

# **How Can Greece's Economy Achieve Sustainable Growth?**

## **Estimating the Impact of Alternative Policy Measures Designed to Spur Growth**

**July 2018**

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## Acknowledgments

This report was prepared by an IHS team led by Elisabeth Waelbroeck-Rocha (VP & Chief International Economist) and made up of Diego Iscaro (Senior Principal Economist); Mohsen Bonakdarpour (Director, Economic Consulting); Maria Kulikova (Senior Manager, Economic Consulting); James Richards (Senior Consultant, Economic Consulting); Lucas Casalino (Director, World Industry Service) and Sacha Tenenbaum (Economist). The report was prepared at the request of the Global Citizen Foundation (GCF) as part of its project on the Future of Europe, which seeks to craft a new vision for Europe that could lead to a system that is better able to respond to the wishes and expectations of member-country citizens while taking into account their endowments, availability of resources, and the environment they live in.

The project team for this report would like to thank the GCF for its substantial support for this project. It is very appreciative of helpful comments and suggestions by Stefanos Manos, Theophilos Priovolos, and Miranda Xafa. In addition, the team is grateful for comments it received in the initial phase of its work from Andreas Andreadis, Takis Athanassopoulos, Takis Chinofotis, Anna Diamantopoulou, Giannis Lixouriotis, Alex Manos, Giannis Paraschis, Dimitris Paxinos, Stathis Potamitis, Giannis Ragousis, and George Theodosis.

The team also acknowledges contributions by Shahrokh Fardoust and George Schink, who reviewed and commented on the entire study, and Barbara Karni, who provided excellent editorial support.

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## Executive Summary

The Greek economy deteriorated markedly over the past decade and, despite some improvement in conditions in 2017, there are concerns about the country's ability to generate growth over the long-term. Potential growth is now estimated at 1.2 percent per year at most, down from 3 percent between 2000 and 2008. With public debt just below 180 percent of GDP and domestic credit severely constrained, the economy's ability to grow without foreign direct investment (FDI) is severely hampered.

The three bailout programs implemented since 2010 provided Greece with financial assistance in return for its commitment to adopt certain structural reforms and meet fiscal targets. Most of the conditionality concerned tax hikes, while labour and product market reforms have also been legislated. The measures implemented led to a significant reduction of the fiscal deficit, and even a budget surplus in 2016. However, Greece's public debt to GDP ratio remains, by far, the highest in the EU, raising the question of debt sustainability. The fiscal tightening has triggered a vicious cycle of slow growth, deflation, and weak public revenue. Further tax increases and spending cuts reduced confidence, investment, and potential growth, and more deflation.

On June 22, 2018, the Eurogroup confirmed that Greece successfully completed its European Stability Mechanism (ESM) program and granted debt relief through interest capitalization, maturity extensions and other measures.<sup>1</sup> While the debt relief measures announced are expected to have a significant positive effect on Greece's fiscal situation over the short-term, they will not on their own lead to fiscal sustainability over the long-term. Under the current political and social circumstances and given the lack of national consensus on fundamental reforms, the likelihood of Greece receiving a larger debt relief is fairly slim. Moreover, the post-program monitoring arrangements keep a substantial degree of conditionality by making debt relief partly dependent on the completion of planned reforms and the achievement of very ambitious fiscal targets, which may not be socially or politically viable unless accompanied with a significant acceleration in economic growth and job creation.

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<sup>1</sup> European creditors granted frontloaded debt relief to Greece by extending the grace period on European Financial Stability Facility (EFSF) loans by 10 years and the weighted average maturity by 10 years. Profits on Greek government bonds held by the Eurosystem (€4.8 billion) would be transferred to Greece on a semi-annual basis starting in December 2018, subject to Greece's compliance with post-program commitments. The Eurogroup agreed to review Greece's debt sustainability at the end of the grace period in 2032. The final disbursement under the ESM program amounted to €15 billion, of which €5.5 billion would be used for debt service payments and €9.5 billion to help build a €24 billion cash reserve covering amortization payments over the 22 months after the end of the program. Greece committed to complete the reforms initiated under the third bailout subject to enhanced surveillance and quarterly reviews by official creditors.

This study quantifies the economic outlook for Greece under current policies and determines whether a shift in public policy based on a reduction in fiscal pressure and an acceleration of reforms would put Greece back on the path of healthy sustainable growth. The analysis is based on a detailed model of the Greek economy designed to take into account the relationships between demand and supply conditions, the interlinkages between industries, and the interdependencies between Greece and the rest of the world. It produces projections of output, consumption, investment, trade, prices and wages, competitiveness, public finances, and debt. The model also allows quantification of the effects on 57 industries of a change in demand in any one of these industries, projections of public sector revenues and expenditures for the categories used by the Greek Ministry of Finance, and analysis of the effects of policy changes on different income brackets.

The baseline (business as usual) forecast assumes a continuation of current policies. It projects moderate improvement over the performance of 2008–17. The improvement is not sufficient to restore the nation's economic health, however, and downside risks are substantial.

The report examines several alternative policies. The most promising one involves targeted policies that attract FDI combined with pension-related fiscal policy reforms. Projected FDI inflows into three sectors identified in the report (combined with pension-related reforms) are expected to bring about incremental benefits to the economy. Under this scenario, which is estimated to initially require modest increases in FDI inflows (of about € 2 billion per year above the baseline level), real GDP is 5 percentage points above the baseline level by the end of 2021 and 9 percentage points higher by the end of 2028. The bulk of this jump is attributable to real fixed investment, which is 15.5 percentage points above the baseline projection by end 2028; exports of goods and services, which are 28 percentage points higher at the end of the forecast period. Employment is 5.3 percentage points higher in 2028.

### **The Outlook for Greece in the Absence of Policy Change**

The baseline model assumes that current policies are maintained. This forecast also assumes global economic conditions to remain positive the coming years. We project world growth to stand at 3.4% in 2018 and 2019, a slight acceleration from the 3.3% growth rate registered in 2017. Activity in Europe is also expected to be solid despite the growing risks from protectionism. The Eurozone is seen growing well above potential, although we project growth to gradually decelerate from 2.5% in 2017 to 2.3% and 2.0% in 2018 and 2019, respectively. Growth in the United Kingdom is expected to decelerate more markedly from 1.8% in 2017 to 1.2% in 2018 and 1.3% in 2019 as the economy battles with Brexit-related uncertainty.

For Greece the baseline forecast assumes political and policy stability in 2018 and beyond and continued funding by official creditors as long as bond markets remain closed. We

estimate there is a good probability of Greece exiting its current bailout without a new programme in August 2018. The outlook is relatively positive for Greece, but downside risks, including political instability arising because of continuing high unemployment and mounting fiscal pressure, are many.

