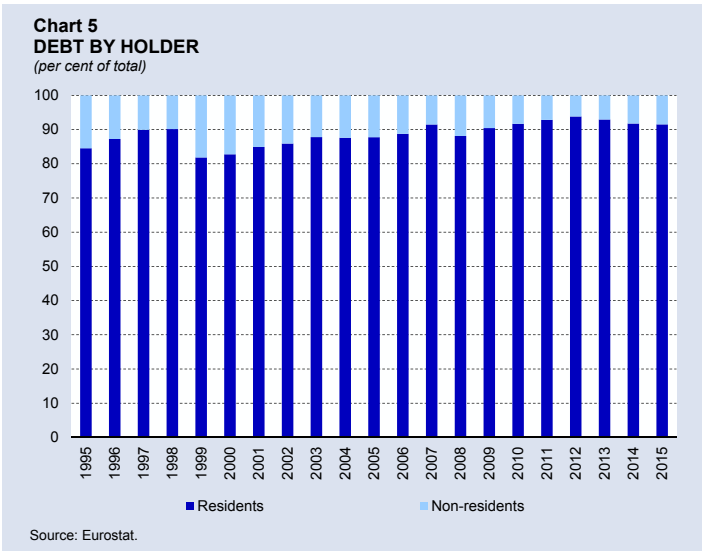
The data reveal that a substantial portion of government debt is long-term, that is, has a residual maturity greater than one year. The share of long-term debt has risen over time, and stood at around 94% in 2015. Consequently, debt needs to be rolled over rather infrequently and thus refinancing risks are limited.

The share of government debt held by residents of Malta is significantly high. In 2015, more than 91% of debt was held by residents, with this share increasing over time. Higher shares of debt held by residents are generally preferred since residents are likely to be less sensitive to adverse economic developments because they usually have access to more accurate and timelier information than non-residents.

Until 2007, a small portion of government debt was denominated in foreign currency. However, thereafter, virtually all debt was denominated in euro and hence there is almost no exposure to exchange rate risk.

Prior to 2009, all long-term government debt was subject to a fixed interest rate. Since 2009, the Government has issued long-term debt instruments that carry a variable interest rate. Although the share of long-term debt with a variable interest rate has risen over time, in 2015 it stood at less than 5%. As a result, interest rate risk is also largely contained.

In recent years, Maltese government bond yields converged to those for the euro area at low rates and stood below the yields of many euro area countries. Moreover, domestic government bond yields have historically been rather stable. Market participants therefore

Chart 5
DEBT BY HOLDER
(per cent of total)

Source: Eurostat.

Chart 6
DEBT BY CURRENCY
(per cent of total)

Source: Eurostat.

Chart 7
LONG-TERM DEBT BY INSTRUMENT
(per cent of total)

Source: Eurostat.

perceive Maltese government debt as being relatively low risk and this debt is likely to be subject to low interest rates in the short to medium term.

4.2 Medium- to long-term sustainability: solvency
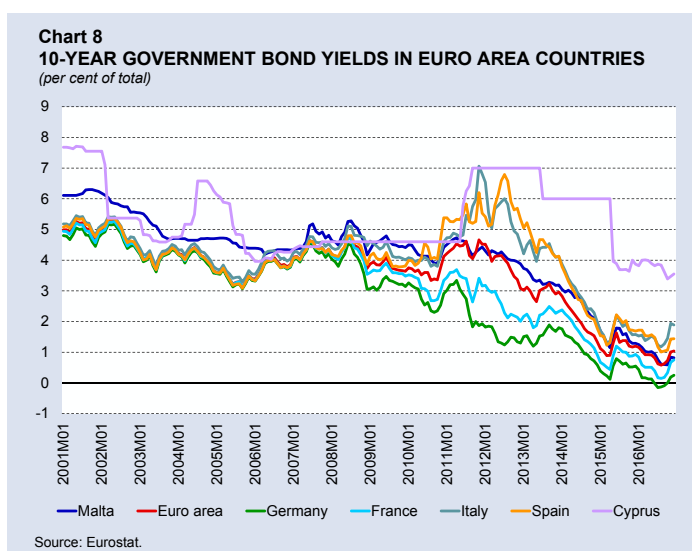
4.2.1 Scenario analysis
To gauge sustainability over the medium to long term, we employ scenario analysis which forms the basis of conventional debt sustainability analysis (DSA). Starting from the government budget constraint, it involves assuming paths for the determinants of the evolution of the

Chart 8
10-YEAR GOVERNMENT BOND YIELDS IN EURO AREA COUNTRIES
(per cent of total)

Source: Eurostat.

debt ratio $(g_t, i_t, \pi_t, pb_t, dda_t)$ over a medium- to long-term horizon, to generate a trajectory of the debt ratio. In light of the definition of sustainability presented above, projected debt paths are considered to be sustainable if they are unlikely to require 'major readjustments'.[12,13] This study generates three separate scenarios for Maltese government debt over a ten-year horizon spanning from 2016 to 2025, which explore different fiscal policies the Government is likely to pursue over this horizon. The assumptions underlying these scenarios are explained below and average values are provided in Table 1.

4.2.1.1 Scenario 1
The assumptions underlying the first scenario are based on the Bank's latest internal projections over the 2016-2019 period.[14] Thereafter, assumptions that are commonly employed in conventional DSA exercises are generally adopted to generate the paths for the input variables, which are constructed as follows. Since the current positive output gap is expected to close by 2019, over the rest of the projection horizon, real GDP growth is set to equal the potential real GDP growth estimates found in the first chapter of this publication. This produces a gradually declining profile for real GDP growth that falls to 3.1% by 2025.

The nominal interest rate is defined as an effective rate, that is, interest payments paid in the current year as a percentage of the previous year's debt. The interest payments reflect projections of interest rates at different maturities and the maturity structure of government debt.[15] The projected interest rates are derived by applying a spread on euro area interest rate projections provided by the European Central Bank (ECB), while the maturity structure of government debt projected for 2019 is assumed to persist throughout the rest of the projection horizon.[16]

Inflation, as measured by growth in the GDP deflator, is assumed to converge to 2% by 2020, broadly in line with the ECB's objective of euro area inflation rates that are below, but close to, 2% over the medium term.

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[12]   See Blanchard (1990).
[13]   Examples of studies that apply scenario analysis as part of their government debt sustainability assessment include Deutsche Bank Research (2010), ECB (2011a), ECB (2012) and European Commission (2015a).
[14]   These projections are based on the Eurosystem's December 2016 Broad Macroeconomic Projection Exercise (BMPE) but were updated to take into account the 2016Q3 vintage of national accounts and general government statistics, published in December 2016 and January 2017, respectively. The BMPE is prepared jointly by staff from the euro area national central banks and from the ECB on a bi-annual basis. Based on a common set of assumptions and principles, all euro area national central banks produce projections of their respective economies that cover a range of macroeconomic variables, which are then aggregated to provide a short- to medium-term outlook of the euro area. See ECB (2001) for further details.
[15]   We distinguish between four maturities: three months, one year, five years and ten years.
[16]   The euro area interest rate projections were provided by the ECB as part of the common set of assumptions underlying the December 2016 BMPE.

Between 2020 and 2025, the structural component of the primary balance as a percentage of GDP is assumed to gradually converge towards its long-run average. The cyclical component reacts to the output gap, however, since the output gap is closed over this period, this component is equal to zero. It is also assumed that there will be no temporary measures. Together, this produces a primary balance ratio that is set to deteriorate gradually but remain positive.[17] This implies that the overall balance-to-GDP ratio is expected to worsen to -1.3% by 2025, which would largely be brought about through the decline in the primary balance ratio since the nominal interest rate is expected to remain broadly unchanged. From 2020 onward, the deficit-debt adjustment is set to equal its long-run average.[18]

As Chart 9 reveals, these assumptions produce a trajectory for the debt-to-GDP ratio that is set to decline steadily by around 17 percentage points over the course of the next decade, from just under 61.0% in 2015 to 44.1% in 2025. This improvement in the Government's fiscal position is largely driven by robust real GDP growth, but also by primary surpluses.

4.2.1.2 Scenario 2

The assumptions behind the second scenario are identical to those for the first scenario, except in one respect: the path the primary balance ratio is assumed to take between 2020 and 2025.[19] While the projections for the primary balance ratio covering the 2016-2019 period are taken from the Bank's latest internal projections and are thus the same as those employed under the first scenario, thereafter the dynamics of the primary balance ratio are governed by a fiscal reaction function. Fiscal reaction functions emerge from the idea that fiscal policy is likely to react to changes in the debt ratio, with governments generally counteracting rising debt levels by improving the primary balance, and vice-versa. In the light of this, a fiscal reaction function is an equation which explains movements in the primary balance ratio as a function of previous values of the debt ratio and other regressors, based on past fiscal behaviour. In our case, this relationship is estimated under an error-correction framework.[20]

The regression results provide evidence of a positive and significant fiscal reaction to rising indebtedness.[21,22] Consequently, between 2020 and 2025, the primary balance deteriorates in response to past improvements in the debt ratio, going into deficit from 2022 onwards. However, this worsening of the primary balance acts as a strain on the debt ratio, causing the primary balance to deteriorate at a diminishing rate. The fiscal reaction function thus offers an alternative path for the primary balance ratio that is less favourable than that presented under the first scenario. This translates into an overall balance ratio that worsens considerably to -2.8% by the end of the projection horizon, which would again mainly be the result of a weakening primary balance position since changes in the nominal interest rate are projected to be marginal.

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[17] The primary balance is equal to the structural primary balance plus the cyclical primary balance and temporary measures. Since under this scenario the latter two components are equal to zero between 2020 and 2025, the primary balance is equal to the structural primary balance over this period.

[18] We follow this approach, rather than assume the deficit-debt adjustment to be equal to zero as is usually done in conventional debt sustainability exercises, because, in our view, this produces a more realistic path for the deficit-debt adjustment. Moreover, the resulting debt path is more conservative. That said, applying the standard assumption would leave the key conclusions unchanged.

[19] Note that while the assumptions relating to the nominal interest rate are the same as those under the first scenario, the data for the nominal interest rate might itself be different since this depends on the previous year's debt which is different between the two scenarios.

[20] A seminal paper on fiscal reaction functions is Bohn (1998). For further details on fiscal reaction functions, including empirical estimates, see Berti et al. (2016) and references therein.

[21] This is an interesting finding in itself since Bohn (1998, 2005) argues that a positive and significant debt coefficient is a sufficient condition for sustainability. However, this has been challenged by Gosh (2011, 2013) and Checherita-Westphal and Ždarek (2015) amongst others.

[22] Our estimates suggest a long-run debt coefficient of 0.095 for Malta, which is in line with other results reported in the literature. For example, Checherita-Westphal and Ždarek (2015) compile an extensive literature review of fiscal reaction functions and find that the debt coefficient tends to vary between 0.01 and 0.10.

Together, these assumptions generate a path for the debt ratio that is set to fall by around 11 percentage points over the projection horizon, from just under 61.0% in 2015 to 50.2% in 2025, as shown in Chart 9. This improvement in public finances is largely brought about by strong real economic activity and primary surpluses recorded until 2021. Therefore, in comparison with the first scenario, a primary balance ratio which is, on average, 0.6 percentage point less favourable over the course of a decade, gives rise to a debt ratio that is 6.1 percentage points higher.

4.2.1.3 Scenario 3

In the third scenario, the macroeconomic assumptions (assumptions for g_t, i_t, π_t) are identical to those underlying the first and second scenarios, however, the fiscal assumptions (assumptions for pb_t, dda_t) differ.[23] Between 2016 and 2019, the fiscal projections are those found in the Government's budget for 2017.[24] Thereafter, the structural adjustment is consistent with the requirements of the Stability and Growth Pact (SGP), while the assumptions behind the cyclical component of the primary balance and temporary measures are the same as those found under the first scenario.[25] This produces a robust primary balance ratio, that declines only slightly between 2020 and 2025. Despite a largely unchanged nominal interest rate, this strong primary balance position results in an overall balance ratio that improves considerably to 0.1% in 2019, with a virtually balanced budget recorded over the rest of the projection horizon. Similar to the other scenarios, beyond 2019, the deficit-debt adjustment is assumed to take its long-run average value.

Under the third scenario, the trajectory of the primary balance ratio is therefore more favourable than that underlying the other scenarios, while the path of the deficit-debt adjustment ratio is slightly less favourable. As shown in Chart 9, these assumptions translate into a debt ratio that is set to

Chart 9
SCENARIOS FOR THE MALTESE GOVERNMENT DEBT RATIO
(per cent of GDP)

Source: Authors' calculations.
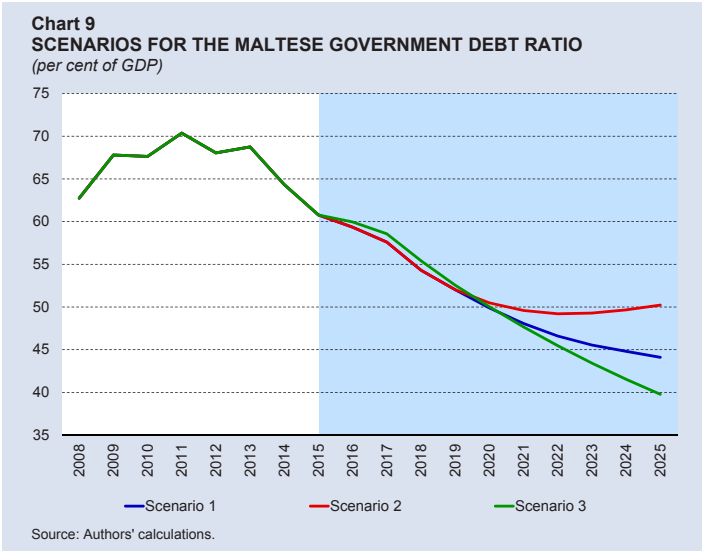
Table 1
SCENARIO ASSUMPTIONS: AVERAGES 2016-2025

Per cent

	Real GDP growth	Nominal interest rate	Inflation	Primary balance-to-GDP ratio	Deficit-debt adjustment-to-GDP ratio
Scenario 1	3.5	3.9	2.0	1.2	0.4
Scenario 2	3.5	3.9	2.0	0.6	0.4
Scenario 3	3.5	3.9	2.0	1.7	0.5

Source: Authors' calculations.

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[23] See footnote 19.

[24] The macroeconomic projections are not taken from the Government's budget for 2017 because these were based on a national accounts vintage which was later subject to substantial revisions.

[25] The structural adjustment is the difference in the structural balance ratio between two periods.

decline markedly from just under 61.0% in 2015 to 39.8% by 2025, thus falling by around 21 percentage points over the next decade. This strengthening of the Government's fiscal position largely mirrors robust economic growth reinforced by large primary balances.

*4.2.1.4 Sensitivity analysis*

In order to assess the robustness of the projected debt paths, each scenario is subjected to four adverse shocks. This shows how the debt trajectories would change if the macroeconomic or fiscal environment is less favourable than assumed under the three scenarios. The first three shocks are adverse single-variable shocks to the real GDP growth rate, the real interest rate and the primary balance ratio, calculated as the baseline projection minus 0.5 of a historical standard deviation in the case of the real GDP growth and primary balance ratio shocks, and plus 0.5 of a historical standard deviation in the case of the real interest rate shock. Since an economic shock generally affects the real GDP growth rate, the real interest rate and the primary balance ratio simultaneously, the fourth shock is an adverse multivariable shock of 0.25 of a historical standard deviation in all three variables.[26] The shocks are all permanent ones, that is, they persist throughout the 2016-2025 period.[27,28]

As shown in Charts 10-12, the sensitivity analysis reveals that under many of the shock scenarios, the debt ratio remains on a downward trajectory. Moreover, in those cases where the shock eventually pushes the debt ratio along an upward path, increases in the ratio are very moderate and it remains below the current level throughout the projection horizon.

Chart 10
SHOCKS TO SCENARIO 1
(per cent of GDP)
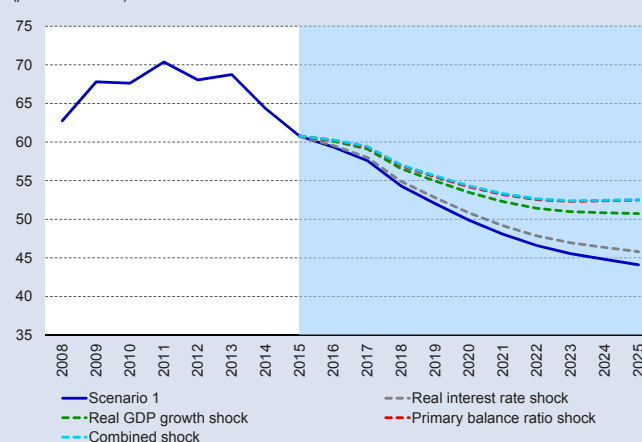
Source: Authors' calculations.

Chart 11
SHOCKS TO SCENARIO 2
(per cent of GDP)
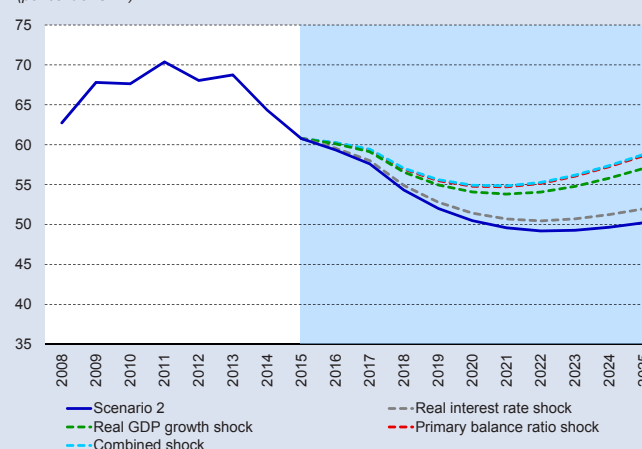
Source: Authors' calculations.

Chart 12
SHOCKS TO SCENARIO 3
(per cent of GDP)
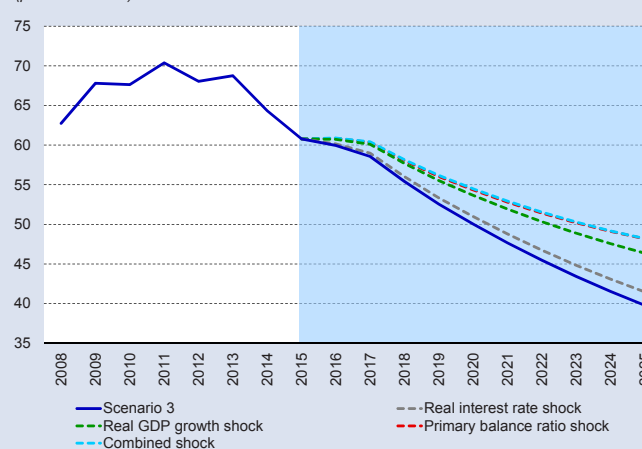
Source: Authors' calculations.

[26] The historical standard deviations are based on data covering the 2000-2015 period.
[27] The nature of these shocks, including their magnitude, is commonly found in the literature. See, for example, Deutsche Bank Research (2010) and IMF (2012). European Commission (2015a) applies shocks that are slightly different. Although these shocks are not presented here for brevity, they produce debt trajectories that are very similar to those shown above.
[28] The economic activity shock translates into real GDP growth that is 1.3 percentage points lower in each year of the projection horizon. Under the interest rate shock, real interest rates are 0.4 percentage point higher throughout, while the fiscal shock is equivalent to primary balance-to-GDP ratios that are 0.9 percentage point lower in all years. The combined shock translates into real GDP growth that is 0.7 percentage point lower, real interest rates that are 0.2 percentage point higher and primary balance ratios that are 0.4 percentage point lower in each year.

4.3 Other considerations relevant for sustainability

We now turn to two considerations relevant for sustainability in both the short run as well as the medium to long run: the signal approach for fiscal stress and recent policy measures conducive towards sustainability.

4.3.1 The signal approach for fiscal stress

The signal approach for fiscal stress, which draws on the signal approach used as an early warning system of currency and banking crises, is aimed at the early identification of fiscal vulnerabilities by considering a broad spectrum of fiscal, macroeconomic and financial variables that have signalling power in detecting episodes of fiscal stress.[29] Panel data are used to calculate a threshold for each of these variables, which maximises the ability of the model to 'predict' past fiscal crises. If the value of a variable exceeds its threshold, this signals fiscal stress emanating from that particular variable.[30]

This study considers 25 fiscal, macroeconomic and financial variables, which can be classified under three categories: short-term risks, medium-term risks and long-term risks. Most thresholds are taken from European Commission (2015a), which provides both upper and lower thresholds.[31] These are used to present the results in the form of a heat map. Those variables with a score below the lower threshold are classified as low risk (marked in green). Variables whose value lies between the lower and upper threshold are considered to carry medium risk (marked in yellow), while variables with a score that exceeds the upper threshold represent a source of high risk (marked in red).

The heat map is presented in Table 2 below.[32] Historically, short-term fiscal risks have stemmed largely from the share of short-term debt, financing needs (in both gross and net terms), private sector debt, non-performing loans (NPL) (in terms of both their share in total loans, as well as the change in this share), unit labour costs (ULC) and the real effective exchange rate.[33] That said, the level of risk emanating from these variables has generally declined over time. All indicators suggest that there was a low degree of short-term fiscal stress as at 2015, except for the share of NPLs in total loans which signals a high level of risk. Moreover, preliminary estimates suggest that risks relating to the structure of debt and liquidity are likely to have remained low in 2016.

Turning to the medium term, almost all of the indicators considered were a source of medium or high fiscal risk in the past. Again, however, medium-term fiscal risks have decreased over time. Moreover, to capture the medium-term nature of these risks, they are calculated over 10-year rolling windows. The last window that could be considered was that covering 2006-2015, which takes stock of medium-term fiscal risks back in 2006. Since then, key fiscal statistics such as the government debt ratio and the government balance ratio have witnessed an improvement, which suggests that the medium-term fiscal outlook is likely to be even more favourable at the current juncture. Going forward, on the basis of the assumptions underlying the scenario analysis presented above and the resulting debt paths, all indicators signal low fiscal stress in the medium term.

With regards to the long term, two indicators are considered: the projected cumulative difference in ageing costs between 2025 and 2060 and general government guarantees. Both suggest that long-term fiscal risks were high in 2015.

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[29]   Some seminal studies where the signal approach is used to construct an early warning system of currency and banking crises include Kaminsky, Lizondo and Reinhart (1998) and Kaminsky and Reinhart (1999).

[30]   For further details on the signal approach applied to detect fiscal stress, see Baldacci et al. (2011), Berti, Salto and Lequien (2012), Hernández de Cos et al. (2014) and European Commission (2015a).

[31]   Further details on these thresholds, can be found in European Commission (2015a).

[32]   The heat map does not extend back to 2000 for some indicators due to data unavailability.

[33]   Rapa (2016) argues that, over the last decade, there has been a disconnect between aggregate ULC developments and economic performance, which, in turn, might highlight potential weaknesses associated with aggregate measures of ULCs. In light of this, although in many years ULCs appear to have been a source of short-term fiscal risk, this might simply reflect deficiencies in the underlying measure of ULCs, rather than risks relating to Malta's price competitiveness.

The sustainability of Maltese government debt revisited

Table 2
HEAT MAP

Short-term	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016[1]
Structure of debt																	
Share of short-term debt																	
Change in share of short-term debt (y-o-y)																	
Share of foreign currency denominated debt																	
Share of debt with variable interest rate in GDP																	
Share of public debt held by non-residents																	
Liquidity risks																	
Gross financing needs (% of GDP) (High/Low risk)																	
Net financing needs (% of GDP)																	
10-year government bond spread over AAA rated euro area spot rates																	
Macro-financial risks																	
Private sector debt (% of GDP)																	
Private credit flow (% of GDP)																	
Net international investment position (% of GDP)																	
Share of non-performing loans to gross loans (core banks)																	
Change in share of non-performing loans (core banks) (y-o-y)																	
Bank loans-to-deposits ratio (core banks)																	
Change in nominal house prices (y-o-y)																	
Competitiveness risks (High/Low risk)																	
Unit labour costs (% change over 3 years)																	
Real effective exchange rate (% change over 3 years)																	
Current account balance (3 year average as % of GDP)																	
Export market shares (% change over 5 years)																	

Medium-term	1995-2004	1996-2005	1997-2006	1998-2007	1999-2008	2000-2009	2001-2010	2002-2011	2003-2012	2004-2013	2005-2014	2006-2015	2016-2026[2]	2016-2026[3]	2016-2026[4]
Debt ratio at end of period															
Debt peak year															
Percentile rank average structural primary balance ratio															
Required primary balance to stabilise debt															

Long-term							2015
Cumulative difference in ageing costs 2025-2060 (p.p. of GDP)							
General government guarantees (% of GDP)							

[1] Based on authors' projections.
[2] Based on scenario 1.
[3] Based on scenario 2.
[4] Based on scenario 3.

Source: Authors' calculations.

4.3.2 Recent policy measures targeted at enhancing sustainability

4.3.2.1 Regulations and budgetary procedures

As a euro area member state, the Maltese government is subject to the fiscal rules outlined in the SGP and the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union, commonly known as the Fiscal Compact. Broadly speaking, countries are required to rapidly achieve a structural balance of not less than -0.5% of GDP.[34] In addition, member states with government debt exceeding 60% of GDP are required to reduce the difference form the reference value by an average rate of one-twentieth per year.

Member states need to submit annual updates of their medium-term country plans for scrutiny by the European Commission. The latter ensures that targets are sufficiently well specified and can be reasonably achieved in the time frame stipulated.

The above requirements were transposed in national legislation through the introduction of the Fiscal Responsibility Act in August 2014. The Government is required to pursue fiscal policies which "*maintain the public debt at sustainable levels over the medium and long term*", in line with the requirements of the SGP. Towards this end, Ministries and Departments are required to prepare rolling three-year business and financial plans, which are then vetted by the Ministry for Finance.

The Act empowers the Ministry for Finance to regularly scrutinise all government entities such that no additional spending is carried out beyond the allocated budgetary amounts. In addition, in order to enhance accountability on fiscal matters, the Ministry is required to publish a mid-year and an annual account of the Maltese economic and budgetary situation.

One of the most important provisions of the Fiscal Responsibility Act relates to the creation of the Malta Fiscal Advisory Council. The latter is an independent institution which is tasked with assessing and endorsing macroeconomic and fiscal forecasts and securing compliance with fiscal rules. The Council is obliged to publish opinions and recommendations on the annual fiscal budget and medium-term strategy update, as well as the Ministry for Finance's half-yearly and annual reports.

4.3.2.2 Other measures

As part of a periodic review of the Maltese pension system, in June 2015 the Pensions Strategy Group published a number of recommendations aimed at improving the sustainability of the pension system. These include, inter alia, incentivising active participation of elderly persons by removing the ceiling on the payment of contributions after reaching 65 years of age and removing the mandatory retirement age, as well as introducing a gradual increase in the number of years required for taxpayers to contribute before being eligible for the maximum allowable pension. At the same time, the Group recommends a gradual increase in the guaranteed national minimum pension, further measures to discourage activity in the shadow economy and introducing an economic migration policy.

Taken together, these proposals were estimated to reduce the pension system deficit by over 1.0 % of GDP by 2060.[35] A number of these recommendations were subsequently included in the 2016 and 2017 Budgets.

In order to improve the efficiency of public expenditure, a series of comprehensive spending reviews are currently underway. These reviews have analysed the operations of the Department for Social Security (in 2014), Mater Dei Hospital (in 2015), and the Ministry for Education and Employment (in 2016). So far, the Government has announced the reform of various procedures in the social security and health sectors, as advocated by the spending reviews.

As part of ongoing efforts to combat the shadow economy and improve tax compliance, a new Joint Enforcement Task Force was formed in October 2016. This measure complements a more comprehensive reform of

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[34] The scale and speed of fiscal adjustment is relative on countries' initial budgetary conditions and size of the output gap.
[35] For further details, see Malta Pensions Strategy Group (2015).

the Maltese tax administration, through which the Inland Revenue, VAT and Customs departments are being merged into a single authority. These reforms are expected to promote more information sharing between the various entities and thereby improve tax collection efficiency.

4.3.2.3 Assessment by the Council of the EU

Following recommendations by the European Commission, the Council of the EU issues country-specific recommendations (CSR) on member states' medium-term country plans. Recent CSRs for Malta made specific reference to enhancing the fiscal framework, improving tax compliance and boosting the efficiency of public health services. By 2015, as a result of the abovementioned measures, most of the recommendations were deemed to be either partly met or met in full.[36]

The 2016 CSRs make particular reference to improving the long-term sustainability of public finances. In its assessment of progress made in addressing these recommendations, the European Commission acknowledges that the impact of new measures targeting the efficiency of the pension system have yet to be fully assessed.[37] However, it does not consider current efforts as sufficiently ambitious. Consequently, Malta is considered to have made limited progress towards addressing the 2016 CSR on long-term fiscal sustainability.

4.4 Is Maltese government debt sustainable?

What can we infer about the sustainability of Maltese government debt? Recall that overall debt sustainability requires the debt to be sustainable in both the short run, as well as the medium to long run. Starting with short-term sustainability, the composition of Maltese government debt is highly favourable: 94.3% of the debt is long-term, 91.5% of it is held by residents, all of it is denominated in domestic currency and 95.3% of it is subject to a fixed interest rate. In addition, Maltese government bond yields have been low and stable in recent years.

Turning to medium- to long-term sustainability, within the context of scenario analysis, projected debt paths are deemed to be sustainable if they are unlikely to require 'major readjustments', such as a substantial increase in taxation, major cuts in government spending, monetisation or outright default. This exercise does not point towards a likely need for drastic adjustments. First, the three principal scenarios suggest that the debt-to-GDP ratio is set to decline markedly over the next ten years. Since the Government can sustain the current debt ratio, it is unlikely to face difficulties in servicing lower debt ratios in the absence of significant changes to the current economic landscape. Second, sensitivity analysis reveals that the need for major adjustments will be unlikely even if substantial shocks materialise since debt ratios will still remain below the current level.

This study also took into account other considerations relevant for both short-term and medium- to long-term sustainability. First, the signal approach for fiscal stress suggests that, at the current juncture, there is generally a low degree of fiscal risk. From the 25 indicators considered, only five signal medium to high levels of risk. Lastly, in recent years, a number of measures that are conductive towards sustainability have been introduced.

In light of all this, Maltese government debt appears to be sustainable in both the short and the medium to long run. In other words, the Government's fiscal position is both liquid and solvent. However, this is subject to a number of caveats. The signal approach for fiscal stress revealed that the share of NPLs in total loans is a source of high short-term fiscal risk. In 2016, NPLs in Malta stood at a relatively high 5.3%. An elevated NPL ratio threatens the health of the financial sector. Given the strong inter-linkages that exist between the financial sector and the fiscal sector, financial stress can rapidly translate into fiscal strain which, in turn, exerts further pressure on the financial sector in an amplifying vicious circle. For instance, a financial crisis might require fiscal intervention that acts as a strain on public finances. Since a large portion of government

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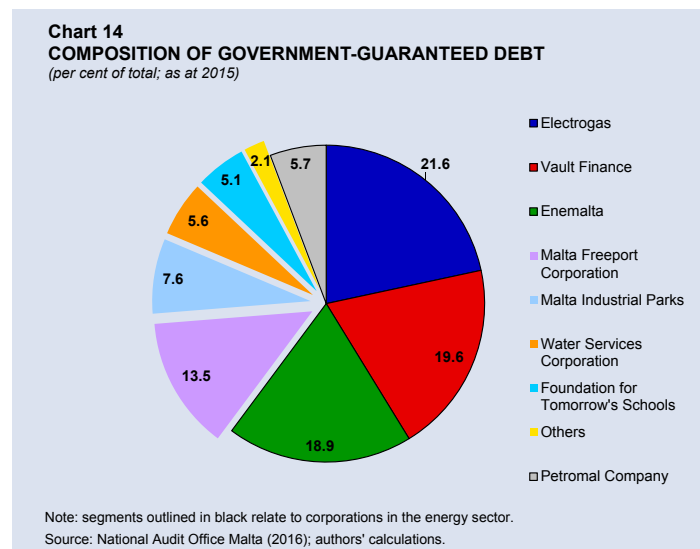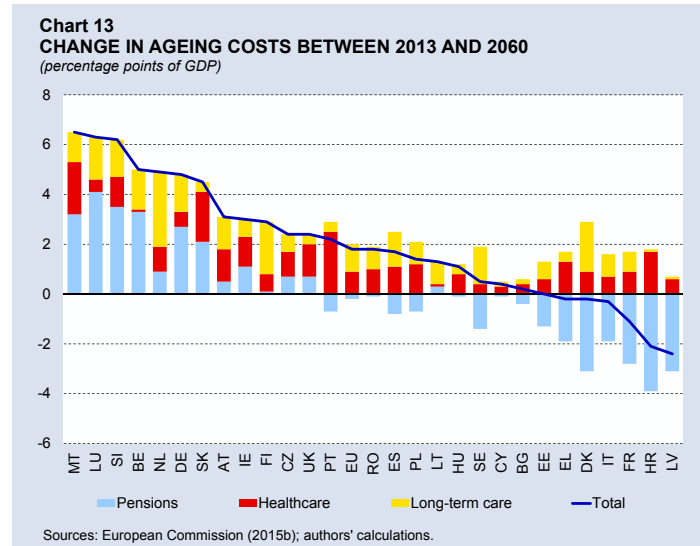[36]   See European Commission (2015b) for further details.
[37]   Additional details are found in European Commission (2017).

debt is held by banks, this will, in turn, trigger further financial stress.[38] Therefore, financial turmoil can potentially generate substantial adverse fiscal consequences. That said, Maltese banks are highly liquid and the NPL ratio has fallen significantly in recent years.

The signal approach also suggests that implicit liabilities and contingent liabilities, in the form of ageing costs (pensions, healthcare and long-term care) and government guarantees, respectively, pose high long-term fiscal risks. As Chart 13 shows, Malta is projected to have the highest increase in age-related spending in the European Union (EU) between 2013 and 2060.[39] Over this span, pension spending is expected to increase by 3.2 percentage points of GDP, while healthcare and long-term care costs are expected to rise by 2.1 and 1.2 percentage points, respectively, for a total increase in ageing costs of 6.5 percentage points, which is 4.7 percentage points higher than the EU average. However, Malta's current spending on social security as a proportion of GDP is well below the EU average and is expected to remain so till at least 2040.[40]

Government-guaranteed debt in Malta has been relatively high in recent years. As at 2015, it stood at 15.2% of nominal GDP, one of the highest rates recorded among EU countries. A substantial portion of this debt was issued to Electrogas, Vault Finance, Enemalta and Malta Freeport Corporation, which account for 21.6%, 19.6%, 18.9% and 13.5% of these liabilities, respectively, as displayed in Chart 14.[41] More than two-thirds of government guarantees are concentrated among corporations within the energy sector. Restructuring of public corporations is, however, contributing towards restoring profitability which, in turn, reduces the risk associated with government guaranteed debt. Moreover, the European Commission's approval of the Maltese government's plan to pay Electrogas for providing energy to Enemalta, should lower these liabilities. [42]

The results are also subject to limitations associated with the methodologies employed. Starting with scenario analysis, firstly, this

Chart 13
CHANGE IN AGEING COSTS BETWEEN 2013 AND 2060
(percentage points of GDP)

Pensions | Healthcare | Long-term care | —Total

Sources: European Commission (2015b); authors' calculations.

Chart 14
COMPOSITION OF GOVERNMENT-GUARANTEED DEBT
(per cent of total; as at 2015)

■ Electrogas 21.6
■ Vault Finance 19.6
■ Enemalta 18.9
■ Malta Freeport Corporation 13.5
■ Malta Industrial Parks 7.6
■ Water Services Corporation 5.6
■ Foundation for Tomorrow's Schools 5.1
□ Others 2.1
□ Petromal Company 5.7

Note: segments outlined in black relate to corporations in the energy sector.
Source: National Audit Office Malta (2016); authors' calculations.

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[38]   As at 2015, commercial banks held 36.0% of Maltese government debt, while other financial institutions (excluding the central bank) accounted for another 16.2%.

[39]   See European Commission (2015c) for further details.

[40]   In 2015, social security spending in Malta amounted to 11.1% of GDP, whereas the figure for the EU stood at 21.0%, nearly double that of Malta.

[41]   Additional details can be found in National Audit Office Malta (2016).

[42]   The key results presented in this study are in line with those put forward by IMF (2016) and European Commission (2015a).

approach only delivers reliable results to the extent that the assumed paths set for the macroeconomic, fiscal and financial variables used as inputs are realised. Secondly, although the empirical literature points towards interdependencies between these variables, this tool does not usually capture such feedback effects. For example, one strand of literature suggests that, beyond a certain threshold, debt has an adverse effect on economic growth.[43] In addition, several studies find that high debt ratios may lead to a rise in government bond yields.[44] Another empirical finding is that primary balances react to changes in the debt ratio, with fiscal tightening often following periods of rising indebtedness as governments attempt to address sustainability concerns.[45] These and other such links are generally absent from scenario analysis, although the second scenario captures the latter link through the inclusion of a fiscal reaction function. If feedback effects are believed to be limited, this approach can be expected to deliver reliable results, however, if the interdependence between the input variables is pronounced, one should treat the results with caution. Finally, this analysis is based on explicit government-owned liabilities only. However, there are other liabilities that might ultimately have to be borne by the Government, such as contingent liabilities, implicit liabilities and other off-budget liabilities.[46,47,48,49]

Turning to the methodological limitations behind the signal approach for fiscal stress, since fiscal crises occur infrequently, which limits the number of observations of crisis episodes, the thresholds are calculated using panel data and are thus not country-specific. The relevant thresholds for Malta might differ from the 'average' thresholds used in this study. Furthermore, this approach is based on historical relationships which may break down in the future and the interaction among the different variables is not taken into account.