Greece's economy remains challenged. After the almost uninterrupted economic contraction since late 2007, GDP grew by 1.4 percent in 2017. We expect growth to remain in place over the short term, standing at 1.7 percent in 2018 and 2019. Over the medium term, we project growth to average 1.4 percent between 2020 and 2030. This, combined with muted inflationary pressures, will not be enough to drive a marked reduction in gross general government debt levels. The debt to GDP ratio is expected to decline to 137.4 percent by 2030—well above the 118 percent target set in conjunction with Greece's institutional creditors.

Improvement in real GDP growth in the baseline forecast largely reflects the stabilization of economic conditions in several areas that were severely hurt during 2008–16, as well as modest progresses in exports, employment, and tourism. Growth is so tepid, however, that not until 2040—more than two decades from now—does real GDP recover its 2007 level.

### **Towards an Alternative Policy Scenario**

Several simulations were conducted to quantify the impact of alternative stimulus measures on the economy and public finances and to determine whether a radical change in the orientation of economic policy might improve Greece's long-run economic outlook. Four measures are analysed: (a) a reduction in the value added tax (VAT) rate; (b) a reduction in the corporate tax rate; (c) a reduction in the personal income tax; and (d) a change in the pension package that combines a reduction in pension outlays with the elimination of social contributions paid by employers and employees.

The first three measures provide some boost to activity, but the budgetary cost is high. Reducing the VAT and personal income tax rates stimulates household consumption, but it also leads to higher imports, which limits the positive impact on domestic growth and employment. Reducing the corporate tax rate does not boost growth sufficiently given the low level of taxes paid in Greece (corporate tax revenue accounted for just 1.7 percent of GDP in 2015, and 1.5 percent in 2017).

The fourth measure (the pension package) eliminates social contributions paid by employers and employees, raises the retirement age to 67 and stops paying the pensions of younger retirees with an option of grandfathering the existing recipients, and caps pensions at €700 a month. Under this scenario, the €21.6 billion in revenue that the government loses as a result of eliminating all social contributions (ie both pension and health) is not entirely offset by the €16.4 billion annual savings in pension payments, but the expectation is that the improved

competitiveness will stimulate higher growth and will have a positive spillover effect on government revenue. Maintaining health contributions amounting to about €5 billion per year would make the pension reform budget-neutral, while grandfathering old-age pensioners below 67 years by offering them pensions of €700 a month would cost some €5.9 billion annually (3.3% of GDP).<sup>2</sup> The effect of grandfathering would only last a few years, however, depending on the age composition of the current retirees.

Elimination of social contributions by employers and employees is expected to trigger a private sector-led recovery, for three reasons. First, it reduces labour costs, which lowers prices, improves Greece's competitiveness, and stimulates increased employment and output.<sup>3</sup> Second, real personal disposable income immediately increases, which stimulates domestic demand. Third, reduced labour costs and increased domestic demand stimulate fixed investment.

However, the elimination of pensions for retirees under the age of 67 and the cap on pensions for retirees 67 and over attenuates these benefits, and the higher retirement age causes many younger retirees to return to the labour market, increasing both labour force participation and unemployment rates.<sup>4</sup> The increase in the number of people seeking employment heightens competition for jobs, putting downward pressure on wages and salaries.

The positive economic impact of the elimination of social contributions is therefore largely offset by the reduction in pension outlays. Elimination of social contributions paid by employees immediately increases real personal disposable income, which stimulates domestic demand. The stimulus is not as large as the tax cut, however, because part of the disposable income gain is saved and part is spent on imports. As a result, the boost to private sector activity is relatively muted.

The fall in production costs and the rise in profit margins made possible by the pension package stimulates investment. However, the acceleration remains tepid, because the

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<sup>2</sup> According to the HELIOS database, as of March 2018 there were 617,034 pensioners below 66 years who received an average pension of €998 per month, at a total cost of €7.4 billion a year. Among these, 391,221 were old-age pensioners. They received an average pension of €1,242 per month, at a total cost of €5.9 billion a year. Interpolating between those below 66 and those below 71 years of age yields the estimated 470,000 retirees aged less than 67 referred to in this study.

<sup>3</sup> Labour costs are reduced directly, because employers' social contributions are eliminated. Wage growth is also reduced, because employers (who know that their salaried personnel have benefited from an income boost thanks to the elimination of employees' social contributions) will not increase nominal pay as rapidly as they would otherwise have done during salary negotiations.

<sup>4</sup> Currently, an estimated 470,000 people under the age of 67 collect old-age pensions. Given that many of them are already working in either the formal or informal sector, we assume that half of them return to the labour market as a result of change in the retirement age.

measures mainly reduce labour—as opposed to capital—costs, causing a substitution of labour for capital. Investment continues to suffer from the poor financing situation: low deposits and continued tight credit as a result of low saving domestically and the public debt squeeze-out effect, as a result of the negative impact of the package on the public deficit and debt.

The net impact of this pension package is slightly higher real GDP (1.9 percent above the baseline by 2022, 1.6 percent in the long term) and a 2.6 percent increase in employment by 2028, but a fiscal balance of –5.0 percent of GDP in 2028 (versus –1.8 percent in the baseline forecast), largely due to the deflationary impact of the package on nominal GDP.

These simulations show that fiscal policies alone will not put Greece back on a sustainable long-term growth path, because of the weak condition of the domestic economy and its unfavourable production and export mix. Sustainable longer-term growth requires policies that stimulate FDI.

Taken alone, none of these measures accelerates real GDP while reducing public debt. Therefore, an alternative scenario was examined that focuses on attracting targeted FDI. Combining this focus on attracting FDI with pension reform improves Greece's attractiveness to foreign investors by reducing operating costs and provides a significant and sustained economic stimulus.

### ***Policies to Attract Foreign Direct Investment***

Policies designed to attract FDI would relax the financing constraints and kick-start new industries that have more promising export potential than the goods and services Greece exports today. Such policies would be designed to attract FDI in industries with good export potential. The FDI attraction policies should be complemented by fiscal policy changes that would also help attract FDI, such as pension reform.

Initiatives designed to attract FDI include structural reforms such as the reforms presented in the 2017 Doing Business report for Greece (World Bank 2017). These reforms include (a) measures to open up and deregulate the economy, reform the labour market, reform public administration, improve the administration and efficiency of the justice system, create a land registry, and privatize public enterprises; (b) fiscal policy changes, such as temporary tax breaks for investments and reform of the pension fund system; and (c) policies for sectors deemed strategic.