5. Concluding remarks

The primary aim of this study was to gauge the sustainability of Maltese government debt over the next decade. The results suggest that Maltese government debt is sustainable, but this comes with a number of caveats. A number of policy implications emerge from this analysis.

The sustainability of Maltese government debt hinges on the assumption that there will be fiscal rigour over the medium to long term, with the Government registering primary surpluses or moderate primary deficits. It is therefore important for the Government to adhere to its commitment towards fiscal discipline, particularly during economic upturns. Fiscal discipline is also vital to provide sufficient fiscal space – that is, buffers that allow room for fiscal manoeuvre – to counter adverse shocks.

The verdict of sustainability also rests on the assumption of robust economic growth over the projection horizon. Thus, it is imperative that the Government pursues policies geared towards solid and sustained economic growth through, for example, labour market reforms, investment in education, infrastructure and technology, financial deepening and improved efficiency and effectiveness of public institutions.

Given the high degree of interconnectedness between the financial and fiscal sectors, financial stress can have a considerable negative impact on public finances. A sound financial sector should therefore be a key

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[43]   See Reinhart and Rogoff (2010), Kumar and Woo (2010), Checherita and Rother (2010), Cecchetti, Mohanty and Zampolli (2011), Balassone, Francese and Pace (2011), Padoan, Sila and van den Noord (2012) and Baum, Checherita-Westphal and Rother (2012).

[44]   See, for example, Codogno, Favero and Missale (2003), Ardagna, Caselli and Lane (2004), Attinasi, Checherita and Nickel (2009) and Schuknecht, Von Hagen and Wolswijk (2010).

[45]   As examples, see Bohn (1998), Mendoza and Ostry (2008) and ECB (2011b).

[46]   Contingent liabilities are future liabilities that only arise if a particular event materialises, an example being the guarantees the Government has given to cover borrowings by public non-financial corporations. Implicit liabilities relate mostly to entitlements that fall due in the future, such as pensions, healthcare and long-term care spending associated with an ageing population. Off-budget liabilities are liabilities that originally do not fall under the definition of general government but could eventually become classified as government debt. This may arise from, for example, the reclassification of state-owned enterprises as part of general government. A case in point is the reclassification of Malta Shipyards Limited in 2008.

[47]   While the scenario analysis did not take contingent liabilities and implicit liabilities into account, the signal approach for fiscal stress did, and therefore our overall assessment of sustainability does not ignore these considerations.

[48]   For a critique of scenario analysis within the context of conventional DSA, see Leeper (2010).

[49]   Despite its limitations, scenario analysis carries a number of advantages. It is fairly transparent and straightforward to use, which makes it easier to interpret and communicate the results. Moreover, the setup is flexible and hence the baseline can easily be adjusted to reflect a different set of assumptions. These benefits explain why this tool is widely used by international institutions and financial market participants alike.

priority. Towards this end, authorities should continue to push for a reduction in the NPL ratio by, for example, introducing other Pillar 2 measures and encouraging banks to improve their coverage ratio.[50]

It should also be ensured that contingent liabilities do not undermine sustainability. In this regard, the Government's exposure to government-guaranteed debt could be lowered through improved governance and restructuring of public corporations. Similarly, it is important for the authorities to mitigate the risks associated with implicit liabilities by, for example, addressing at a sufficiently early stage the projected increase in ageing-relating expenditures associated with an ageing population through further pension and healthcare reform.

In conclusion, the global financial and economic crisis and the European sovereign debt crisis were a bitter reminder that sustainable public finances are a crucial pillar of a healthy economy. Its absence threatens price stability, financial stability and economic growth. It is therefore imperative that a sound fiscal framework that supports the sustainable evolution of public finances – and thus safeguards the stability and prosperity of the broader economy – is in place at all times.

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[50] The coverage ratio is defined as the ratio of loan loss provisions to NPLs.

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AN EVALUATION OF RECENT SHIFTS IN MALTA'S CURRENT ACCOUNT POSITION

Aaron G. Grech and Noel Rapa[1]

Malta's current account has improved substantially since 2009, by about four times the change seen in the euro area. This paper argues that cyclical demand factors did not cause this, while lower oil prices and a better real exchange rate played a minor part. Structural developments, such as improving energy intensity and falling import content, were more important drivers. Malta's current account now appears to be stationary, a necessary condition for avoiding sustainability problems in external accounts. This reflects a recovery in the national saving rate, driven by better fiscal performance, and rising corporate and household savings due to export-oriented services sectors. Conversely investment has declined, as these sectors rely more on human capital. To ensure growth remains sustainable, there should be further emphasis on investment in education and infrastructure.

1. Introduction

The current account of the balance of payments is a key economic indicator, which can be understood as either the difference between a country's exports and its imports, or else as the difference between national savings and investment. Up to the early 1980s, Malta had very high current account surpluses, driven by the rapid expansion of industry and tourism, while consumer imports were restricted. This was followed by a period of relatively high deficits, driven initially by lower exports, and when these recovered, by higher imports of consumer and capital goods. After EU membership, this started to change, following a rise in exports of services. Malta's current account position improved by nearly 12 percentage points after 2009, the largest change amongst euro area countries and about four times the movement seen on average.

To understand whether the recent change is cyclical or structural is important, as this has implications for the sustainability of Malta's external accounts. Thus, after reviewing trends in Malta's current account position, this paper then presents estimates of the cyclically adjusted current account position, calculated in line with the approach adopted by the European Commission, but adjusted to reflect better local circumstances. Besides looking at the cyclically adjusted position, the paper also studies the possible impact of lower oil prices and an improved real exchange rate. This is followed by an analysis of structural factors, such as the improvement in energy intensity and the broader change in Malta's import intensities, mainly due to the changing composition of its economy. The impact of the latter development on the recovery in the national saving rate and the continued decline in investment is also studied. The paper concludes with some policy recommendations.

2. Trends in Malta's current account position

The current account of the balance of payments is closely followed by policymakers.[2] There are two broad ways of conceiving it: either as the difference between what a country exports and what it imports, or else as the difference between national savings and investment. While the two measures are equivalent in monetary terms, they are concerned with two different issues. The first approach mainly emphasises competitiveness, whereas the second is more concerned about growth dynamics. Edwards (2002) gives a very good overview of the changing views of economists on the current account since the late 1940s, starting with the initial concentration on trade flows and elasticities, followed by the intertemporal saving and investment focus in the 1970s and 1980s culminating in the Lawson Doctrine,[3] to the subsequent emphasis on current account sustainability and the current interpretation of current accounts as signs of economic imbalances.

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[2]   It is one of the key indicators in the European Union's macro imbalances procedure, with a country's three-year backward moving average of the current account balance as a per cent of GDP needing to be within a range of a surplus of 6% of GDP and a deficit of 4%. The IMF, due to its mandate of lending money to member states with balance-of-payments deficits, is also very interested in the current account (see Ghosh and Ramakrishnan, 2006).

[3]   The Lawson Doctrine, associated with the British Chancellor of the Exchequer Nigel Lawson, argued that as long as the fiscal accounts are balanced, a large current account deficit is not of any concern.

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Past research on Malta's current account has focused on assessments of sustainability (Demarco, 1999) and on the role of the private and public savings gaps in driving its development (Grech, 2000). More recently, the analysis has focused on the shift towards consistent current account surpluses, which is being attributed to the emergence of high value-added export-oriented services sectors (Grech, Micallef and Zerafa, 2016).

Chart 1 shows Malta's current account position as a share of gross domestic product (GDP) since 1970. Up to the early 1980s, Malta had very high current account surpluses. This is diametrically opposite to the traditional view that developing countries run very high current account deficits as they invest heavily, while they still have low savings on account of their low income. In part, this reflected Malta being "an unusual case of fiscal conservatism coexisting with financial repression and rigid controls on capital movement and trade" (Findlay and Wellisz, 1993). Export growth accelerated due to the rapid expansion of industry and tourism, while consumer imports were restricted (Grech, 2015). That said, irrespective of what the intertemporal traditional view implies, a small open economy facing borrowing constraints and subject to considerable external shocks may be better off in the long run if it goes through a period of high surpluses in order to accumulate foreign reserves.

In fact, the situation for Malta changed significantly in the 1980s when adverse international conditions resulted in a decline in exports of goods and tourist activity. Subsequently the current account position did not recover, on account of growing government deficits combined with very high rates of investment and increasing private consumption. This changed after EU membership due to a very significant rise in exports of services.

As can be seen from Chart 2, which focuses on developments over the last two decades, the profile of Malta's current account position has shifted from having a very high deficit to forming part of the group of EU countries with relatively high current account surpluses in recent years. Nevertheless, on average, Malta had a current account deficit of 3.2% of GDP since 1995, whilst the Netherlands, the EU country with the most consistently high surplus, averaged a 7.1% surplus. Greece was the EU country with the worst performance over this period, and had a deficit that averaged 8.0% of GDP. However, as can be seen in Chart 2, even Greece has experienced a significant improvement in its current account position after the financial crisis. Malta has seen its current account position improve by 11.9 percentage points

Chart 1
TRENDS IN MALTA'S CURRENT ACCOUNT POSITION
(per cent of GDP)
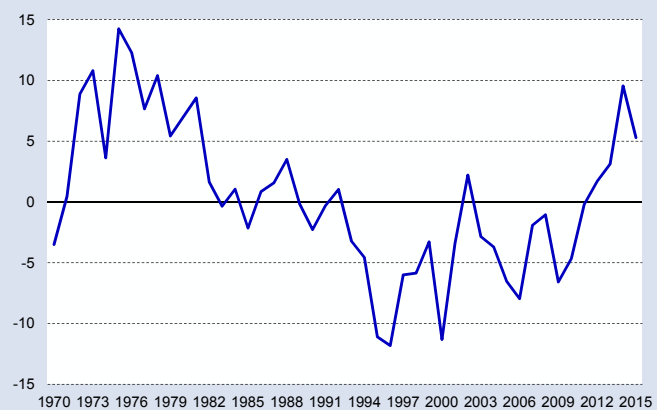
Source: Authors' calculations using Central Bank of Malta macroeconomic time series database.

Chart 2
MALTA'S CURRENT ACCOUNT POSITION VIS-À-VIS THAT OF LARGEST SURPLUS AND DEFICIT COUNTRIES IN THE EU
(per cent of GDP)
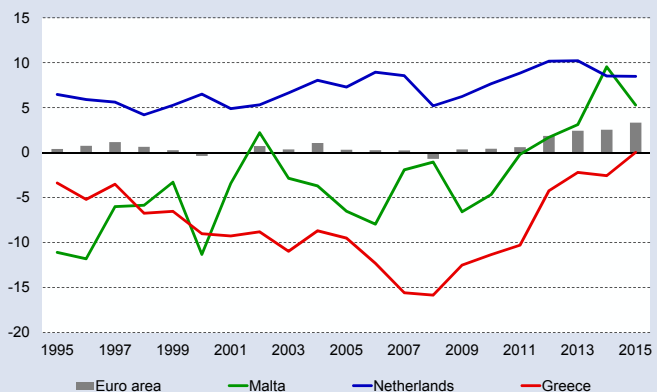
Source: Authors' calculations using Central Bank of Malta macroeconomic time series database and AMECO.

since 2009, the largest improvement amongst euro area countries and about four times the change seen on average.
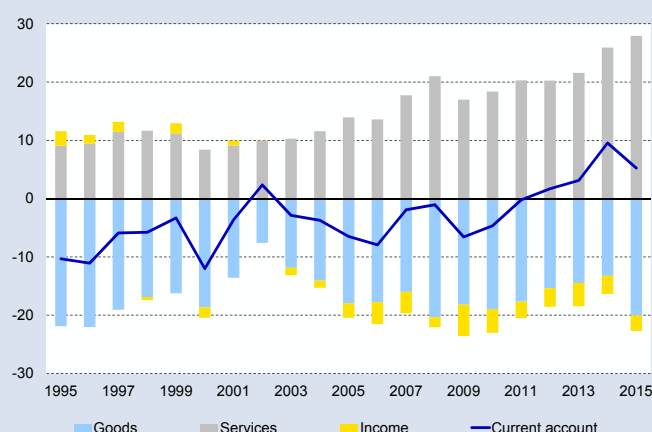
The change in Malta's current account was mainly driven by the rapid growth of net export services (see Chart 3). While the trade deficit in goods increased by 1.8% of GDP between 2009 and 2015,[4] the services surplus rose by 11.0% of GDP. There was also an improvement in the income account of 2.7 percentage points over this period. A significant proportion of this was due to an increased inflow of EU funds. The rest was accounted by lower net outflows of profits made by foreign owned firms. The latter development could partly reflect the changing composition of the services sector, with more external services activity generated by firms who are retaining funds locally to finance their very high rate of expansion. Malta's services sector is, in fact, changing significantly, as can be seen in Chart 4. On the one hand, the traditionally strongest services sector – tourism – has experienced a steady increase, accounting for nearly half of the improvement in the services surplus since 2009. On the other, the financial services sector, after exceptional surpluses between 2008 and 2011, appears

Chart 3
MAIN BALANCES IN MALTA'S CURRENT ACCOUNT
(per cent of GDP)

Source: Authors' calculations using Central Bank of Malta macroeconomic time series database.

Chart 4
DECOMPOSITION OF MALTA'S SERVICES SURPLUS
(per cent of GDP)
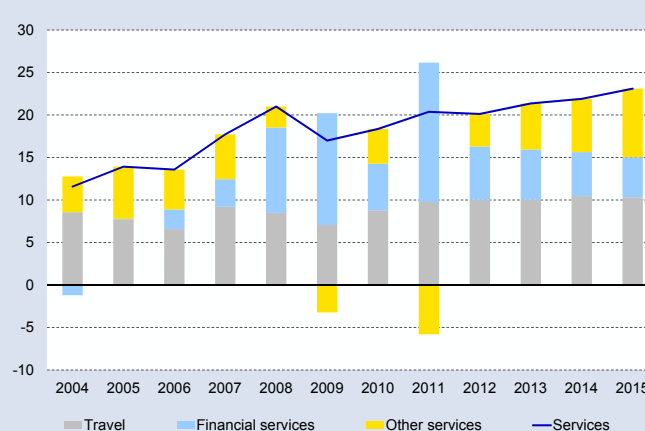
Source: Authors' calculations using Eurostat database.

to have settled to much lower levels. This development was offset by other services sectors, notably remote gaming, maintenance & repair, telecommunications and computer & information services. These sectors, as evidenced by the continued rise in their employment, are now generating substantial export revenues.

3. Distinguishing between cyclical and structural causes of changes in Malta's current account position

The financial crisis has reignited interest in the current account. While before the crisis, there was concern about the size of global imbalances, the subsequent slowdown in activity and trade was accompanied by a "sizable reduction in global external imbalances" (Haltmaier, 2014). The sum of current account balances of all the countries in the world in absolute terms fell from 5.3% of global GDP in 2008 to 3.8% in 2015 (see Chart 5). This development has led to several studies on whether this rebalancing is cyclical or structural, with particular focus on trends in the EU. By 2008 the share of the euro area's periphery in total global imbalances had nearly doubled to 10%, before falling to just 3%. Conversely the rest of the EU's share

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[4]   Note however, that if the analysis did not include 2015 – a year characterised by very large imports of capital goods – the trade deficit would have improved by 4.9 percentage points, accounting for a significant part of the overall improvement in the current account.

has risen to 21% of the total. On the one hand, the euro area periphery countries have registered lower deficits, while on the other the core countries have experienced higher surpluses.

To understand better the causes of these trends, economic literature has focused on the calculation of cyclically adjusted current account positions, looking at issues of import compression during recessions and the influence of foreign demand.[5] The European Commission, for instance, has adopted the methodology of Salto and Turrini (2010) to compute measures of cyclically adjusted current account

Chart 5
DEVELOPMENTS IN GLOBAL IMBALANCES
(per cent of GDP)

Source: Authors' calculations using World Economic Outlook database.

positions. This involves adjusting levels of imports and exports to reflect respectively the potential domestic output level and that of a country's trading partners. Furthermore, the adjustment of the current account position also takes into consideration changes in the real exchange rate, assuming that their impact on exports and imports last for two years.[6] While very intuitive, this approach suffers from a major defect, namely the assumption that income elasticities of exports and imports are both equal to 1.5 for all EU countries. Fabiani, Federico and Felettigh (2016) instead advocate calculating these elasticities empirically, similarly to the approach taken in Christodoulopoulou and Tkacevs (2014).

In accordance with this line of thinking, Malta's cyclically adjusted current account position is studied in this paper using empirically derived elasticities. The first step involves the construction of a measure for Malta of demand from its main trading partners. This was done using GDP data from the World Economic Outlook database and the trade in goods shares for Malta from the Central Bank of Malta's macroeconomic time series database. While there is a close relationship between developments in Malta's exports and developments in the weighted GDP of Malta's trading partners, the long-term income elasticity stands at 1.33, or lower than the measure adopted by the European Commission. To derive the import elasticity, Malta's imports were regressed against measures of potential output derived from a production function.[7] This yielded a long-term income elasticity of imports for Malta, lower than that of exports, at 1.25, and significantly smaller than the 1.5 used by the European Commission in its cyclically adjusted current account methodology.

Besides the issue of having different income elasticities for imports and exports, the other key determinant of the cyclically adjusted current account position is the difference in the relative cyclical position. Malta's economic cycle broadly tracks that of its main trading partners, even though it is somewhat more volatile. In recent years there appears to have been a break in this relationship, with Malta experiencing a smaller drop in activity in 2009 and its output gap turning into a significant surplus in recent years, whereas it remains

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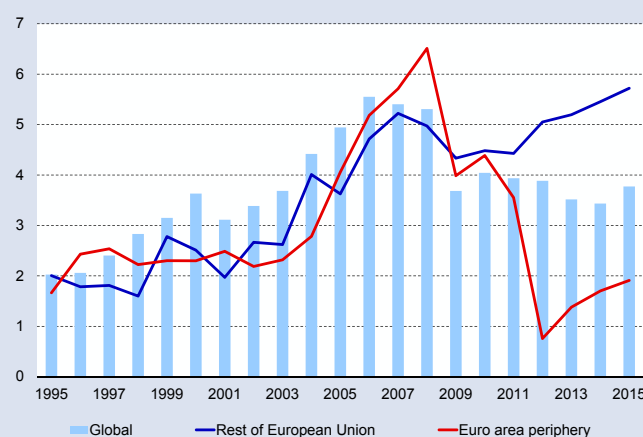
[5]   For instance, see European Central Bank (2014). A less refined approach is to try to extract the cyclical elements by applying statistical filters to current account data (see Bardakas, 2016).
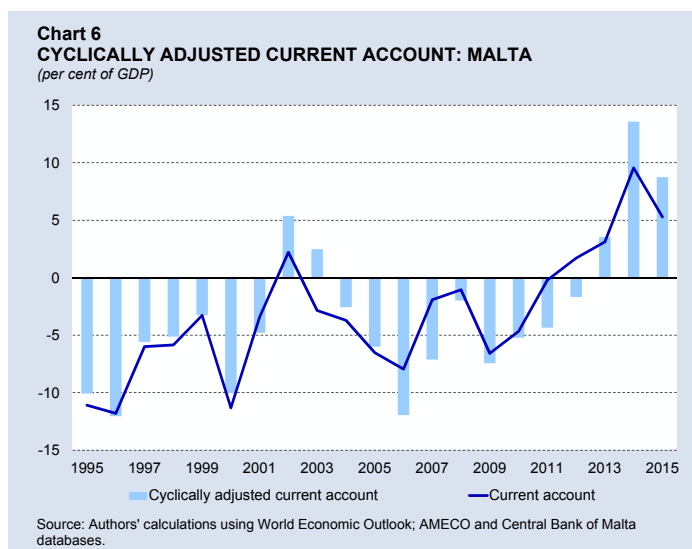
[6]   The adjustment is as follows:

$$uca_t = \frac{CA_t}{P_tY_t} + \theta_M \frac{P_t^M M_t}{P_tY_t} \times \frac{Y_t - Y_t^*}{Y_t^*} - \theta_X \frac{P_t^M X_t}{P_tY_t} \times \frac{Y_t^F - Y_t^{F*}}{Y_t^{F*}} + \left[\frac{P_t^X X_t}{P_tY_t} \eta_X - \frac{P_t^M M_t}{P_tY_t} \eta_M \right] (0.4 \times \Delta reer_t + 0.15 \times \Delta reer_{t-1})$$

where *uca* and *CA* are, respectively, the adjusted and unadjusted current account balance; *PY* is nominal GDP, *P^M M* and *P^X X* are nominal imports and exports; *Y* and *Y** are, respectively, real actual and potential output (and denote the same variables for trading partners *Y^F* and *Y^F**); reer is the log of the real effective exchange rate; η_X and η_M are, respectively, the elasticities of exports and imports with respect to the real effective exchange rate; θ_X and θ_M are the income elasticity of exports and imports.

[7]   For details on this approach applied for Malta see Grech and Micallef (2016).

negative in many other countries. The fact that Malta's economy is performing better than that of its trading partners implies that its cyclically adjusted current account position should exceed the unadjusted position. On the one hand, Malta's exports would be higher if its trading partners were not operating below capacity. On the other, its imports would be lower if GDP were closer to potential. The impact of the first factor is higher than the impact of the second, because exports are a larger share of GDP, while the income elasticity of exports is higher than that of imports.

Chart 6
CYCLICALLY ADJUSTED CURRENT ACCOUNT: MALTA
(per cent of GDP)

Source: Authors' calculations using World Economic Outlook; AMECO and Central Bank of Malta databases.

These considerations are borne out by the data depicted in Chart 6, which plots the cyclically adjusted and the unadjusted current account position for the Maltese economy over the period 1995 to 2015. The two measures track closely each other.[8] While European Commission (2015) estimates that between 2007 and 2015, under unchanged cyclical differences, Malta's current account position would have improved by an additional 6.9 percentage points compared to its observed change, the results in Chart 6 suggest that the adjusted current account improved by 15.9 percentage points, as against nearly 7.2 percentage points in the unadjusted position. This indicates that cyclical demand factors are not causing the improvement in Malta's current account position.

That said, some studies, notably Haltmaier (2014), argue that other mainly temporary factors, such as changes in real exchange rates were nearly as big a cause of external rebalancing across the world as the cyclical changes in economic activity. Changes in oil prices are also mentioned as possible causes for temporary changes in current account positions. To demonstrate this, Haltmaier (2014) regresses changes in current account balances on current and lagged values of changes in the output gap differential (defined as trading partner output gap minus home country output gap), on changes in the log of the real exchange rate, on changes in the log of oil prices and on the lag of the current account balance for 35 countries from 1980 onwards.[9]

These estimates are compared with those derived applying the same regression[10] to Maltese data (see Table 1). This suggests that the impact of oil prices on the current account position is more pronounced in Malta, reflecting our economy's stronger reliance on imported oil. A 1% rise in the oil price, in fact, induces in the long run a 0.04% deterioration in Malta's current account, as against a 0.01% change in the countries studied in Haltmaier (2014). The real exchange rate also plays a more pronounced role in Malta. In the long run a 1% appreciation in the real exchange rate brings about a 0.11% worsening in the current account position for Malta, as against a 0.04% deterioration, on average, across the 35 countries surveyed in Haltmaier (2014). This greater influence of the real exchange rate is in line with the results for Malta shown in Christodoulopoulou and Tkacevs (2014). Cyclical differences are the strongest determinant of the current

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[8]   The degree of correlation between the two measures stands at 0.9 for the period 1980 to 2015.
[9]   Another example of this type of study is Brissimis et al. (2010), which regresses the current account balance on the real exchange rate, the government saving gap, the private investment ratio, inflation volatility, bank lending to the private sector, the difference between real GDP per capita in the domestic economy and a comparative one, demographic developments and the real interest rate.
[10] $\Delta CA_t = c + \Delta oil_t + \Delta rer_t + \Delta(gaptrad_t - gapmt_t) + CA_{t-1}$

where *CA* is the unadjusted current account balance as a % of GDP; oil is the log of the price of Brent crude, *rer* is the log of Malta's real exchange rate, *gaptrad* is the output gap in Malta's trading partners while *gapmt* is Malta's own output gap.

Table 1

THE IMPACT OF CYCLICAL DIFFERENCES, REAL EXCHANGE RATES AND OIL PRICES (1980 to 2013)

	Estimated coefficient		Long-run effect	
	35 countries (Haltmaeir, 2014)	Malta (Grech, 2016)	35 countries (Haltmaeir, 2014)	Malta (Grech, 2016)
Change in the output gap differential (trading partners minus home country output gap)	0.44	0.44	0.28	0.31
Real exchange rate	-0.06	-0.15	-0.04	-0.11
Oil price	-0.02	-0.06	-0.01	-0.04
Lagged current account	-0.57	-0.41		

Note: This table shows the equation results of a regression of changes in current account balances on changes in the relative cyclical position of trading partners and a home country, changes in the real exchange rate and in the oil price and the lagged current account position of the home country. The long-run effect shows the cumulative effect of changes in the explanatory variables. Thus for instance, whereas a one-percentage point increase in the output gap differential improves the current account balance by 0.28 percentage points on average across the 35 countries studied by Haltmaeir (2014), it leads to a 0.31 percentage points improvement in Malta. The impact of the real exchange rate and of oil prices is, on the other hand, much stronger in Malta than in the countries studied by Haltmaeir (2014).
Sources: Authors' calculations; Haltmaeir (2014).

account position for Malta, similarly to the results for other economies, though again the long run elasticity is stronger.

The long-run elasticities derived from this regression can be used to assess the contribution of changes in oil prices, real exchange rates and cyclical differences towards Malta's current account position during different periods. Any change that cannot be attributed to these three factors is considered as due to structural changes. This decomposition is shown in Chart 7 for two periods: the years between Malta's EU accession and the onset of the financial crisis and the years following the financial crisis. In the first period, Malta's current account position had deteriorated by 3.7 percentage points of GDP. This mostly reflect-

ed rising oil prices, though the appreciation in the real exchange rate also contributed to widen the deficit. On the other hand, cyclical differences reduced the current account deficit slightly during this period. Other (structural) factors also contributed positively to the current account, but were the third most important factor during this period. By contrast, these factors appear to account for nearly the entire improvement in the current account position in the post-financial crisis years. Changes in the oil price and in cyclical differences, in fact, offset most of the impact induced by the improvement in the real exchange rate.

Chart 7
ESTIMATED IMPACT OF CYCLICAL DIFFERENCES, REAL EXCHANGE RATE AND OIL PRICE MOVEMENTS ON CURRENT ACCOUNT CHANGES
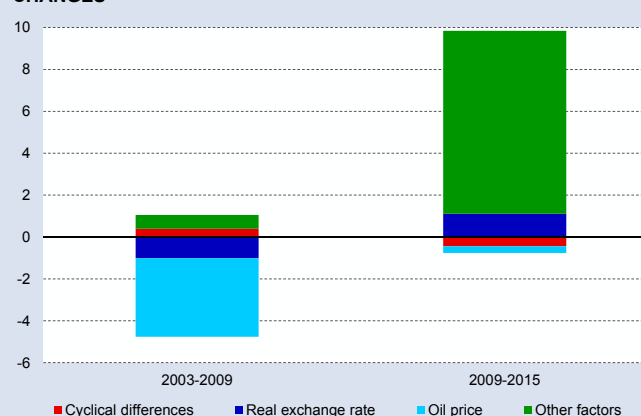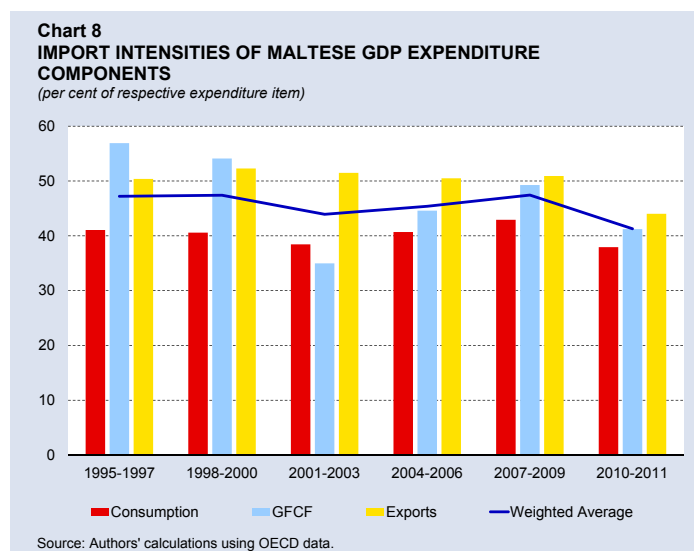

Source: Authors' calculations.

4. Understanding the structural factors driving recent changes in Malta's current account

Grech (2000) had indicated that Malta's external accounts did not exhibit stationary behaviour[11] up to 1997, and the current account position was deteriorating by 0.6 percentage point of GDP every year. This finding, together with econometric tests that showed that this was being driven by worsening public finances, was quite worrying as stationarity is a necessary (although not a sufficient) condition for avoiding sustainability problems in external accounts.[12] By contrast, running the same econometric tests on data spanning to 2015 indicates that the current account position is now stationary. In fact, in recent years most external account sustainability indicators have registered a strong positive upturn. For instance, the net international investment position has grown from 28% of GDP in 2006 to nearly 49% in 2015, the third highest ratio in the EU. The public sector's external loans fell from 7% of GDP to 5% during the same period, while the general government's external loans declined from 3% of GDP to 2%, the lowest in the EU.

The analysis presented in the previous section indicates that the change in Malta's current account position was mostly of a structural nature. Understanding these structural factors is therefore important, as they are highly likely to persist in the coming years. In this light it is important to study their possible macroeconomic implications.

One of the structural factors driving the change in the current account appears to be the improvement in the energy intensity of the Maltese economy. Whereas in 2005 it took 162.8kg of oil equivalent to generate €1,000 of GDP, by 2014 this had fallen to 118.7, or more than a quarter less (Eurostat, 2016). In fact, while in 2005, Malta required nearly 9% more oil than the EU average to generate the same amount of economic output, it now needs 3% less than the EU average. This turnaround reflects a number of developments, notably the reduced importance of exports of goods (which fell by nearly 17% in their relative significance over the same period) and the improvement in the efficiency in the generation of electricity. Given that Malta imports all of its fuel, these developments undoubtedly generated an underlying improvement in Malta's structural current account position. Amongst other things, the progress in energy intensity should reduce Malta's vulnerability to oil price shocks.[13]

Another factor responsible for driving the recent improvements registered in Malta's current account is the general reduction of Malta's import intensities.[14] As shown in Chart 8, Malta's overall dependence on imports fell by around 8 percentage points between 1995 and 2011, with reductions registered in the import intensities of all three expenditure items.[15] It can also be noted that most of the fall in import intensities occurred between 2010 and 2011, a period characterised by a marked increase in the share of services in Maltese output. These findings continue to highlight that the recent improvement of Malta's

Chart 8
IMPORT INTENSITIES OF MALTESE GDP EXPENDITURE COMPONENTS
(per cent of respective expenditure item)

Consumption | GFCF | Exports | Weighted Average

Source: Authors' calculations using OECD data.

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[11] A stationary process is one where statistical properties, such as the mean of the time series, are constant. Since current account deficits need to be financed by external debt or by foreign direct investment, a country running permanently deteriorating deficits would end up facing unsustainable external debt or very little domestic ownership of its economy.

[12] Trehan and Walsh (1991) show that given the equality relation between the current account and the capital account, a stationary current account implies that the present discounted value of the expected stock of assets would converge to zero. Quintos (1995) defines this as a 'strongly sustainable' current account position, and shows that even if the current account is integrated of order 1, this position is 'weakly sustainable', though the country would eventually have problems to finance its external debt.

[13] Grech and Rapa (2016) suggest that a permanent 20% increase in the oil price would lower real GDP by 0.4 percentage point in 3 years, boost the gross debt to GDP ratio by 0.3 percentage point and raise the unemployment rate by 0.1%.

[14] The average import intensity is highly correlated with the current account balance with a correlation coefficient of -0.6.

[15] Import intensities are derived using the methods explained in Claus (2003).

current account is not caused by cyclical fluctuations but is rather an effect of the changing structure of the Maltese economy. Moreover, these results also imply that multipliers have risen over time, increasing the possible impact of fiscal and other policies. Furthermore it means that expansion of export activity is having more impact domestically, resulting in higher consumption and social welfare than in the past.

One of the key developments driving the improvement in Malta's current account was the recovery in the national saving rate. Chart 9 shows how the latter practically halved in the decade prior to EU accession.

Chart 9
DEVELOPMENTS IN THE NATIONAL SAVING RATE
(per cent of GDP)

Source: Authors' calculations using Central Bank of Malta macroeconomic time series database.

The main cause was a significant deterioration in public savings, as government started running substantial primary deficits.[16] However there was also a notable decline in private saving. This reflected in part the restructuring of the Maltese economy that preceded EU membership. During this period, a number of sectors that had previously been shielded by tariff and non-tariff barriers had to improve their competitiveness, with some firms closing down or changing significantly their operations. National accounts employment data show that employment in manufacturing fell from 34,840 in 1995 to 26,950 in 2004, a drop of 23%. Grech (2014) also shows that from growth rates of over 5%, household disposable income fell to slightly negative in the same period. Consequently the household saving rate more than halved. Gatt (2014) suggests that bank lending was another important cause for developments during this period, as bank lending was growing at nearly 20%. Reductions in credit constraints may have led households to save less.[17]

By contrast, with the exception of 2009, the national saving rate has been on a consistent upward path since 2006. On the one hand, public saving has improved by some 5 percentage points in recent years. On the other, the emergence of new export-oriented services sectors, combined with the impact of greater competition and restructuring on previously existing sectors, has led to a much higher growth in profits. The combined gross operating surplus of Maltese firms grew by €1.9 billion in the decade following 2006, more than double the increase in the decade preceding EU accession. This led to a significant improvement in corporate saving. Furthermore, the strong economic growth registered in recent years, combined with higher dependence on labour in the new economic sectors, has contributed to raise disposable income. While consumption has increased, the household saving rate is estimated to have returned to levels last seen in the late 1990s.
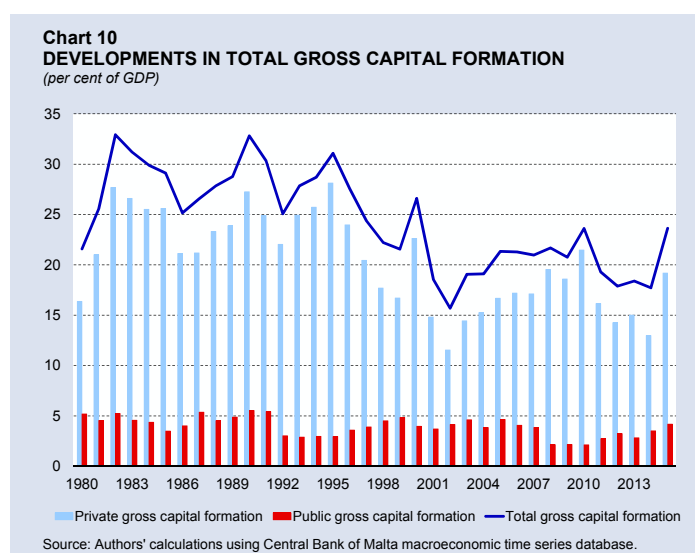
Trends in investment mirrored to a certain extent those in savings. However there were some important differences. For instance, while there was a decline in total gross capital formation in the 1990s, the reduction was more restrained, with a drop of 11 percentage points as against 16 percentage points in the national saving rate. This probably reflected the need for firms to invest more as part of their pre-EU accession efforts to increase competitiveness. Another important different trend was the fact that public investment remained relatively stable in this period, as against the sharp drop in public saving. Subsequently public investment gradually fell, halving by 2008 to its lowest historical level, before recovering sharply in recent years. In fact, public gross capital formation accounted for more than half of the rise in total investment since 2009.