Studies by the Organisation for Economic Co-operation and Development (OECD), the International Monetary Fund (IMF), the European Commission, and others establish that various conditions must be in place if a country is to attract FDI. They include:

- a predictable, efficient and non-discriminatory regulatory environment

- the absence of excessive administrative impediments to business
- an adequate framework for providing a healthy competitive environment in the domestic business sector
- measures that safeguard public sector transparency, including an impartial and administratively efficient system of courts and law enforcement
- rules and their implementation that rest on the principle of non-discrimination between foreign and domestic enterprises that are in accordance with international law.

In the World Bank's *Doing Business 2018* report, Greece ranked 67st out of 190 countries—nine places lower than in 2016. The *Global Competitiveness Report* for 2017-2018, published by the World Economic Forum, also reveals Greece's weak competitive position. These reports identify barriers to doing business that should be removed to make Greece a more attractive destination for foreign investors.

There is also a need for further labour market reform. Despite measures introduced in recent years, Greek's labour market remains rigid, as highlighted by the country's poor performance in the *Global Competitiveness Report*, where it ranked 110th on labour market efficiency. That report highlights the lack of flexibility of wage determination, the effect of taxation on incentives to work, and the country's limited capacity to attract and retain talent as the most pressing issues affecting the labour market.

Investment is not likely to be attracted without a growing, more open, and deregulated economy; adequate infrastructure; and political stability. Rigidities in product markets discourage potential investors and limit productivity improvements.

### ***Supportive Fiscal Policies***

Greece has lost momentum in the implementation of reforms, and taxes have risen sharply since mid-2015. Both *Doing Business* and the *Global Competitiveness Report* suggest that Greece's tax system is viewed as a major barrier to competitiveness and growth. Reducing social contributions and reforming pensions could complement targeted measures aimed at boosting fixed investment, in particular FDI. Temporary tax breaks for new investments could play a part in stimulating such investment.

The pension package appears to be good complement to an FDI policy, because it reduces labour costs. It is likely to be more effective than the other fiscal measures analysed in the study for several reasons. The VAT and personal income tax cuts would mainly stimulate domestic demand, whereas Greece needs to focus on developing export-oriented industries. Cutting the corporate tax rate cut would be less effective than providing a tax holiday on new investment, including FDI. The pension change lowers production costs and improves Greece's relative competitiveness. By eliminating employee social contributions, it also

stimulates domestic demand. The package also has almost no effect on the government deficit, unlike the other fiscal policies, which increase it.

### ***Industries to Target***

Five criteria could be used to identify the industries to target to attract FDI:

- the extent of backward linkages to other Greek industries (or the magnitude of spill over effects)
- the size and maturity of existing industries in Greece today, with preference given to smaller ones
- the industry's export intensity
- the industry's capital intensity
- the need to expand an industry's capacity in Western Europe to serve growing world demand for its goods or services.

The three industries that ranked most favourably on all five criteria are aircraft and spacecraft manufacturing, shipbuilding, and machinery and manufacturing. Attracting FDI to these industries would increase Greek exports, because all three industries are ones in which Europe has a strong position in global markets. It would trigger increases in output and employment in domestic supplier industries.

Cuts in social contributions would augment the effect of this reform. The increase in output and employment would produce additional income, which would stimulate investment in other industries, boost household consumption, and generate additional tax revenues.

### ***Effects of the Proposed Reform on Macroeconomic Indicators***

A €2 billion rise in FDI by 2020 (inward FDI totalled EUR3.6 billion in 2017) would raise fixed investment nearly 8 percent above the baseline forecast in 2020 and support an additional 6 percent increase in investment in other industries thanks to improved financing conditions. By 2025 the combined direct and indirect efforts would result in increases over baseline of 7.6 percent for real GDP, and close to 9 percent by 2028. In that year, real private consumption would be 2.5 percent higher than in the baseline, real exports of goods and services would be 27 percent higher, and real fixed investment nearly 16 percent higher. With faster real GDP growth and lower labour costs, the unemployment rate falls to 11.7 percent by end 2028. Employment is initially supported by the reduction in labour costs, which increases the competitiveness of labour-intensive industries. It continues to increase as exports accelerate as a result of the transformation of the product mix. Both labour and total factor productivity rise in this scenario, increasing long-term potential growth. The impact on inflation is similar to that observed in the pension package scenario, however, because the faster productivity growth offsets the inflationary effects of a tighter labour market. Debt per

person employed falls measurably, reaching €76,500 in 2022, a reduction of €5,700 (per person employed) from the baseline level.

### **Conclusion**

On its own, an unconditional and unilateral reduction in the size of Greece's debt will not lead the economy to a sustainable, healthy, long-run growth path, and domestic fiscal stimulus policies will not produce a strong and sustained Greek recovery. Comprehensive structural policy reforms to attract targeted FDI combined with a supportive fiscal policy change are needed.

Achieving the required increase in FDI is one of the great challenges facing Greece. Consistent government policies that accelerate structural reforms, support new investment, and reduce the cost of labour would all work in the desired direction. If a successful FDI attraction policy is implemented, the positive effects on the Greek economy could be even larger than depicted in this report, thanks to increases in consumer and business confidence, and the positive effects of deep structural reforms on productivity and potential growth.

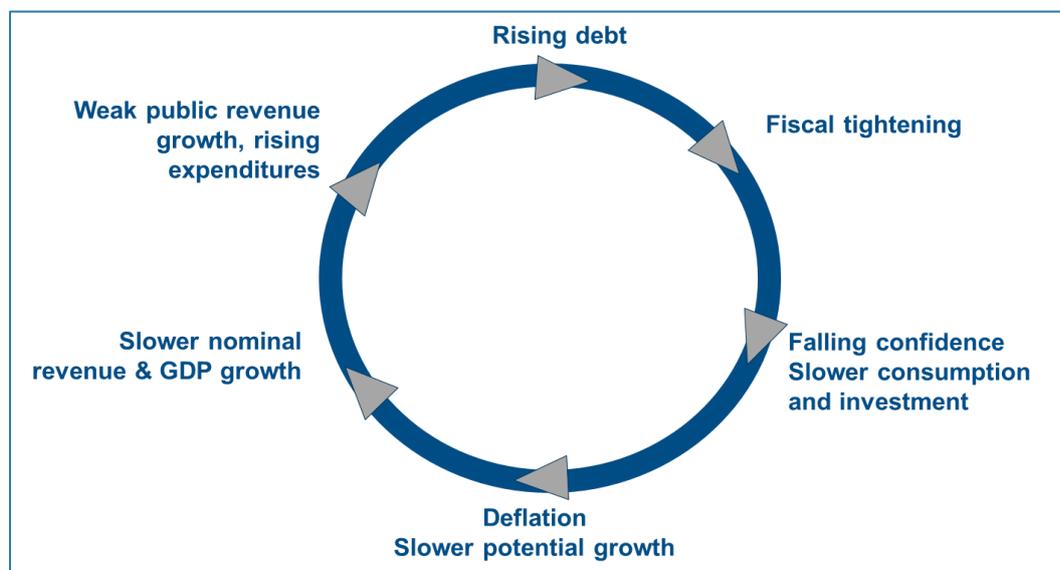
## 1 Introduction

Greece is still in the worst economic crisis in its modern history. Despite the economy returning to growth in 2017, real GDP declined by 25.9 percent between the second quarter of 2007 and the fourth quarter of last year. Declining activity led to a substantial deterioration in labour market conditions, with the unemployment rate still standing above 20% by the end of 2017. The crisis had dire consequences for the country's public finances and highlighted its poor competitive position in a situation where currency devaluation is not possible.

Rapidly rising public spending during the boom years that followed Greece's accession to the euro zone in 2001 resulted in a marked worsening of public finances before the crisis. The extent of the deterioration was revealed only when revisions to the data in 2009 and 2010 showed that both the fiscal deficit and the public debt were much higher than previously estimated. In October 2009, the estimate for the fiscal deficit was revised from 3.7 percent to 7.7 percent of GDP, and the general government gross debt was estimated at 99.2 percent of GDP.

Public debt levels have increased despite three bailout programs since 2010, and a major debt restructuring in 2012. The bailouts provided Greece with financial assistance in return for making certain structural reforms and meeting fiscal targets. Most of the conditionality focused on tax hikes. Reforms reduced the fiscal deficit, which shifted from a peak of 15.4 percent of GDP in 2013 to a surplus of 0.8 percent of GDP in 2017. The primary (i.e., excluding interest payments) budget balance has posted larger than projected surpluses in 2016 and 2017, well above the targets agreed with the country's official creditors.

However, even these large primary surpluses have not been enough to drive a meaningful reduction of the public debt ratio, raising questions about debt sustainability. The marked fiscal tightening measures triggered a vicious circle of slow growth and deflation that caused the government to raise taxes and cut spending further, which in turn led to falling confidence and investment, lower potential growth, and more deflation (Figure 1). The decline in the level of economic activity (GDP) was a major factor in causing the debt-to-GDP ratio to rise again in 2017, reaching 178.6 percent, by far the highest debt-to-GDP ratio in the euro zone.

**Figure 1 Greece's macroeconomic vicious circle**

The GDP deflator was negative between 2012 and 2016 and rose only modestly in 2017. Long-term annual economic growth is now projected at a modest 1.2 percent.

The recession, and the resulting sharp increase in unemployment, have caused a severe deterioration in the quality of bank assets in Greece. The share of nonperforming exposures (nonperforming loans and loans likely to turn bad) in banks' total loans rose from 5.5 percent in 2008 to 46.6 percent by the end of the third quarter of 2017. Over that period, concerns about the sovereign position led to a significant contraction in bank deposits. Deposits plummeted by EUR43.9 billion (26.7%) between September 2014 and July 2015. Although the capital controls implemented in June 2015 helped to stop the outflow, in February 2018 deposits were still EUR39.8 billion below their peak. The sharp decline in deposits has left banks reliant on liquidity from the European Central Bank (ECB) for their operations. Their difficult liquidity situation, exacerbated by the deteriorating quality of their assets, left banks unable to support economic recovery.

During the second half of 2015 and the first quarter of 2016, heightened uncertainty and capital controls caused a further deterioration of economic activity. Despite conditions improving in 2017, when the economy grew by 1.4 percent, real GDP remains almost 25 percent below the pre-crisis peak. Unemployment has been on a downward trajectory since the second quarter of 2014, when it peaked at 27.8 percent, but the jobless rate was still above 20 percent at the end of 2017.

Given the structural barriers to growth still in place, a shrinking population, tight credit and fiscal conditions, and a difficult external environment, there is little hope for a sustained increase in activity that would bring Greece's growth and public debt back to a sustainable

path. Tight credit conditions and the government's fiscal policy stance have crushed domestic incomes, choking both private consumption and private investment, as well as private sector employment. High out-migration, weak global growth, and mounting uncertainty in Europe due to fears of protectionism and delays in the Brexit negotiations make it unlikely that a spontaneous boost in exports will lead the Greek economy out of recession.

## 2 Objectives and Structure of This Study

This study projects the outlook for Greece under current economic policies and a variety of alternatives. It then examines whether a radical policy shift could reverse the trends of the past decade and put Greece back on a path to sustainable growth.

The study is organized as follows. Section 3 describes the model used. Section 4 analyses the outlook for Greece under a business as usual scenario. Section 5 looks at the impact of a radical shift in the orientation of economic policy, quantifying the implications of various measures, both taken in isolation and combined. Section 6 summarizes the study's conclusions. The report also includes six appendixes:

- Appendix A: Main Economic Indicators for Greece
- Appendix B: Public Finances
- Appendix C: Industry Criteria
- Appendix D: Description of the Model
- Appendix E: Model Validation
- Appendix F: Macroeconomic and Fiscal Effects of Alternative Scenarios

More technical appendices are presented in the second and third volumes of this report (they will also be available on the study's website). These appendices include the following:

- Appendix G: Input-Output Table for Greece
- Appendix H: Detailed Equations Specification
- Appendix I: Modelled Variables
- Appendix J: History and Forecast for All Economic Indicators
- Appendix K: History and Forecast for the Industry-Level detail (GVA and Employment File).
- Appendix L: Public Finances of Greece
- Appendix M: Input-Output Tables for Greece in the alternative scenario

## 3 The Model

### The Core Macroeconomic Model

The core macro model used in this study is the Greek model in IHS Markit's Global Link Model (GLM).<sup>5</sup> This time series-based, quarterly, econometric model is designed to forecast short-, medium-, and long-term developments in the world economy and to quantify alternative scenarios. The model projects real GDP and its components, prices and wages, employment and labour market developments, trade, current account and capital account balances, and public finances. The core model was expanded to include public finance, income distribution, and industry (with input-output framework) modules.

The core macroeconomic model for Greece includes 688 variables, of which 331 are endogenously determined (see Appendix I). There are 357 exogenous variables (trade weights, base commodity price indexes, etc). Some of the exogenous variables in the Greek model—including the euro-dollar exchange, the ECB intervention rate, the money market interest rate, and other variables capturing developments in the rest of the world—come from other parts of the GLM. With the addition of the public finance module (described below), the Greek model includes 874 variables.