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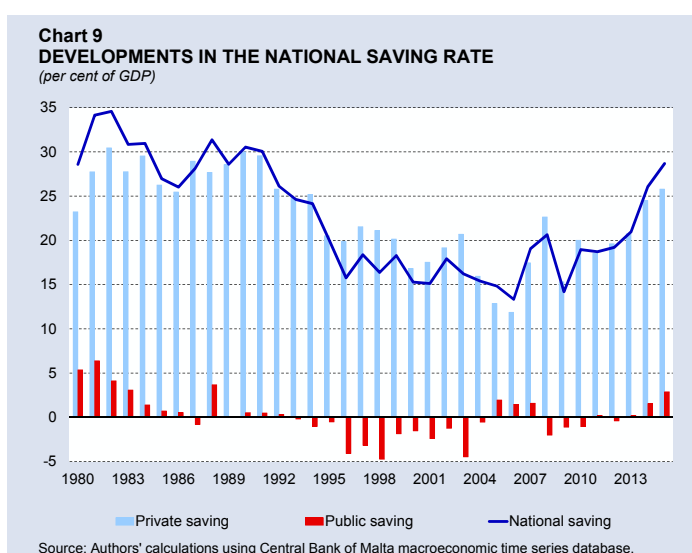
[16]   A similar narrative can be applied to the decline in national saving in the preceding decade, which for a large part reflected the disappearance of high primary surpluses in government finances.
[17]   A similar consideration can be made for the mid-1990s when financial liberalisation led to lending growth rates spiking to over 35%.
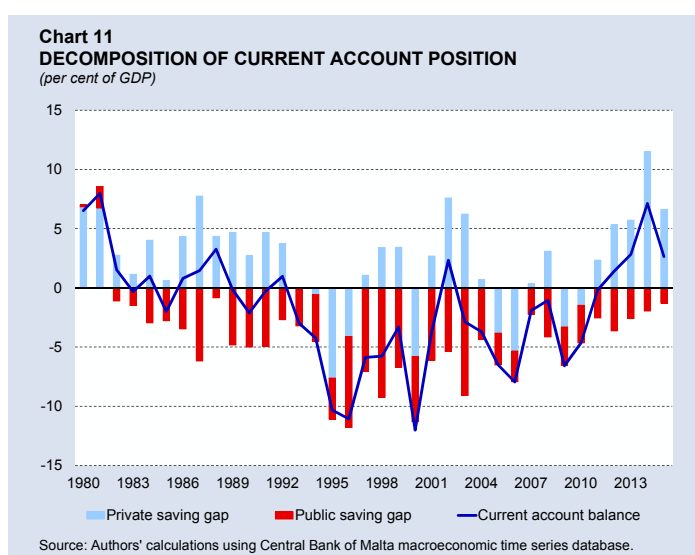
During the first part of the 2000s, private investment was relatively stable[18] (see Chart 10), while saving continued to fall. In the second half private capital formation picked up steadily reaching levels last seen in the late 1990s. However, this trend was reversed in the first half of the 2010s, possibly reflecting the growing share of the services sector, which depends more on investment in human rather than on physical capital. That said, 2015 saw the emergence of yet another services sub-sector, aviation services, which is heavily capital-intensive, resulting in a sharp rise in the private investment ratio.

Chart 10
DEVELOPMENTS IN TOTAL GROSS CAPITAL FORMATION
(per cent of GDP)

Source: Authors' calculations using Central Bank of Malta macroeconomic time series database.

The current account position, conceived as the difference between saving and investment can be broken down into a private saving gap (private saving less private investment) and a public saving gap (public saving less public investment).[19] This redefinition allows one to study the influence of the fiscal position on the country's external accounts. Furthermore one can attempt to study whether there is a correlation between the saving and investment decisions made by the private sector and fiscal policy.[20] For instance, the Ricardian equivalence hypothesis posits that the private sector neutralises any increase in the fiscal deficit through higher saving, as agents expect future rises in taxes. Similarly the crowding-out theory implies that a fiscal deficit, especially when an economy is operating at full capacity, could reduce private investment and lead to higher saving.

Evaluating whether an economy is characterised by Ricardian equivalence has important policy implications. For instance, it can indicate whether fiscal deficits could lead to external account issues, or whether private saving would counteract partly, or fully, imbalances in government finances. On the other hand, in small open economies like Malta if private investment is not closely correlated with private saving, large investment projects could still result in volatile current account positions.

Chart 11 decomposes the current account into a private saving gap and a public saving gap. At first glance, this seems to invalidate the hypothesis that they are inversely related. National saving is not stationary, and the current account and the fiscal deficit appear to be positively, rather than negatively,

Chart 11
DECOMPOSITION OF CURRENT ACCOUNT POSITION
(per cent of GDP)

Source: Authors' calculations using Central Bank of Malta macroeconomic time series database.

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[18] Note that the large investment in 2000 was due to one sector changing significantly its production lines, while the drop in 2001 was also due to a statistical issue, namely the impact of the national airline selling and then leasing back its aircraft.
[19] See Centeno (1995) or Grech (2000).
[20] See, for instance, de Castro and Fernandez (2009).

related. This suggests that it is more likely that the Maltese economy exhibits patterns more consistent with the Keynesian twin deficit framework.[21]

While private saving and private investment have a strong positive correlation, when one looks at the period 1980 to 2015, they appear to have a much weaker relationship during recent decades. On the other hand, the relationship between government saving and government investment appears to have strengthened substantially, particularly since EU membership. This suggests that while public investment is increasingly being financed internally by Government (primarily through the use of EU funds), private investment is going in the opposite direction, with the rise in private saving not bringing about a commensurate increase in private capital formation. The reasons for the latter development are not easy to ascertain. It is true that bank lending to private firms has remained fairly stable,[22] raising the question of whether investment was held back due to lack of access to finance. However, the financial resources of many firms have improved significantly, with corporate saving nearly doubling from 9% of GDP in 2006 to 19% in 2015, meaning that firms could invest more using their own funds should they need to.

To understand better developments in gross fixed capital formation one needs to look at sectoral compositions. Table 2 compares sectoral changes between 2006 and 2015 in ratios to GDP of investment, gross value added and gross operating surplus. These bring out a number of interesting trends. Industry and transportation & storage are the only two sectors to have seen a significant increase in their investment ratio, and in both cases their gross value added is lower in relative terms than it was in 2006. This could imply that the sectors are restructuring towards more capital-intensive modes of production. On the other hand, the decline in construction & real estate gross fixed capital formation exceeds the relative drop in their gross value added and operating surplus. Accommodation & food services and, to a certain extent, information & communications have increased investment in line with developments in their activity; while agriculture and financial services have lowered investment less than the relative drop in their value added and operating surplus. The main trend evident in Table 2 is that the services sectors which are increasing their share of

Table 2

CHANGE IN RATIO TO GDP OF SELECTED NATIONAL ACCOUNTS COMPONENTS BY SECTOR (2006 to 2015)

	Gross fixed capital formation	Gross value added	Gross operating surplus
Agriculture and fisheries	-0.18	-0.82	-0.48
Industry	2.51	-4.46	-0.21
Construction and real estate	-3.41	-2.50	-1.32
Wholesale and retail	0.04	-1.17	-0.14
Transportation and storage	3.42	-0.25	0.18
Accommodation and food services	0.32	0.12	0.84
Information and communication	0.48	0.84	0.36
Financial and insurance services	-0.11	-1.26	-1.92
Professional, technical and administrative support	-0.40	3.34	1.19
Public administration, education, health and social work	-0.60	-0.06	-0.19
Arts, entertainment and recreation; other services	0.06	7.19	6.00
Source: Authors' calculations.			

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[21] Regressing the current account on the fiscal balance and the real exchange rate (as in de Castro and Fernandez, 2009) indicates a strong positive relationship between the external and the fiscal position.

[22] Bank lending to transport, storage, information & communication rose by 29% between 2006 and 2015, while that for manufacturing and for accommodation and food services rose by 3.7% and 3.2%, respectively. Bank credit to the wholesale & retail sector rose by 18%, while that for construction & real estate fell by 4%. In no sector was the trend in lending similar to that in value added. For instance manufacturing value added rose by 11%, while accommodation and food services had a 77% rise. Construction & real estate rose by 33%, while the value added of wholesale & retail increased by 53%. The transport, storage, information and communication sectors grew by a combined 81%.

economic activity, such as remote gaming, professional services and administrative support, are doing so without significant changes in gross fixed capital formation.

There is a negative relation between sectors that have a higher propensity to invest and the growth in their share in overall gross value added. Sectors which have traditionally contributed significantly to total investment, such as industry (which on average contributes to around 40% of total investment), and wholesale and retail (whose investment on average makes up around 10% of total investment), have experienced a significant decline in their relative economic share. On the other hand, industries which tend to play a smaller role in investment dynamics (mainly in the services sector) have expanded rapidly in the last years. Therefore Malta's shift from capital intensive industries to the more labour intensive sectors is likely to have led to a compositional effect that has weighed negatively on total investment growth.

5. Conclusion

The analysis presented in this paper suggests that if Malta's export-oriented services sectors remain resilient or grow further, it is highly likely that the current account could remain in surplus over the coming years. The emergence of these sectors has boosted the national saving rate considerably, while reducing the import content, particularly of gross fixed capital formation, of the Maltese economy. Combined with the successful fiscal consolidation, this structural change has made Malta's external account position sustainable, marking a significant turnaround from the conditions that characterised the late 1990s and early 2000s. That said, there still remain significant issues that need close attention.

While in the past, Malta's production was relatively more reliant on imports of capital goods, in recent years it has become quite dependent on imports of labour. The new services sectors are more labour-intensive, and while some sectors, such as manufacturing, are becoming more productive and thus are freeing up skilled labour for use in other sectors, the unfulfilled demand for labour remains very high. Malta has the highest rate of job vacancies in the EU, and in the context of a rapid ageing transition, this is unlikely to change unless there is considerable investment to upskill the working age population and boost labour productivity to raise its potential. It will, however, be challenging to allocate the right type and amount of resources to training in a highly diversified small economy, with constantly changing needs. At the same time, the success of Malta's new economy depends on the country having the right infrastructure, particularly in the areas of digital networks and communications, links with the main trading partners and, increasingly, internal transit. Moreover whereas traditionally investment in human capital and infrastructure were the remit of the public sector, at a time of rising social expenditure due to ageing, the role of the private sector in these fields will need to take a more central role. To sustain the recent shift in Malta's current account, the resultant surplus needs to be leveraged appropriately to generate the seeds for the next phase of growth.

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PART III

MACRO-FINANCIAL CONSIDERATIONS

PROPERTY PRICE MISALIGNMENT WITH FUNDAMENTALS IN MALTA

Brian Micallef[1]

This paper computes an aggregate 'misalignment' index using a multiple indicator approach to identify under or overvaluation of house prices in Malta based on fundamentals. A total of 5 indicators are used that capture demand, supply and banking system factors: the house price-to-RPI ratio, the price-to-income ratio, price-to-construction costs ratio, dwelling investment-to-GDP ratio and the loan-to-income ratio. These indicators enter the index in 'gap' form, that is, as a deviation from their trends or long-run averages. The weights are derived using principal component analysis. Based on the Central Bank of Malta house price index, the misalignment indicator shows a period of overvaluation in house prices that peaked in 2006-2007. This disequilibrium started to be corrected following the decline in house prices, reaching a trough in 2013. Starting in 2014, however, the index started to recover such that, by end-2015, house prices were broadly in equilibrium.

1. Introduction

Developments in house prices are important for the assessment of the overall business cycle. For instance, in the period preceding the financial crisis, booming house prices in some countries were accompanied by rising private sector indebtedness and unsustainable growth in the construction industry. In the subsequent bust, the drop in house prices reduced collateral values, leading to an increase in non-performing loans, a weakening in the banks' balance sheet and a decline in credit growth. In addition, excessive growth in house prices may lead to additional distortions in the economy, such as a misallocation of resources from productive sectors to the non-tradable sector, which in part explains the weak productivity growth experienced by some countries after the crisis.

The housing sector affects the business cycle through a number of channels.[2] First, house prices affect private consumption through their impact on household wealth. For instance, housing wealth accounts for around 60% of total household wealth in the euro area and therefore, can have substantial effects on households' consumption, investment and portfolio decisions (ECB, 2006). Second, developments in real estate prices affect housing investment and the construction industry, which tend to have a relatively high multiplier effect (Cassar, 2015). Finally, these channels tend to be reinforced via the financial accelerator effect, given the role of real estate as collateral, thereby also affecting the banks' balance sheet and their willingness to extend credit to the real economy (Bernanke et al., 1999; Iacoviello, 2005).

In addition to these economic considerations, a better understanding of the state of the house price cycle is also important from a financial stability perspective. Macro-prudential policies are intended to prevent the build-up of risks in the financial sector, including those originating from the property sector, and their spillovers to the real economy. According to the IMF, house price busts occur less frequently than equity price busts but last nearly twice as long and are associated with output losses that are twice as large, reflecting greater effects on consumption and the banking system, which are usually heavily exposed to real estate.[3]

Against this background, this note documents recent developments in the real estate market using a multiple indicator approach to identify under or overvaluation of house prices in Malta. This methodology has become increasingly popular in recent years. UBS (2012) applies a multiple indicator approach for the housing market in Switzerland, with the same methodology being subsequently used to assess real estate prices in the larg-

[2]   See Mishkin (2008) on the main transmission channels.
[3]   According to IMF (2003), equity price busts are found to occur on average every 13 years, last for 2.5 years and are associated with GDP losses of around 4% of GDP.

est global cities. Similarly, Lenarcic and Damjanovic (2015) and Schneider (2013) apply a similar methodology for Slovenia and Austria, respectively. For the purposes of constructing a misalignment indicator for Malta, a total of 5 indicators are used that capture demand, supply and banking system factors. The house price-to-RPI ratio and the price-to-income per capita ratio represent the demand side, price-to-construction costs ratio and dwelling investment-to-GDP ratio represent the supply side, while the loan-to-income ratio captures the banking system perspective. The indicators enter the index in 'gap' form, that is, as a deviation from their trends or long-run averages. The weights of the sub-components in the overall index are derived using principal component analysis. The analysis is performed on both the Central Bank of Malta (CBM) and National Statistics Office (NSO) house price indices, which are based on advertised and contract prices, respectively.

The main findings are summarized as follows. The misalignment indicator based on the CBM house price index shows a period of overvaluation in house prices that peaked in 2006-2007. This disequilibrium started to be corrected following the decline in house prices, reaching a trough in 2013. Starting in 2014, however, the index started to recover such that, by end-2015, house prices were broadly in equilibrium. On the contrary, given that the NSO index lags behind the CBM index by around one year, the analysis based on the NSO index suggests that the undervaluation gap remains more pronounced as at end-2015.

The rest of the note is organized as follows. Section 2 provides a selective review of the literature on the subject. Section 3 reviews the main developments in the Maltese housing market since 2000, focusing on both demand and supply factors. Section 4 describes the sub-indices and the overall misalignment indicator. Section 5 provides some sensitivity analysis by comparing the misalignment index with alternative valuation measures derived from statistical filtering techniques. Section 6 concludes and provides avenue for further research.

2. Brief literature review

The property price cycle and its impact on both the macroeconomy and the financial system has received a lot of attention from both academia and policy institutions after the global financial crisis. Studies estimate the real estate cycle, which cannot be observed directly, using both statistical and econometric techniques.

The present value literature calculates the fundamental price of housing by discounting the expected future returns from rental income and compares it to the market house prices. The user cost method compares the expenditures associated with home ownership to rents. The factors typically considered in the user cost of housing include the interest costs, property tax payments (less any deductibles, interest and tax payments from taxable income), maintenance costs, risk premia and expectations about future changes in house prices (Himmelberg et al., 2005). In equilibrium, the user cost of housing should be equal to the rental costs as any difference between the two is arbitraged away.

Most of the academic literature applies a broad range of econometric methodologies to determine equilibrium house prices. Igan and Loungani (2012) estimate the equilibrium level of house prices using both demand and supply variables for a large sample of advanced and emerging economies using a reduced form regression. They find that long-run price dynamics are mostly driven by local fundamentals, such as income and demographics but credit market conditions can cause short-run deviations from this equilibrium. Gattini and Hiebert (2010) use a vector error correction model (VECM) with four variables – house prices, housing investment, disposable income per capita and interest rates – to estimate equilibrium house prices in the euro area. The latter approach can also be used for forecasting and the identification of structural shocks. The Deutsche Bundesbank (2013) estimates fundamental residential property prices for Germany using panel regression analysis. Dreger and Kholodilin (2013) propose an early warning system to identify speculative bubbles in house prices using different approaches, including logit and probit models. Gerdesmeier et al. (2012) applies a quantile regression model to detect booms and busts in the housing market, pointing to possible non-linear effects. Other approaches used within this vast literature also include the use of Markov switching models (Schaller and van Norden, 2002) and state-space models (Kizys and Pierdzioch, 2009).

A number of studies apply statistical methods to identify the house price cycle. For instance, Runstler and Vlekke (2016) apply a multivariate structural time series model to estimate the trend and cyclical compo-

nents of real GDP, real credit and real residential property prices for the US and the five largest economies in the EU. Similarly, Schuler, Hiebert and Peltonen (2015) characterise the financial cycle using multivariate and time-varying approaches. Other studies rely on univariate de-trending techniques, such as turning point analysis (Claessens et al., 2011, 2012), univariate band-pass filters (Aikman et al., 2015) or a combination of both (Drehmann et al., 2012).

All of the techniques used to estimate fundamental prices are subject to substantial uncertainty. The conclusion is however more reliable when a number of different indicators coincidentally point to the same direction. In its Financial Stability Review, the European Central Bank (ECB) publishes a misalignment indicator for residential property in a number of euro area countries (ECB, 2011). This indicator is based on four different measures, namely, the house price-to-rent ratio, the house price-to-income ratio, a demand equation approach and an asset pricing approach. Similarly, Kulikauskas (2016) uses several statistical indicators (price-to-rent ratio, price-to-income ratio, univariate Hodrick-Prescott filter) and estimates from an equilibrium equation to assess house price misalignments in the Baltic countries.

The multiple indicator approach uses a number of indicators to capture both the demand and supply side of the property market, with the individual indicators being weighted and aggregated in a single index. UBS (2012) has been calculating the "UBS Swiss Real Estate Bubble Index" since 2011 in order to identify risks and imbalances in the Swiss housing market. The UBS index consists of six sub-indices that track the following ratios: house prices-to-rent, house prices-to-household income, house prices-to-inflation, mortgage debt-to-income, construction activity to gross domestic product (GDP) and loan applications for rental properties to total loan applications. Recently, the UBS index has been extended to track the risk of property price misalignment in the global financial centres. Similarly, Schneider (2013) and Lenarcic and Damjanovic (2015) develop similar misalignment indices based on seven sub-indicators representing the fundamentals driving the housing market in Austria and Slovenia, respectively. In both cases, the sub-indices are chosen to cover the perspectives of households and investors, as well as the banking sector wide factors.

3. An overview of house price developments in Malta: 2000-2015

This section provides an overview of the Maltese housing market since 2000 in order to put the subsequent quantitative method in perspective.[4]

Based on the CBM house price index, residential property prices in Malta increased rapidly in the early 2000s with double-digit growth rates registered between 2003 and 2005. The boom in property prices peaked in 2004, after which the growth rate in house prices gradually slowed down though it remained positive until late 2007 (see Chart 1). As in other countries, house prices declined in 2008 and 2009, partly correcting the previous excesses. The drop was, however, relatively mild, averaging just under 4% per annum over these two years and was followed by relatively low growth between 2010 and 2012. Property prices started to recover in 2013, exceeding the pre-crisis peak in early 2014. Subsequently, house prices maintained strong and positive momentum, averaging 6.6% per annum between 2014 and 2015.