The GLM is built on a neoclassical framework of output and price determination, with short- and long-run dynamics. Long-run economic growth depends on the expansion rate of potential output which in turn depends on labour force and the real capital stock, trends in energy production and distribution capacity, and technical progress.

### The Public Finance Module

The core model was expanded by adding a detailed public finance block (Appendix B) which makes it possible to forecast trends in central and general governments' revenues, expenditures, and debt and to examine the implications of changes in fiscal policy on the economy as a whole as well as on the fiscal balance and debt.

### The Income Distribution Module

The income distribution module was added in order to estimate the impact on the aggregate propensity to consume of changes in fiscal policy that alter the income distribution. A large proportion of households in Greece do not pay income tax because their income falls below the minimum threshold. These households would not benefit from a reduction in the personal

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<sup>5</sup> The GLM covers 68 countries in detail at the macro level and provides a number of regional aggregates, as well as the world total. It captures all interrelationships between and within countries, making it possible to assess how changes in the macroeconomy, the financial sector, commodity markets, and the political sphere affect the economies of individual countries and how shocks propagate at world level.

income tax rate. They would, however, be affected by a change in the tax-free income ceiling. Similarly, changes in the amount paid or caps on pensions would not affect all households equally. In 2015, the tax-exempt income threshold stood at €9,545. In 2016, Greece reduced this tax-exempt income threshold to €8,182. The IMF has recommended a further reduction to €5,000 a year.

The income distribution module takes into account the different propensities to consume within each income bracket and quantifies the change in private consumption expected as a result of a change in the tax structure or the level of income. This module runs in parallel to the Greek macro model. It is not an integral part of it, because it relies on microsimulation data and on a set of assumptions relating to income distribution and propensities to consume published by Euromod.<sup>6</sup>

### **The Industry Model**

The industry model is based on the Leontief input-output framework. It forecasts production, employment, productivity, exports, imports and compensation in 57 manufacturing and service industries. It translates macroeconomic forecasts for final demand components (private consumption, government consumption, investment, and exports and imports) into demand by industry, then estimates the effect of these changes on demand for intermediate inputs. The average hourly wage rate used in each industry is equal to the total wage bill (including social contributions) of each industry divided by the total numbers of hours worked.

The Leontief modelling framework that underlies the industry model depicts the relationships among the different industries within an economy by tracking how the output of one industry may become the input of another. It shows the dependence of every industry on its customers—whether they are other industries or final users, such as households, government, companies, or the rest of the world—and on its suppliers (input flows).

Input-output matrices are country specific and represent the interrelationships between industrial and service sectors at a given point in time. The technical coefficients (or share of inputs needed to produce a given output) depend on both the product mix of each industry and the technology used to produce the good or service in a given year. Changes in technical coefficients can be traced by following different input-output tables over time.

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<sup>6</sup> EUROMOD statistics on distribution and decomposition of disposable income are available at <http://www.euromod.ac.uk/using-euromod/statistics>.

The collapse of the economy in 2007 caused production in Greece to plummet. The composition of inputs used to produce a given unit of output did not change dramatically, however (paper products remain paper products, however low production falls).

The baseline scenario assumes no radical transformation of the economy. Although rates of growth vary across industries, there is no significant change in the weight of each industry in the total economy or in each industry's product mix. The technical coefficients remain thus unchanged.

The alternative scenarios assume a different policy mix, focused on a private sector-led recovery achieved through targeted FDI. These scenarios would have a profound effect on Greece's industrial fabric, with the opening of new plants, the restructuring of others, and changes in the nature and type of goods and services produced. In these scenarios, the technical coefficients of the input-output matrix are adjusted to reflect the changing structure of production. The information needed for these adjustments comes from IHS Markit's world industry service's input-output tables for 75 countries, which include 105 industries per country.<sup>7</sup>

### **Model Validation**

The model was validated through a series of statistical tests and scenario simulation exercises. Fiscal policy simulations were also conducted to compare the GDP multipliers resulting from various fiscal policy changes with those obtained by the ECB in a similar exercise (Kilponen et al. 2015).

The fiscal multipliers that were tested consisted of a €1 billion cut in current government expenditure, transfers, indirect tax revenue (combination of VAT and excise), household income tax receipts, and corporate tax revenue.

The validation exercise revealed that the IHS model tracks history with sufficient accuracy and the multiplier effects are consistent with the ECB results; differences are explained mainly by the different time periods covered and the fact that the ECB focused on fiscal tightening whereas IHS looked at the multiplier effects of cuts in expenditures as well as reductions (as opposed to increases) in taxes. The IHS simulations took into account the worsened credit conditions in Greece in 2016 following the run on deposits in early 2015, for example, and assumed no redistribution of the budget savings resulting from the fiscal

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<sup>7</sup> This information makes it possible to test the more sophisticated proposition that new FDI in manufacturing capacity will choose to implement the highest-productivity technology available.

tightening. The ECB simulations cover an earlier period and assume a redistribution of the gains when the fiscal tightening is permanent.

## 4 Outlook under Current Policies

### Outlook for the World Economy

Real global GDP grew by just 2.7 percent a year between 2012 and 2016, well below the 3.1 percent average before the crisis.<sup>8</sup> Several emerging economies (including Russia and Brazil) went through deep recessions, and others (including China) experienced slowing growth. This had repercussions on other countries and on commodity prices.

Weak global demand coincided with the rapid development of energy production in the United States, making the United States the new swing producer in the energy market. The low oil prices that its increased production has fostered did not provide the expected boost to world activity, however, because the increased share of renewables in the developed world—combined with rising energy efficiency, still tight fiscal policies, and the difficult banking sector situation of many countries—all of which limited the benefits of low oil prices in the advanced economies.

World's real GDP growth accelerated to 3.3 percent in 2017 – the highest rate in seven years – and is projected to improve further to 3.4 percent in 2018 and 2019. This improvement will be led by faster activity in the United States and the end of recessions in Brazil and Russia, which will counterbalance weaker growth in China.

In this global context, growth in the Eurozone is expected to remain solid, despite a modest deceleration in 2018 vis-à-vis 2017. Very accommodative monetary conditions – despite an expected gradual normalisation of monetary policy starting in 2019 – will continue to support domestic demand, which will remain an important engine of growth. Alongside the easy monetary policy stance, the fiscal stance among Eurozone countries has also become more supportive of growth, although the space for more expansionary fiscal policy remains limited by the high public debt levels in many countries in the area. In the UK, high inflation and continued uncertainty about the path to Brexit mean that the country's growth is forecast to slip from 1.8% last year to 1.4% this year, moderating the overall expected growth at EU-28 level.