The boom in house prices in the early 2000s was due to a combination of demand and supply factors. Malta's membership in the European Union in 2004 may have influenced expectations about future economic prospects, while the entry in the ERM II mechanism, two years prior to the adoption of the euro, led to a gradual convergence of domestic interest rates to those set by the ECB. Bank lending rates to households for mortgages declined from around 6.6% in early 2000 to 4.3% by end-2004 following the monetary easing by the ECB in the early 2000s. Low interest rates had a positive effect on property prices, with residential mortgage debt increasing from only 14.5% of GDP in 2000 to 35.0% of GDP in 2007.

A supporting factor for domestic property prices was the Investment Registration Scheme, a tax amnesty for Maltese residents with overseas assets that was effective between 2001 and 2005. This allowed the

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[4]   The Maltese housing market is characterised by a high degree of home ownership. According to the Survey on Income and Living Conditions (SILC), the degree of home-ownership in Malta stood at 80% in 2014, with only a quarter of these having a mortgage loan, although the share of the latter has been increasing over time. The share of tenants stood at 20% in 2014, although a very high proportion of these pay subsidized rents. However, the share of households paying the market price for rent has been rising in recent years.

Chart 1
MAIN DEVELOPMENTS IN THE HOUSING SECTOR

Annual growth in house prices
(per cent)

House prices, income and GDP
(index 2010=100)

Permits for number of units

Dwelling investment-to-GDP ratio

Sources: Central Bank of Malta; Eurostat; author's estimates.
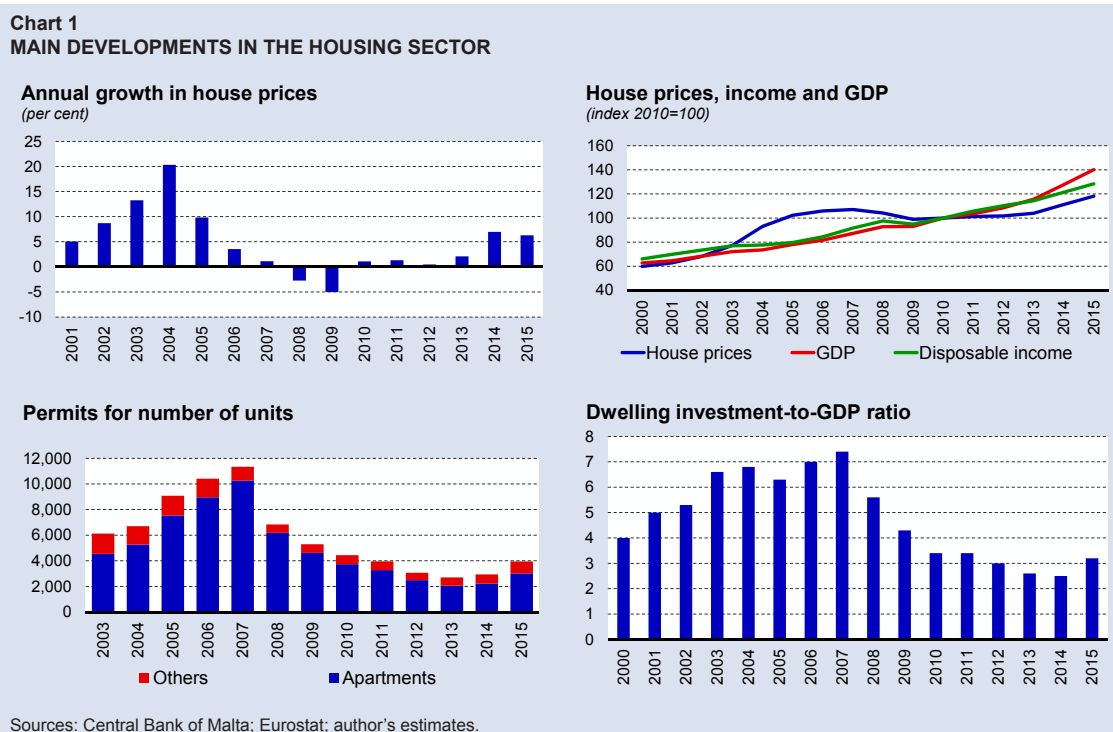
legalization of previously undeclared income from overseas assets once declared and repatriated to Malta. Many residents took advantage of this scheme and, in the context of the low interest rate environment prevailing at the time, often invested these assets in domestic property. In addition, property development was further encouraged by the rationalization exercise in 2006 by the Malta Environment and Planning Authority (MEPA). The rationalization consisted in the relaxation of height limitations and the inclusion of parcels of land in development zones.

The combination of these policies encouraged construction. For instance, the number of development permits for new dwellings units, mostly apartments, almost doubled between 2003 and their peak of 11,343 in 2007. Similarly, the share of dwelling investment in GDP peaked at 7.4% in 2007, up from 4.0% in 2000. The increase in supply co-existed with a sharp increase in the number of vacant dwellings. According to the 2005 census, the number of dwellings increased to 192,314 units in 2005, an increase of 24% compared with a decade earlier. Of these, vacant properties amounted to 27.6%, or 53,136 units, of the total housing stock in 2005, an increase of 49% compared with 1995.

The decline in house prices during the crisis was a global phenomenon caused by over-investment in construction in the pre-crisis years. However, compared with other European economies which had experienced excessive increases in house prices before the crisis, such as Ireland and Spain, the correction in domestic property prices was moderate in Malta.

The slowdown in the construction sector, together with the decline in price, is attributable to a number of factors, mostly supply-related. For instance, despite the small size of the market, the 2005 census showed a high share of vacant properties. House price appreciation in earlier years encouraged owners of large houses to develop their properties into apartments that were relatively small and of a lower standard than those generally demanded by the market.

The adjustment in housing market affected both prices and quantities. The number of permits for new units collapsed by more than 50% between 2007 and 2009, reaching a trough of 2,705 units in 2013. Similarly, investment in housing declined from its peak of 7.4% of GDP in 2007 to 2.8% in 2013. House prices declined in 2008 and 2009, followed by a period of sluggish growth until 2012.
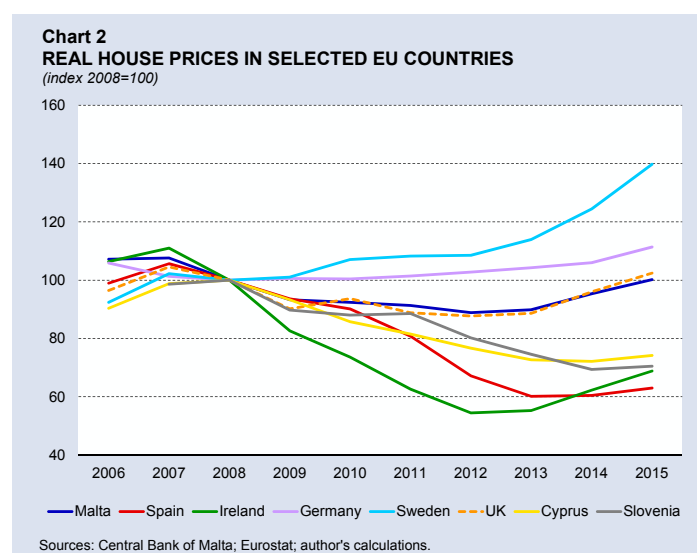
Following a correction that lasted around five to six years, the housing market started to recover in 2013, with property prices registering healthy growth rates in 2014 and 2015. In addition to the robust economic growth and the drop in unemployment to historical lows, the increase in house prices is also attributable to targeted government policies aimed at stimulating the property market. Malta's Individual Investor Programme (IIP) targets high net worth individuals, raising demand for high-end properties.[5] Other measures include another investment registration scheme in 2014, the exemption of stamp duty for first-time buyers on the first €150,000 of their new property value and the reform of the capital gains tax (CGT) in 2015, with the introduction of a final withholding tax system based on the value of the property. Portfolio rebalancing by investors into the housing market could also have played an increasingly important role, especially in the context of the prevailing low interest rate environment.

In addition, social and demographic factors are also having an important impact on the housing market. Ageing and changes in the traditional family nucleus, brought about, for instance, by the introduction of divorce or the increase in single-parent families inevitably raises the demand for housing.[6] Similarly, the influx of foreign workers, which increased from around 1% of the workforce at the time of Malta's EU membership in 2004 to more than 10% a decade later, also had a positive impact on demand. In addition to its impact on house prices, the latter phenomenon has also spurred demand for the rental market, especially in regions in the proximity of main hubs for tourism and fast-growing industries, such as remote gaming and the financial sector.

Finally, Chart 2 compares the developments in Malta's real house prices with those of other EU countries. As expected, there is a high degree of heterogeneity among EU countries, reflecting country-specific characteristics of the housing market. In 2015, real house prices in Malta had returned to their 2008 levels, though they remained lower than their peak of 2006-2007. House prices were still between 20% and 40% lower compared to 2008 in those countries that suffered from an unsustainable boom in construction before the crisis or were severely affected by the crisis (e.g. Ireland, Spain, Cyprus and Slovenia). The UK witnessed a correction in house prices after the crisis but experienced a strong recovery in recent years such that, by 2015, property prices had reached their pre-crisis peak. In Germany, which did not register a boom in house prices before the crisis, property prices stood around 11% higher in 2015 compared to the level prevailing in 2008. Finally, the housing market in Sweden remained on a strong upward trajectory, with real property prices in 2015 standing around 40% higher compared with 2008. This cross-country comparison suggests that the increases in Malta's real house prices in recent years was not excessive, especially given the strong economic performance, with Malta registering one of the highest GDP growth rates in the EU.

4. The misalignment indicator and sub-indicators

Based on the above information, this section looks at the main indicators used in the construction of a 'misalignment' indicator to identify under or overvaluation of house prices in Malta. The index is based on five indicators that represent the fundamentals driving the housing market, covering demand and supply factors, as well as one indicator representing a banking system-wide perspective.

Chart 2
REAL HOUSE PRICES IN SELECTED EU COUNTRIES
(index 2008=100)

Sources: Central Bank of Malta; Eurostat; author's calculations.

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[5] IIP applicants are required to make an investment in property of at least €350,000 or enter a property rental contract for at least €16,000 per annum, both on five-year contracts.
[6] According to SILC, there were 26,410 one person households in 2005 and 3,610 single parent households. By 2014, one person households were up to more than 37,000 while single parent households had increased by another 3,000.

The following two indicators were used to capture demand factors:

Price-to-RPI ratio: the real residential property price index is the indicator that most clearly summarizes housing market developments in Malta. Chart 3 refers to the CBM house price index which is based on advertised prices. The real index is obtained by deflating the nominal index by the retail price index (2010=100). The index is linearly de-trended to derive the price-to-RPI gap.
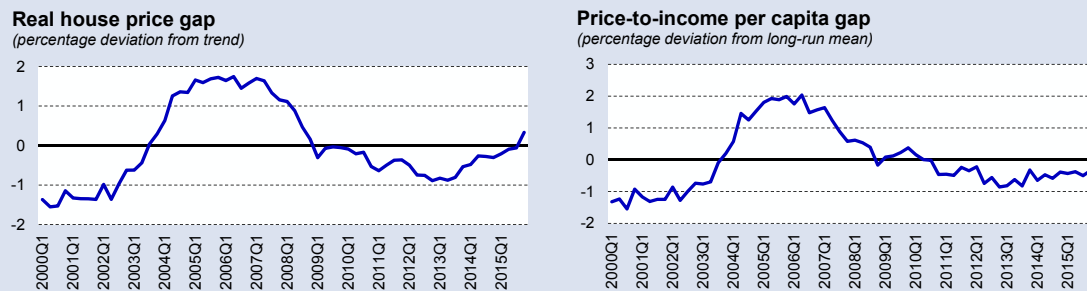
Price-to-income per capita ratio: this measure gives a better insight of the households' purchasing power needed to buy a residence and hence, is considered as a measure of affordability. In the absence of official data, CBM estimates of households' disposable income are used as the measure of income.[7] The latter is divided by the population to account for demographic changes. The gap is derived as the percentage deviation from the long-term mean over the period 2000-2015.

The next two indicators capture the supply side (see Chart 4):

Housing investment-to-GDP ratio: the ratio of housing investment to GDP represents the supply side. A housing sector that accounts for a high percentage of GDP implies a state of overheating, which can be interpreted as a sign of a housing bubble. Conversely, rising house prices stimulate construction, which would dampen excessive price increases in the medium term. The gap is obtained by subtracting the housing investment-to-GDP ratio from its long-run mean (2000-2015).

Price-to-construction cost: construction costs are another important supply-side factor. Applying Tobin's *q* (the ratio of market value of a firm to its replacement cost) to properties, this cost measure is calculated as the house price divided by the construction cost. The latter includes both labour and materials costs in construction. An important limitation of this concept is that that it fails to consider land prices. The index is linearly de-trended to derive the price-to-construction cost gap.

Chart 3
DEMAND INDICATORS (HOUSEHOLDS' PERSPECTIVE)

Real house price gap
(percentage deviation from trend)

Price-to-income per capita gap
(percentage deviation from long-run mean)

Sources: Central Bank of Malta; author's calculations.

Chart 4
SUPPLY INDICATORS (FIRMS' PERSPECTIVE)

Dwelling investment-to-GDP gap
(percentage point deviation from long-run mean)

Price-to-construction cost gap
(percentage deviation from trend)
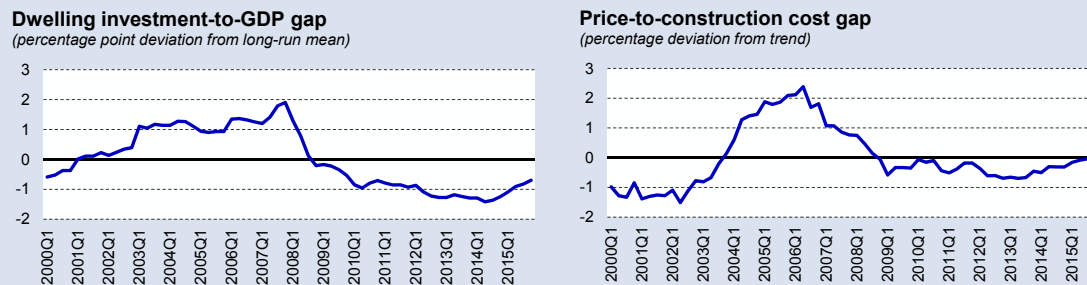
Sources: Central Bank of Malta; Eurostat; author's calculations.

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[7] See Grech (2014) for further details on disposable income in Malta.

Finally, the last indicator captures the banking system perspective:

Loan-to-income ratio: this index considers bank loans to households for mortgages relative to household income (see Chart 5). As before, the latter is proxied by the CBM disposable income indicator. When this ratio gets too high, households may become increasingly dependent on rising house prices to service their debt. The 'gap' is derived by linearly detrending the four quarter moving-average of this index.

Chart 5
MORTGAGE LOANS-TO-INCOME GAP
(percentage deviation from trend)

Sources: Central Bank of Malta; author's calculations.
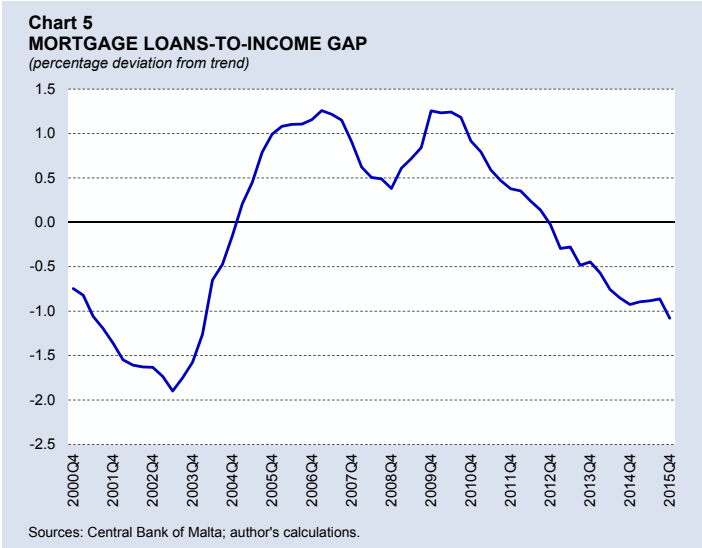
Aggregation
The five indicators enter the aggregate misalignment indicator in 'gap' form and normalized (i.e. divided by their standard deviation). The overall indicator is based as a weighted sum of the individual sub-indices:

$$MI_t = \sum_i v_i x_i$$

where *MI* stands for the overall misalignment indicator and *v* refers to the weight given to the individual sub-indices *x*. The weight for each component is derived by applying a principal component analysis (PCA) on the basis of the cyclical co-movement of the separate indicators. The weights are derived using the factor 'loadings' from the first principal component, which explains 74% of the variance between these indicators. The sub-indicator weights are shown in Table 1.

Results
Chart 6 plots the misalignment indicator and the contributions made by each sub-component. The index shows a period of overvaluation in house prices starting from around the time of EU membership in 2004 that peaked in 2006-2007. During this period, the misalignment indicator clearly shows significant overvaluation of house prices in Malta. The disequilibrium started to be corrected from around 2008 following the

Table 1
SUB-INDICATOR WEIGHTS
(per cent)

Demand	
Price-to-CPI gap	23.3
Price-to-income gap	23.3
Supply	
Price-to-construction cost gap	22.8
Construction investment-to-GDP gap	16.4
Banking sector	
Loan-to-income gap	14.2
Source: Author's calculations.	

slowdown in house prices. All the sub-indices contributed to the correction, although the banking system-wide indicator (loan-to-income gap) lagged behind the other indices. The misalignment index reached a trough in 2013, with all the sub-components contributing negatively. Starting in 2014, however, the index started to recover such that, by end-2015, the overall indicator was broadly in equilibrium. This result is in line with Gatt and Grech (2016), who also arrive at a similar conclusion using both statistical and econometric techniques.

To cross-check the results, Chart 7 plots the misalignment indicator using the NSO house price index, which is based on contracted house prices. A limitation of this index is that it starts in 2005 and hence, the gap analysis is conducted on only 10 years of data. This is clearly a major drawback since the series does not cover an entire house price cycle, which tends to be longer than the traditional business cycle. Hence, the results should be treated with caution. In addition, there are also timing differences between the two indices, with the NSO index lagging behind the CBM index by around one year. Appendix A1 describes the main differences between the two house price indices.

The analysis based on the NSO index suggests that the undervaluation gap remains more pronounced at the end of 2015 compared with the CBM index. Due to the timing differences, the NSO index shows that the overvaluation peak was reached in 2008 with a trough in 2014. In addition, the indicator exhibits a less pronounced recovery in 2015, owing to more subdued growth in the NSO house price index compared to the CBM index over the past two years (see Chart 8).

Chart 6
MISALIGNMENT INDICATOR AND CONTRIBUTION OF SUB-COMPONENTS BASED ON CBM HOUSE PRICE INDEX
(index; percentage point contribution)

Source: Author's calculations.
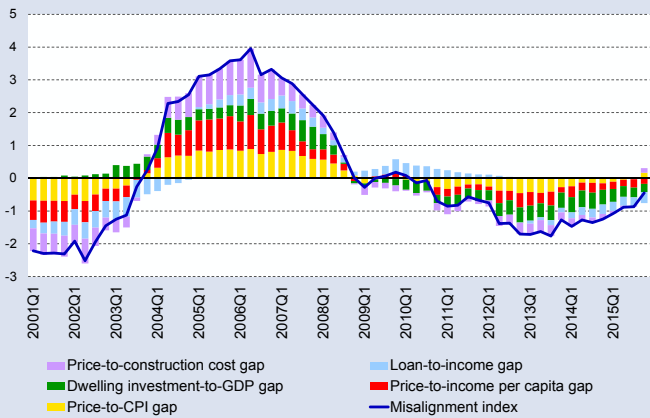
Chart 7
MISALIGNMENT INDICATOR AND CONTRIBUTION OF SUB-COMPONENTS BASED ON NSO HOUSE PRICE INDEX
(index; percentage point contribution)

Source: Author's calculations.
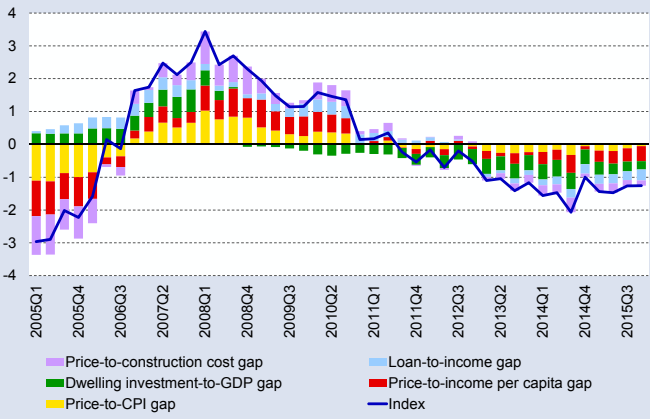
Chart 8
COMPARISON OF MISALIGNMENT INDICES
(indices)

Source: Author's calculations.
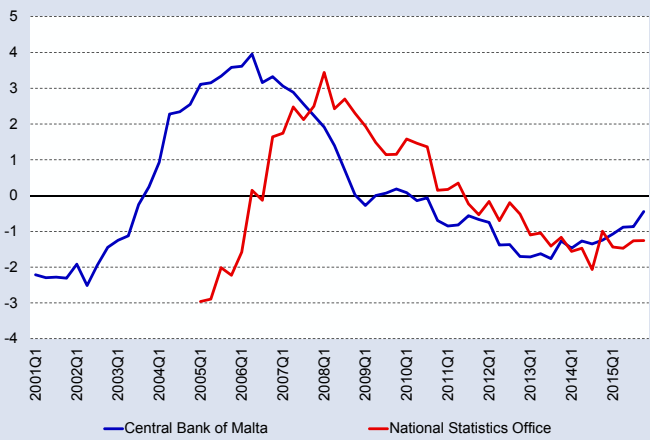
5. Sensitivity analysis

Given their unobservable nature, estimates of house price cycles are characterised by a considerable degree of uncertainty. The misalignment index is therefore cross-checked with statistical filtering techniques to assess the plausibility of the results. In addition to estimation or de-trending issues, the analysis on Maltese data is somewhat more challenging compared to other advanced economies due to the relatively short quarterly time series, especially since house price cycles are typically found to be longer than the business cycles. For instance, Runstler and Vlekke (2016) document house price cycles with a length of between 12 and 18 years. Similarly, Goodhart and Hofmann (2008) and European Commission (2012) use a smoothing parameter of 100,000 for the univariate HP filter, applied on quarterly data that typically starts from the early 1970s, to derive the house price cycle.

To address the limitation imposed by the relatively short quarterly time series in Malta, the robustness analysis is conducted using a longer time series, with real house prices extended backwards using the annual historical database documented in Grech (2015). The series for house prices in the latter database starts from 1980 and a quarterly frequency was obtained using the cubic-spline transformation. A quarterly series for the RPI is available from the Central Bank of Malta's website starting from the mid-1970s. The sensitivity analysis is only conducted on the CBM house price index since this coincides with the definition used in Grech (2015).

The first statistical approach to decompose the house price cycle is the HP filter. The latter is commonly used and easy to interpret but suffers from several well-known drawbacks. In particular, it poses problems at the end of the sample and the choice of the smoothing parameter (λ) substantially influences the outcomes. To minimise the end-point problem, the time series is usually extended using ARIMA models, while different smoothing parameters can be applied to illustrate the sensitivity of the resulting cycle to the choice of λ. Both approaches are used in the subsequent analysis. The real house price index is extended for the period 2016-2020 using an ARIMA(1,1,1) model. Two different smoothing parameters are used. The first measure uses a smoothing parameter of 100,000 following Goodhart and Hofmann (2008) and European Commission (2012). The second measure applies a λ of 400,000 following the recommendation of the European Systemic Risk Board (ESRB) for the calculation of the counter-cyclical capital buffer on the basis of the credit-to-GDP ratio.

In addition to the HP filter, another measure of the real house price gap is derived using the Baxter-King band-pass filter. In line with the literature, the band-pass filter is applied with a frequency band of 32 to 120 quarters, which differs from the frequency band of 8 to 32 quarters that is usually employed to extract business cycles with band-pass filters (Runstler and Vlekke, 2016).

Chart 9 plots the misalignment index together with the range of real house price obtained from the three different statistical filters. Both measures provide a similar interpretation of the property price cycle in Malta, including the peaks and troughs. Like the misalignment index, the statistical filters also point to an overvaluation of house prices in mid-2000s that peaked in 2006, which was followed by a slowdown with prices reaching a trough in 2013. All three statistical filters point to a gradual recovery in the cyclical component of house prices since 2013.

Chart 9
SENSITIVITY ANALYSIS
(per cent deviation from trend; index)

Range from HP and BK filters (lhs) — Misalignment index (rhs)

Source: Author's calculations.
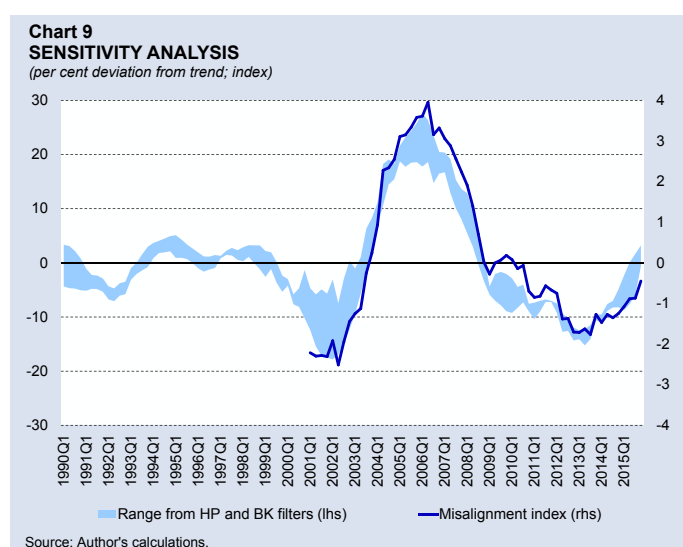
6. Conclusion and way forward

This paper presented a multiple indicator approach to identify house price valuation in Malta based on fundamentals. Based on the CBM index, the misalignment indicator shows a period of overvaluation in house prices that peaked in 2006-2007. This disequilibrium started to be corrected following the decline in house prices, reaching a trough in 2013. Starting in 2014, however, the index started to recover such that, by end-2015, house prices were broadly in equilibrium. The recovery was driven by a number of factors, such as targeted government policies, buoyant economic growth that boosted disposable income and possible portfolio rebalancing by investors towards the property market in the context of the prevailing low interest rate environment. Social and demographic factors are also having an important impact on the housing market. With prudent bank lending policies, risks to financial stability from house price increases appear to be limited at the current juncture, especially since the ongoing recovery in house prices is not driven by rapid credit growth. Even though the misalignment index suggests that house prices are broadly in equilibrium, the momentum of house price increases could imply that they can go above such equilibrium if the trend persists. This poses a dilemma for monetary policy makers as macro-prudential policy instruments are mostly effective to address credit-fuelled speculation but are much less effective if boom conditions are not driven by credit.[8]

More generally, the indicator presented in this paper is intended to provide a broad guide to the current momentum in house prices. The actual numerical results should not be overstated given the limitations in the construction of this index. Among the latter, the level of the variables (e.g. international comparison of property price levels), as well as other important determinants, such as foreign capital inflows, are not factored in the analysis due to lack of data. Perhaps more importantly, data on rents are also not available and hence, the price-to-rent ratio, which compares the costs of owning a property to renting it, could not be computed.[9] Rental costs are likely to play an increasingly important role in light of the influx of foreign workers, which increased demand for housing, especially in certain areas. Going forward, statistics on rents, once they become available, should definitely form part of the fundamental sub-indicators of the misalignment index.

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[8]   The current scenario of very accommodative monetary policy and low/negative interest rates risk forcing investors into portfolio shifts that finance property development without resorting to traditional bank finance channels.
[9]   Data on rents is only available on an annual basis starting from 2006. The HICP rents index is not appropriate either since more than 80% of this index consists of subsidised rents.

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Appendix A: Differences between CBM and NSO house price indices

This Appendix reviews the characteristics of the two property price indices available in Malta. The CBM property price index is based on advertised prices in a leading newspaper while the NSO index is based on contracted prices registered with the Inland Revenue Department (IRD). Both indices draw on the median price at each point in time and across different property types. These median prices are then aggregated to an overall median price index. Given the differences in data sources, the indices display different trends during specific periods as well as year-on-year growth rates (see Chart 10).

The CBM index is published every quarter and is not revised backwards, given that it is based on adverts placed at a specific point in time. On the contrary, the NSO index is subject to revisions. The last 4 quarters at the time of the news release, which is published once a year, are deemed provisional and data before this period is also frequently updated with incoming data. Both indices are chain-linked.

Another difference relates to the residential units included in the indices. The NSO index only covers apartments, maisonettes and terraced houses. In addition to these, the CBM index also includes town houses, houses of character and villas, with the weight of these three being around 15%.

Chart 10
DIFFERENCES BETWEEN CENTRAL BANK OF MALTA AND NATIONAL STATISTICS OFFICE HOUSE PRICE INDICES

Sources: Central Bank of Malta; National Statistics Office; author's calculations.
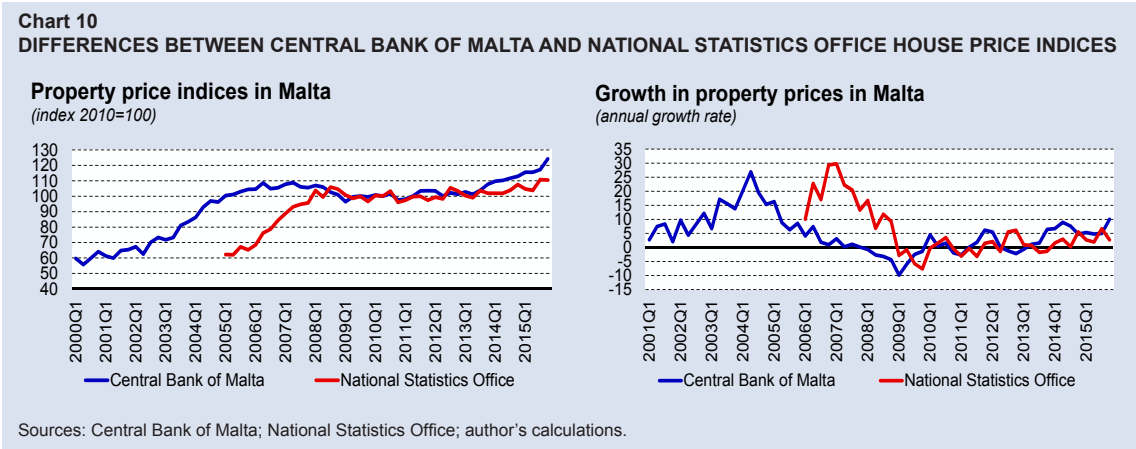
A FINANCIAL CONDITIONS INDEX FOR THE MALTESE ECONOMY

Brian Micallef and Ian Borg[1]

This paper develops a Financial Conditions Index (FCI) for Malta for the period 1996-2015. An FCI provides a summary measure of domestic financial conditions by combining several financial variables that influence economic activity. The FCI for Malta is constructed using interest rates, bank balance sheet indicators, asset prices, as well as external variables. The weights are derived using Principal Component Analysis (PCA) and cross-checked using simulations from STREAM, the Central Bank of Malta's macro-econometric model. Financial conditions in Malta were relatively benign in the mid-to-late 90s, followed by a period of tightening. During the pre-crisis period, financial conditions improved but deteriorated during the financial crisis and remained tight until 2013, although they have recovered somewhat in recent years. The proposed FCIs correlate the most with one to three quarters ahead real gross domestic product (GDP) growth, suggesting potential predictive capacity for short-term forecasting.

1. Introduction

An 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.

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 more dependent on bank financing compared to their counterparts in the euro area, where the corporate bond market and equities play a more important role. According to the Survey on Access to Finance of Enterprises (SAFE), around 75% of Maltese small and medium-sized enterprises (SME) in 2015 considered bank financing as the most relevant source of external financing compared to around 55% of European SMEs (Zerafa, 2016).[2] Domestic SMEs are also more dependent than their European counterparts on bank overdrafts, credit lines and credit card facilities.

The Maltese banking sector emerged relatively unscathed from the financial crisis of 2009 and, three years later, from the European sovereign debt crisis. No financial institution required government support and banks' liquidity and capital ratios remained well above regulatory minimum. However, non-performing loans (NPL), which are mainly concentrated in construction and real estate sectors, started to increase in the aftermath of the correction in house prices that began in 2008, following the double digit increases in property prices recorded in the early-2000s. In addition, despite robust economic and employment growth, credit to the private sector slowed down significantly after 2009 and a negative 'credit gap' opened up between 2012 and 2014 (Micallef, 2015). The contraction in credit was driven mainly by loans to non-financial corporations (NFC) and to households for consumption purposes whereas credit for mortgages continued to grow, albeit at a slower rate. The monetary easing by the European Central Bank (ECB) was imperfectly transmitted to bank retail rates, which, especially for lending rate to NFCs and deposits, the pass-through of policy rates became more sluggish after the crisis (Micallef et al., 2016). More recently, buoyant economic activity led to large increases in bank deposits and a recovery in property prices, with the latter being also influenced by government policies and socio-demographic changes (Micallef, 2016).

Against this background, this paper develops an FCI to evaluate financial conditions in Malta, constructed using interest rates, bank balance sheet indicators, asset prices, as well as external variables. The weights are derived using 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.

The main findings are summarized as follows. Financial conditions in Malta were relatively benign in the mid-to-late 90s, followed by a period of tightening. During the pre-crisis period, financial conditions improved but deteriorated during the financial crisis and remained tight until 2013, although they have recovered somewhat in recent years. The proposed FCIs correlate the most with one to three quarters ahead real GDP growth, suggesting potential predictive capacity for short-term forecasting.

The rest of the paper is organized as follows. Section 2 provides an overview of the literature on financial conditions indices. Section 3 documents the construction of the FCI for Malta, including the data used, using the PCA methodology, while Section 4 presents the alternative index using simulations from STREAM. Section 5 discusses the relationship of the financial condition indices with economic activity. Section 6 concludes.

2. Literature review

The interest in macro-financial linkages emanated from the academic observation that financial frictions in an economy can both cause macroeconomic fluctuations and amplify these shocks (Quadrini, 2011). Despite the significant theoretical contributions in this respect, notably through the incorporation of financial frictions in general equilibrium models (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997; Carlstorm and Fuerst, 1998; Bernanke, Gertler, and Girlchrist, 1999), it is only recently that macro-economic models in policy circles have been explicitly linking financial variables to the macro-economy. The global financial crisis of 2008/09 has prompted a fundamental re-evaluation of the need to properly take into consideration the linkages between the financial sector and the real economy. In part, this was triggered by the fact that many models commonly used in policy circles before the crisis largely assumed frictionless financial markets (Smets and Wouters, 2003; Christoffel et al., 2008).

Traditionally, the main interest in policy circles has been to capture the monetary policy transmission mechanism. The Bank of Canada has been at the forefront of this strategy, by developing a Monetary Conditions Index (MCI) to assess the transmission mechanism. In its simplest form, MCIs take a weighted average of interest rates and exchange rates to summarise the impact of monetary policy changes through these two channels (Freedman, 1995).

The original MCI was, however, very limited in scope. As financial systems became increasingly more sophisticated, the adequate characterisation of these systems, their impact on financing costs and eventually on macroeconomic variables required the inclusion of a broader set of financial variables. Additional variables such as the long-term interest rate, equity prices and house prices, were subsequently introduced to capture more channels of monetary policy. For instance, Goodhart (2001) and Mayes and Viren (2001) include both equity and house prices in their financial conditions indices, since these variables are found to explain fluctuations in the output gap. Similarly, Gauthier et al. (2004) augments a standard data set with asset prices and the bond yield risk premium.

The development of extended MCIs, which became known as financial conditions indices, brought about additional complexities in the methodological framework. A wide range of methodologies for constructing such indices has been developed over time, but the most popular are the weighted-sum approach and the PCA.

In the weighted-sum approach, the weights of each financial indicator are assigned according to the estimated impact on a macroeconomic variable, usually real GDP growth, the output gap or inflation. These are typically estimated either in a vector autoregressive framework (VAR), reduced-form demand equations or structural macroeconomic models.

One of the earlier approaches in this strand of literature is the IS-curve method, in which the output gap is regressed against its own lags, inflation, and financial variables. The weights are set equal to the coefficients estimated on the financial variables. Mayes and Viren (2001) constructed an FCI for a panel of 11 countries using such method. Similar to Goodhart (2001) their main interest was to extend the available MCIs with stock prices and house prices, which are thought to be additional channels of monetary policy that affect output and inflation. Gauthier et al. (2004) employ a similar framework in one of the FCIs they compute for Canada, but add a Phillips curve to include the impact on inflation. These structural methods are therefore concerned with establishing and directly estimating the link between financial variables and output and inflation.

Other studies calibrate the weight of financial variables in FCIs using simulations from large-scale macroeconomic models. Guichard et al. (2009) calibrate FCIs for the euro area, Japan and the United Kingdom, based on estimated weights for the United States. The weights are in turn derived from weights estimated from a combination of VAR impulse response shocks and macroeconomic simulations using the FRB/US model in Guichard and Turner (2008). Similarly, Dudley and Hatzius (2000) simulate shocks using the FRB/US model to derive their weights for the Goldman Sachs FCI.