Risks to the global and Eurozone outlook are skewed to the downside. These downside risks include the possibility of a sharp tightening of global financial conditions, growing trade tensions that could lead to protectionist policies in North America, Europe and Asia, and geopolitical strains, while the outlook for most commodity prices, including oil prices,

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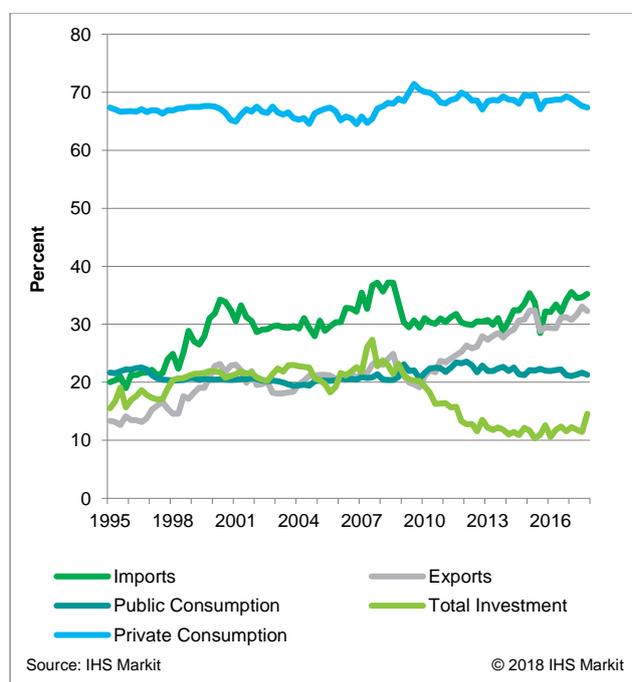
<sup>8</sup> The global GDP growth figures reported here measure the average growth of real GDP in all the world economies, in constant dollars and constant prices. The higher figures quoted by the IMF or World Bank over the same period refer to world GDP growth adjusted for purchasing power parity (PPP).

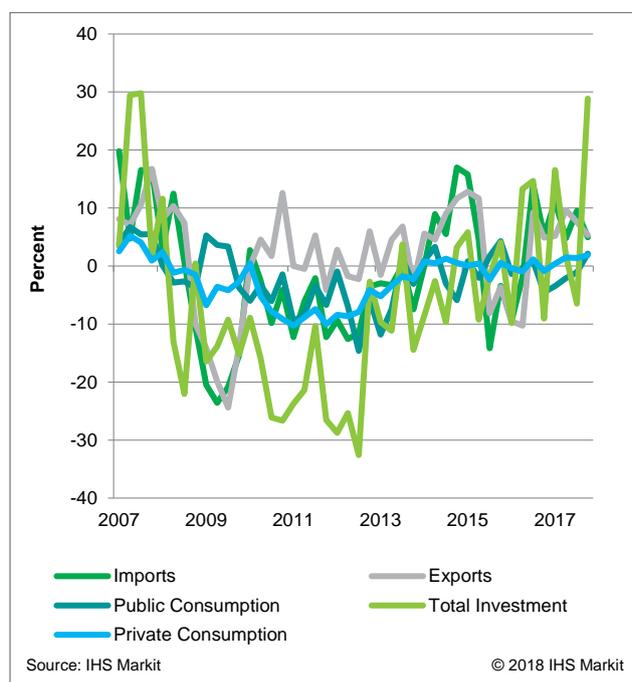
remains highly uncertain. If these risks were to materialize, they could trigger potentially significant fiscal and financing pressures for Greece, adversely affecting prospects for continued fiscal consolidation and economic recovery.

### Short-Term Outlook for Greece

The Greek economy contracted by more than a quarter between the second quarter of 2007 and the last three months of 2017. Domestic demand, and particularly investment spending, were particularly hit by the crisis. Whereas the share of household consumption in GDP remained roughly stable in recent years, the share of investment in GDP fell by almost two-thirds, from a peak of 27.3 percent before the crisis to 12.5 percent in 2017 (Figure 2). The growth of fixed investment was highly volatile between 2008 and 2017, and plummeted between the second quarter of 2007 and 2013 (Figure 3).

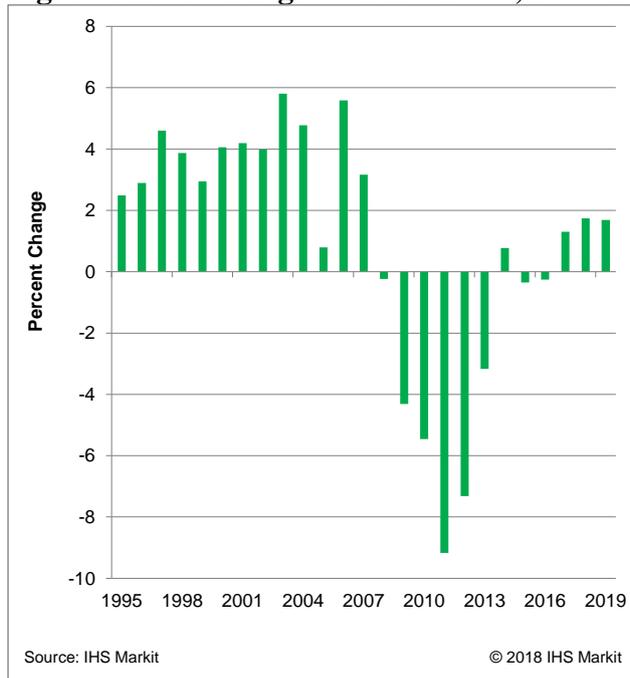
**Figure 2 Components of real GDP in Greece as share of GDP, 1995–2017**



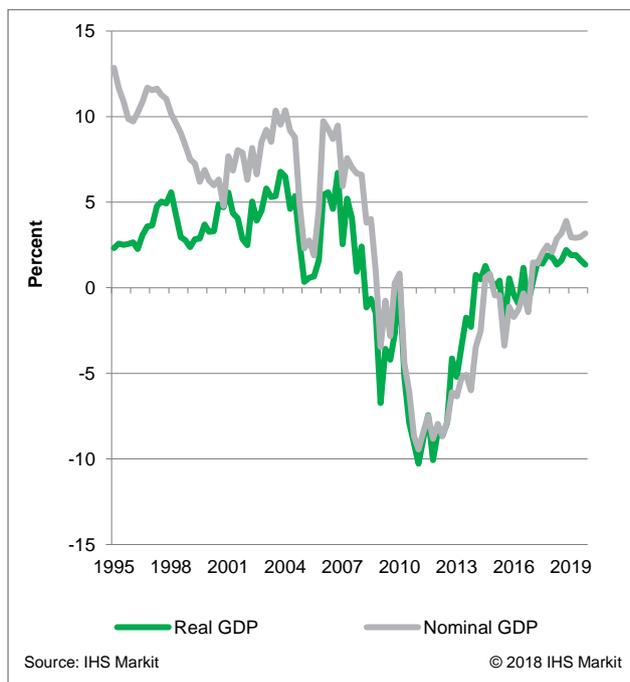
**Figure 3 Year-on-year changes in components of real GDP in Greece, 1995–2017**