VAR models have also gained popularity in deriving the weights for FCIs, primarily because they are able to capture the relationships between macroeconomic and financial variables. Goodhart and Hoffman (2001) utilise a panel VAR to derive weights from a panel of 17 industrialised countries, identifying their shocks using Choleski decomposition. The same approach is used by Swiston (2008) and Ho and Lu (2013) for the US and Poland, respectively. On the other hand, Gauthier et al. (2004) and Osorio et al. (2011) use generalised impulse response functions to circumvent the problem of the ordering of the variables in the VAR commonly faced when using the Choleski decomposition or similar restrictions. In most cases, the weight attached to the financial variables is obtained as the cumulative response, typically between four to six quarters, of GDP growth to a one unit shock to the financial variables included in the VAR.

The main attraction of weighted-sum approach is that they provide a direct link between financial variables and the macro-economy, making use of well-established theoretical frameworks on macro-financial linkages. Nevertheless, they are often faced with the so-called curse of dimensionality, that is, degrees of freedom are quickly consumed and hence very few variables can be included. As previously explained, modern financial systems are complex and their adequate characterisation requires the inclusion of a broad set of variables.

The PCA approach is able to circumvent the curse of dimensionality by extracting a common factor that captures the greatest common variation in a broad set of variables (Stock and Watson, 2002). The main advantage of the PCA is its practicality, as it facilitates the collapse of a large set of financial variables into a single indicator.[3] However, this method is largely atheoretical. As a purely statistical tool, the major disadvantage of this method is its assumption that the indicators with the greatest variability have the biggest economic significance. In addition, some indicators may enter the FCI with a "wrong" sign and therefore have to be dropped.

Angelopoulou et al. (2013) use the PCA approach to construct an FCI for euro area countries using a wide range of prices, quantities, spreads and survey data. Osorio et al. (2011) use a similar approach to provide a quantitative assessment of overall financial conditions in 13 Asian economies. In addition to financial conditions, the PCA method is also used in the construction of indices to measure financial stress (Hakkio and Keeton, 2009; Micallef, 2016). Hatzius et al. (2010) control for past GDP growth and inflation, thereby focusing on the predictive power of financial conditions for future economic activity. The latter approach has become very common in this strand of the literature (Onsorio et al., 2011; Ho and Lu, 2013). Darracq Pariès

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[3]   Using an eigenvalue-eigenvector decomposition, PCA is able to decompose the covariance structure into the common and idiosyncratic component. The largest eigenvalue corresponds to the maximum variance in the matrix of variables, and the eigenvectors are directions that correspond to the largest eigenvalue. The first principal component thus corresponds to the unit-length linear combinations of the variables that correspond to the largest eigenvalue. Each subsequent principal component corresponds to the remaining variance not explained by the previous principal component and orthogonal to the previous principal component.

balance sheet indicators (bank credit and deposits, ROE and NPL), interest rates and spreads (deposit interest rate, sovereign spread and the spread between the lending and the policy rate) and the others (equity prices and issues of NFC securities).

Financing conditions in the mid-to-late 90s 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 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.

Chart 2
CONTRIBUTIONS TO THE FINANCIAL CONDITIONS INDEX
(percentage point contributions)

Source: Authors' calculations.

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 risk premiums.

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 supported by demand-related factors since economic performance during this period was relatively robust. Focusing primarily on NFC credit, Micallef (2015) finds that a significant negative 'credit gap' opened up between 2012 and 2014. 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 that is expected to focus on large-scale infrastructural projects and lending to SMEs. Moreover, the relatively tight financing conditions experienced in 2013 are in part also related to the impaired transmission mechanism of monetary policy, reflected in wider spreads (Micallef et al., 2016).

Starting from early 2014, however, financial conditions improved significantly 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.

As outlined above, 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. Following Gumata et al. (2012), 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. 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.
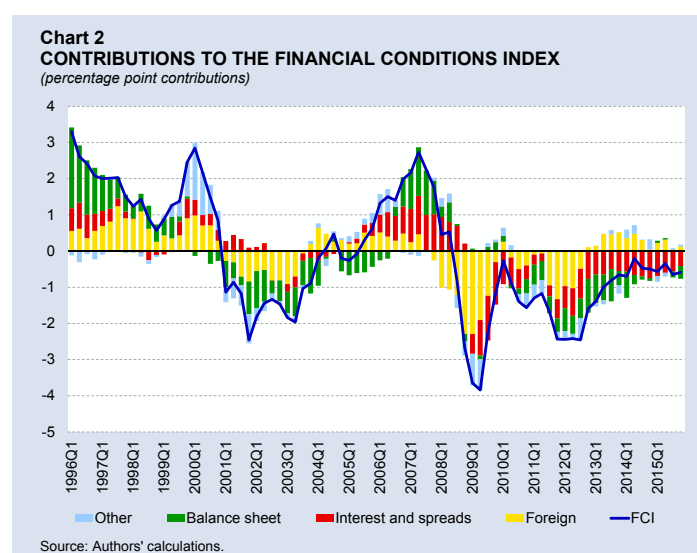
Chart 3 plots the unpurged and purged FCI. The differences between the two series are minimal in most instances, except in two cases. In 2001-2002, the unpurged FCI goes into negative territory, signalling tight financing conditions, while the FCI purged from macro-economic influences remains broadly 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

Chart 3
FCI - PURGED AND UNPURGED
(index)

FCI unpurged — FCI purged — -1 st. dev band

Source: Authors' calculations.

decline in the unpurged FCI in these two instances is partly demand-related rather than driven by financial supply shocks.
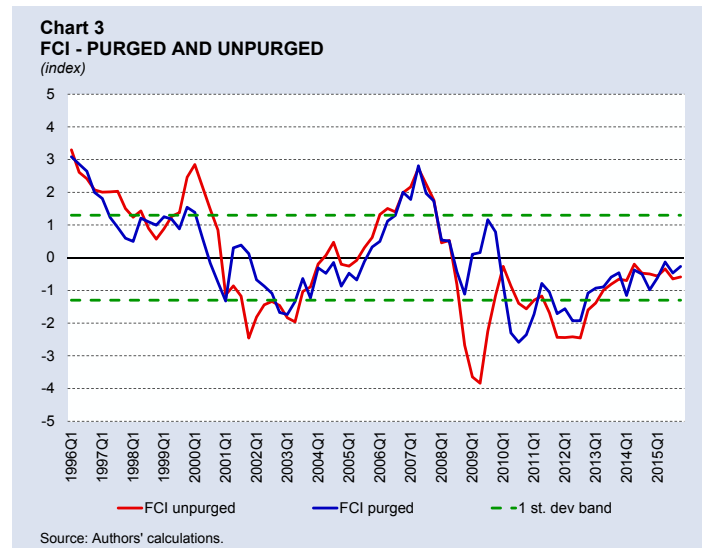
Moreover, Chart 3 plots the two FCIs within a one standard deviation range to assess historical episodes in which financial conditions deviated substantially from its mean. Among these episodes, the mid-1990s as well as the period 2006-2007 are clearly characterised by accommodative financial conditions. On the contrary, financial conditions were tight after the financial crisis and, to a lesser extent, in the early 2000s.

4. Sensitivity analysis – simulations using STREAM

The PCA is only a statistical technique intended to capture variation among a large set of variables. This is a limitation since it is not always clear whether the derived weights are consistent with what one would expect in a particular economy. In addition, some variables enter with the incorrect sign and have to be excluded.

As a sensitivity analysis, we develop an alternative FCI using simulations from STREAM, the Central Bank of Malta's macro-econometric model of the Maltese economy (Grech and Rapa, 2016). The model is composed of five blocks:[4] (i) a supply block, (ii) a demand block, (iii) a price-wage block, (iv) a fiscal block, and (v) a financial block. 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 4 to 6 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 entered with the 'wrong' 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 (Gumata et al., 2012; Ho and Lu, 2013). 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%.

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4   It consists of 232 equations, 28 of which are estimated behavioural equations, and 292 variables; 232 of them are determined endogenously, while the remaining 60 are exogenous.

Chart 4 illustrates the range between the results obtained from 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 explained by the depreciation of the exchange rate, which is excluded from the PCA approach.

Chart 4
SENSITIVITY ANALYSIS
(index)

Range between PCA (purged & unpurged) and STREAM ― ― 1 st. dev range ― ― STREAM
Source: Authors' calculations.

5. Cross-country comparison

One of the useful features of a financing conditions index is that it provides a tractable way to compare the state of financing conditions across countries. Over time, financial systems have become increasingly interconnected and hence, we can expect some level of co-movement between FCIs across countries. However, divergences could occur for a number of reasons. A major source of divergence could be different monetary policy stances across countries. Moreover, even in countries with the same monetary policy such as the euro area, heterogeneity in the banking system could be a source of divergence in the state of financing conditions. In this section we provide a brief overview of the FCIs published recently for the euro area, the United States, and other selected countries, and how these compare to Malta's FCI.

Financing conditions indices calculated by Angelpoulou et al. (2013) and Manning and Shamloo (2015) show that euro area financial conditions began to loosen in 2003 following a period of tightening. The peak was reached in mid-2007 after which a period of tightening and volatility ensued, due to the failure of Bear Sterns in March 2008 and the collapse of Lehman Brothers in September 2008. The recovery in euro area financial conditions after bottoming out in 2009 was very volatile and muted. Darracq Pariès et al. (2014) argue that fiscal concerns in 2011 and the intensification of the sovereign debt crisis in 2012 continued to create a tight financial environment, alleviated somewhat by non-standard measures. Manning and Shamloo (2015) show that the euro area experienced a prolonged period of tight financial conditions in the aftermath of the financial crisis, easing only by the end of 2014.

Angelpoulou et al. (2013) focus on a number of individual countries in the euro area and find substantial divergences between Germany and other peripheral countries in the euro area. German financial conditions were looser than the euro area average in the pre-crisis period, while those in peripheral countries were relatively stable. All euro area countries experienced strong declines in their financing conditions in 2009 due to the uncertainty created by the global financial crisis. Heterogeneities again emerged in the post-crisis period. Financing conditions remained very tight in countries such as Greece, Spain, Portugal, and Ireland, due to the effects of the sovereign debt crisis. Since Germany was not directly impacted by the sovereign debt crisis, its financing conditions recovered faster compared to the stressed economies, also driven by the non-standard measures adopted by the ECB.

Financial conditions in the United States over time were generally similar to those in the euro area. FCIs estimated by Guichard et al. (2009), Hatzius et al. (2010), and Wacker et al. (2014) among others, show that the US experienced a general upswing in financial conditions in the period after the dot-com bubble and before the financial crisis. Financing conditions became very tight during the financial crisis, but, unlike in the euro area, quickly recovered as the Federal Reserve embarked on a more expansionary monetary policy stance and was not saddled by a sovereign debt crisis.

Financial conditions in Malta generally co-move with those from other countries. Malta's financial conditions improved strongly before 2008, driven by both domestic and foreign variables, similar to the loosening
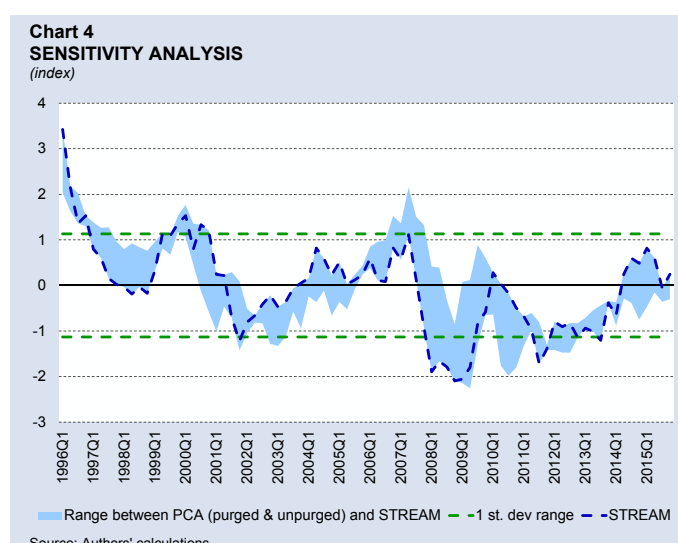
experienced in the euro area and the United States. Moreover, although Maltese banks were not directly hit by the financial crisis due to their limited exposure to the subprime mortgage market, financing conditions in 2008 and 2009 followed those in other countries and became tight by historical standards. Initially, this was driven largely by foreign variables and, to a lesser extent, equity prices and widening spreads. After 2011, however, domestic factors played an increasingly important role. Although Malta was not affected by the sovereign debt crisis like other peripheral economies in the euro area, and despite the strong growth in economic activity, domestic factors such as the decline in credit, the increase in NPLs and a sluggish interest rate pass-through continued to dampen the recovery in financial conditions.

6. Relationship with economic activity

A number of studies in the literature suggest that FCIs tend to have good leading indicator properties and therefore, could be used for short-term forecasting. Chart 5 plots the annual growth rate of real GDP with the range of FCIs for Malta. Notwithstanding the volatility in the GDP series, the chart shows that the FCIs can provide useful information in forecasting GDP growth.

By combining the information from the various financial indicators, the FCI tracks real economic activity better than most of the individual indicators. Table 1 illustrates the correlation between the three FCI indices and real economic activity, both for the entire sample period (1996-2015) as well as two sub-samples (1996-2006 and 2007-2015).

For the full sample, the FCI from STREAM and PCA-unpurged cor-relates the most with one-quarter ahead real GDP growth (ranging
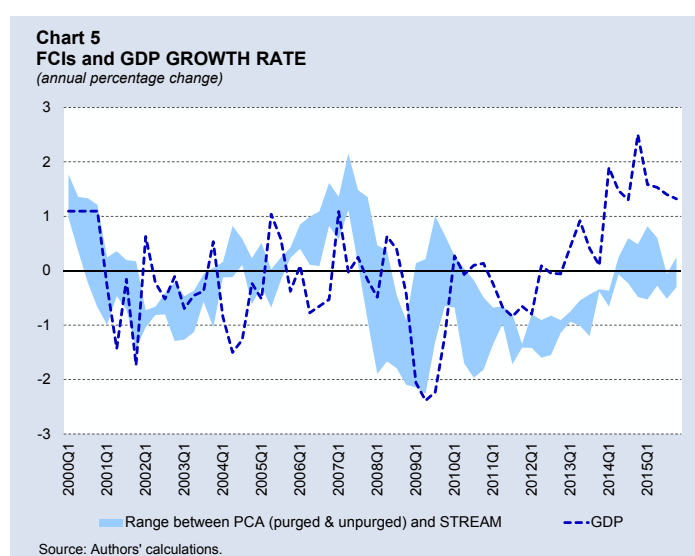
Chart 5
FCIs and GDP GROWTH RATE
(annual percentage change)

Range between PCA (purged & unpurged) and STREAM   ---GDP

Source: Authors' calculations.

Table 1
CORRELATION BETWEEN FCI AND ECONOMIC ACTIVITY

	Real GDP growth (y-o-y)			
Period: 1996-2015	t+1	t+2	t+3	t+4
PCA_unpurged	0.37	0.30	0.21	0.09
PCA_purged	0.13	0.17	0.18	0.13
STREAM	0.39	0.32	0.28	0.25
Period: 1996-2006	t+1	t+2	t+3	t+4
PCA_unpurged	0.47	0.44	0.48	0.38
PCA_purged	0.42	0.44	0.54	0.47
STREAM	0.36	0.28	0.35	0.36
Period: 2007-2015	t+1	t+2	t+3	t+4
PCA_unpurged	0.42	0.32	0.10	-0.07
PCA_purged	-0.05	0.01	-0.05	-0.05
STREAM	0.61	0.55	0.42	0.35
Source: Authors' calculations.				

Table 2
PAIRWISE GRANGER CAUSALITY TEST

	p-values			
PCA-Unpurged	Lag 1	Lag 2	Lag 3	Lag 4
Output does not Granger Cause FCI	0.17	0.41	0.47	0.56
FCI does not Granger Cause Output	0.14	0.02	0.06	0.05
PCA-Purged	Lag 1	Lag 2	Lag 3	Lag 4
Output does not Granger Cause FCI	0.78	0.71	0.15	0.37
FCI does not Granger Cause Output	0.13	0.19	0.29	0.19
STREAM	Lag 1	Lag 2	Lag 3	Lag 4
Output does not Granger Cause FCI	0.69	0.58	0.73	0.89
FCI does not Granger Cause Output	0.06	0.02	0.05	0.09

Source: Authors' calculations.

between 0.37 and 0.39 for t+1). By construction, the FCI-purged has no correlation with contemporaneous GDP growth and therefore the contemporaneous correlation is excluded from Table 1.

There are noticeable differences between the two sub-periods. For instance, the PCA-based FCIs have a higher correlation in the first sub-sample. The correlation of the two PCA-based estimates with real GDP peaks at around 0.5 three-quarters ahead over the period 1996-2006. On the contrary, the FCI based on STREAM exhibits a higher correlation with GDP growth in the second sub-sample. During the latter period, the one- and two-quarter ahead correlation increased to 0.61 and 0.55, respectively. The PCA-based approaches perform less well after the crisis, with the purged PCA exhibiting no correlation with GDP. The difference between the two reflects the effects of the exchange rate depreciation in the STREAM-FCI, which leads to a relatively faster recovery in financing conditions compared to the PCA-based estimates.

Finally, Table 2 shows the pairwise granger causality tests between the three measures of FCIs and GDP growth for different lag lengths. These tests show that, in general, except for the purged PCA, there is causality from the FCI to GDP growth but not the other way around.

7. Conclusion

This article has developed an FCI for the Maltese economy using two approaches, principal components and simulations using STREAM, the Bank's macro-econometric model. The FCIs include both domestic as well as foreign variables, reflecting the openness of the Maltese economy. Financing conditions were relatively benign in the mid-to-late 90s and in the pre-crisis period. On the contrary, Malta's financial conditions were relatively tight in the early 2000s and in the aftermath of the financial crisis. 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. Statistical tests suggest that the information contained in these FCIs can be useful for short-term forecasting. A caveat to keep in mind is that the proposed FCIs are conditioned on the static historical relationship between economic activity and the financial variables. The model would therefore need to be reassessed in the eventuality that this relationship changes over time.

The estimates presented here confirm that Malta's financial conditions tightened in the aftermath of the crisis, initially due to international factors but subsequently mainly reflecting domestic factors. Given that the analysis presented here suggests that financial conditions do affect economic activity, addressing this relatively domestic-inducted tightening could be beneficial to growth. In this light, policy initiatives such as the introduction of the CCR and the setting up of a development bank should help make Malta's growth more sustainable.

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