Although economic conditions remain difficult, real GDP is forecast to grow under the current policy stance (Figure 4 and Figure 5). After the almost uninterrupted economic contraction since late 2007 and modest growth recorded in 2017, Greece's real GDP is projected to increase by 1.7% in both 2018 and 2019. Following peaking in 2020, we expect GDP growth to average 1.4% between 2020 and 2030. Potential GDP has indeed fallen with the outflow of skilled labour and the depreciation of the capital stock over the last decade. Even this modest recovery reflects a stabilization of economic conditions in areas that were severely hurt in 2008–16, as opposed to a true recovery. It takes until 2040—more than two decades—before real GDP reaches its 2007 level. Slow growth means that Greek employment permanently remains below its 2007 peak, and the debt-to-GDP ratio remains high, at about 137.4 percent in 2030—well above the 118 percent target sought by Greece's creditors.

**Figure 4 Real GDP growth in Greece, 1995–2019**



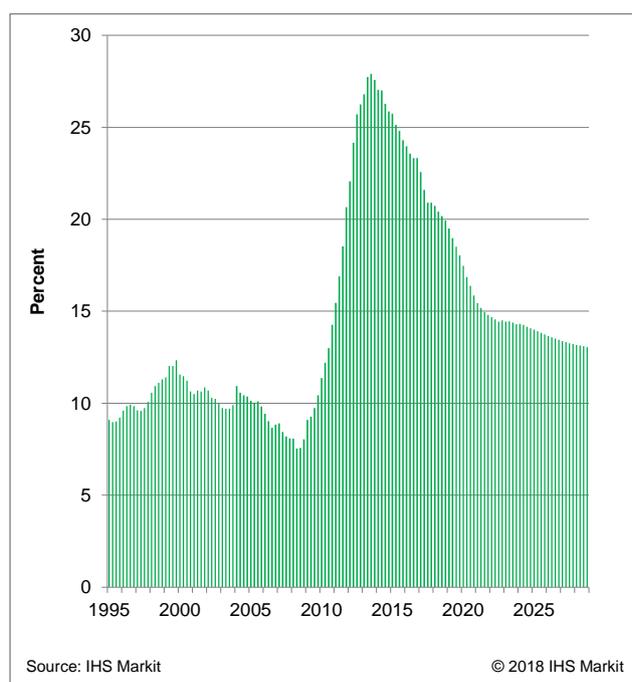
**Figure 5 Year-on year changes in nominal and real GDP growth in Greece, 1995–2019**



Under our baseline scenario, domestic demand is expected to make an increasingly positive albeit still modest contribution to growth. In particular, we project investment spending – which collapsed during the crisis – to gradually recover as firms replace old machinery and adapt to a more upbeat demand environment. The construction sector was particularly hit

during the last decade and we expect the normalisation in economic conditions to drive a recovery in the sector, although this is also likely to be very gradual. Private consumption is also expected to make a positive contribution to the short-term recovery, although many factors will continue to limit households' spending levels. But the labour market has showed some signs of improvement: employment has been growing, on an annual basis, since the second quarter of 2014. Employment growth picked up momentum in 2017 and we see the trend continuing in 2018 and 2019. The unemployment rate has declined from a peak of 27.8 percent in late 2013 and early 2014. However, it remained very elevated at 21.4 percent during the last quarter of 2017. We do not expect the unemployment rate to return to its pre-crisis level for the foreseeable future (Figure 6).

**Figure 6 Projected unemployment rate in Greece in the baseline scenario, 1995–2028**

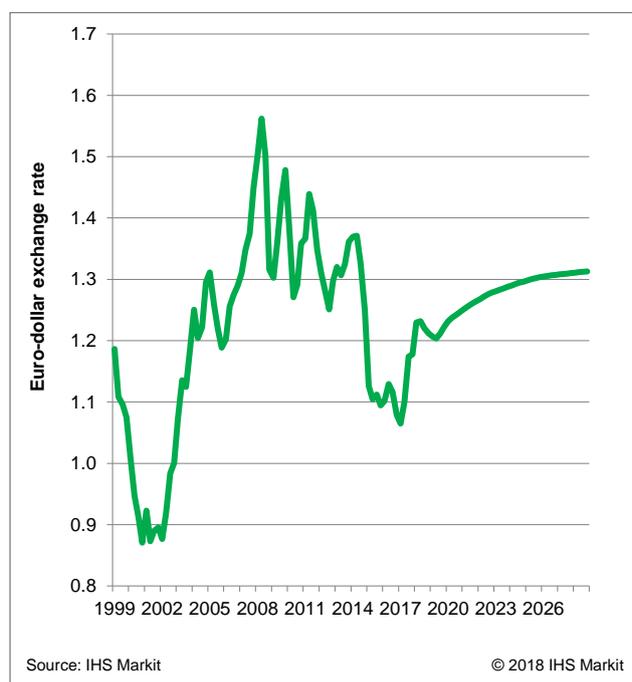


Low inflation should also help to protect households' purchasing power and sustain consumer spending. The deceleration in the inflation rate since the start of 2018 (inflation, when measured by the national definition, stood in negative territory in two out of the first three months of the year) is likely to have been driven by weaker growth in international oil prices, particularly when converted into euro. However, the figures also show that underlying inflationary pressures are extremely weak in Greece despite the modest improvement in economic conditions since the start of 2017. Inflation will not increase significantly over the short term, although we expect headline inflation to trend upwards gradually during the second half of the year.

Tight fiscal conditions will nevertheless continue weighing down on domestic demand during the forecast period. Under the current agreement with its official creditors, Greece is expected to run primary (i.e., excluding interest payments) fiscal surpluses of 3.5% of GDP in 2018 and 2019. Greece has proved that it can achieve such large primary surpluses; in fact, the primary balance showed a surplus of 3.9% and 4.0% of GDP in 2016 and 2017, respectively. However, the fiscal adjustment has been reliant on one-off measures: according to the IMF, only around one-third of the primary surplus in 2016 is explained by structural factors. Moreover, fiscal adjustment has been focused on higher taxes, but the economy's elevated tax burden is weighing down on activity. This raises a question-mark with regards to the sustainability of the fiscal adjustment achieved so far: the large primary surpluses have come at the back of weaker than expected growth. Although activity increased in 2017, output growth was well below an official estimate of 2.7% included on the budget.

Another factor weighing down on domestic demand going forward is still difficult credit conditions. Greek banks have been badly hit by the crisis. Although the capital controls implemented in June 2015 helped to stop the deposit outflows, private-sector deposits remain almost one-quarter below their peak in September 2014. The non-performing exposures (NPE) ratio of 44.6% of total lending at the end of the third quarter of 2017 was the second highest in the European Union after Cyprus. More positively, Greek banks have strengthened their capital levels by almost EUR15 billion (8.5 percent of GDP) since 2015, and Common Equity Tier 1 (CET1) ratios sit well above the regulatory minimums. However, lending to businesses and households will remain limited by banks' poor asset quality, despite some expected reduction in NPE and a reduction in banks' perceived risk as economic conditions gradually improve.

Net foreign trade is also expected to make a positive contribution to the economy over the short-term. Exports recovered sharply in 2017, when they grew by 6.9 percent. The share of real exports of goods and services as a proportion of GDP rose from an average of 21.1 percent between 2000 and 2010 to 31.9% in 2017. On the goods side, energy exports were particularly dynamic in 2017, while higher receipts from tourism and transportation helped to boost exports of services. We project solid world growth to continue being supportive of Greek exports over the coming years, although import demand from Greece's main trade partners will moderate compared to 2017. The appreciation of the euro since the second half of 2017 is also likely to limit the growth of exports outside the Eurozone (countries such as Turkey, Bulgaria and Lebanon are important trade partners) (Figure 7). Rising imports resulting from improving domestic demand levels will also limit the contribution of net foreign trade to the economy, but we expect import growth to lag the increase in exports.

**Figure 7 Actual and projected euro–dollar exchange rate, 1999–2028**

The baseline forecast assumes that the political instability experienced during most of 2015 will not be repeated in 2019 or beyond. The debt relief on official loans granted by the Eurozone in June 2018 should provide a boost to the government's stability, making an early parliamentary election before 2019 unlikely. Measures include:

- Profits made by the ECB and Eurozone national central banks from their holdings of Greek bonds as part of their bond buying programmes, such as the Security Markets Programme (SMP), will be returned to Greece. The funds – worth EUR4.8 billion – will be transferred in biannual tranches from December 2018 to June 2022.
- Abandoning the increase in interest rate margins on EUR11 billion of loans which were used for debt buybacks under the second bailout programme. The increase in interest rates was due to take place this year.

These two debt relief components will be subject to Greece complying with its policy commitments and undergoing post-programme enhanced surveillance, in the form of quarterly reviews. Greece has committed to run a primary (i.e. excluding interest payments) budget surplus of 3.5% of GDP until 2022 and 2.2%, on average, between 2023 and 2060. Greece's gross financing needs (GFN) are expected to remain below 15% of GDP over the medium term and 20% of GDP thereafter.

Additionally, the Eurogroup agreed to extend the grace period for loans given from the European Financial Stability Facility (EFSF) – totalling EUR96.6 billion – by 10 years. As a

result, Greece will not start repaying the principal on these loans until 2032. The weighted average maturity of the EFSF loans also will be extended by 10 years. The Eurogroup will consider further debt relief measures by the end of the grace period if needed to keep Greece's GFN within the agreed parameters.

The last tranche of the current bailout programme will amount to EUR15 billion. Part of these funds (EUR5.5 billion) will be deposited in the segregated account to be used for debt service purposes. The remaining funds will be used to build a EUR24.1 billion cash buffer. This would be enough to cover Greece's financial needs for around 22 months once the current programme expires in August 2018. As a reference, Portugal exited its bailout in 2014 with a cash buffer large enough to cover redemptions for one year.

The IMF welcomed the agreement and mentioned that that it will provide technical assistance in the post-programme monitoring, although it will not disburse the EUR1.6 billion stand-by loan agreed in July 2017.

The June 2018 debt relief agreement supports Greece's desire to exit its current bailout without a new programme in place. But a clean exit would not be without risks. Although Greece would still have to comply with post-programme monitoring, an exit without a follow-up programme would be likely to increase market concerns about Greece's commitment to meeting reforms and fiscal targets outside the constraints of a formal programme. Indeed, multiple previous measures, such as tax, pension and labour market reforms, have been highly contentious and publicly unpopular, serving as the main contributing factor to the considerable decline in SYRIZA's popularity since assuming power in 2015. As a result, it appears likely that the Greek government would be inclined to backtrack on or at least considerably slow the reformist agenda once freed from a formal rescue programme, particularly ahead of elections.

Moreover, positive market environment cannot be assumed. Markets are sensitive to domestic and international developments. Higher inflation expectations for the United States led to rising volatility in international markets earlier this year, and further volatility later in the year cannot be discounted as central banks continue with their gradual tightening of monetary policy. Additionally, there is widespread concern over potential moves towards protectionism, which could trigger periods of market dislocation. Domestically, progress on reforms in the post-program period is likely to be a key driver for yields. Signs that the economic recovery may be faltering or that political instability is increasing would also be likely to damage bond prices, although this is not part of our baseline.

As such, the probability of a flaring up again is not negligible. In our view, the fiscal commitments included within the agreement are not achievable without a significant pick-up in growth. Greece has managed to run large primary surpluses since 2016, well above the programme targets. However, it is not realistic to assume that such large primary surpluses

will be maintained over an extended period. The economy's growth potential is still limited, despite the reforms implemented in recent years, while political pressures to increase discretionary spending are likely to increase once the country exits its programme. However, such outlays would be conducted on a case-by-case basis and based on several factors, including economic performance. We do not expect arbitrary unilateral actions without discussions with Greece's official lenders.

A clean exit would not be without risks. Although Greece would still have to comply with post-programme monitoring, a clean exit would increase market concerns about Greece's commitment to meeting reforms and fiscal targets outside the constraints of a formal programme. Indeed, multiple previous measures, such as streamlining the public sector and labour market and pension reforms, have been highly contentious and publicly unpopular. As a result, there is a realistic probability that the Greek government would be inclined to backtrack on, or at least considerably slow, the reform agenda once freed from a formal rescue programme, particularly ahead of elections.

In summary, despite our view that the economy is likely to grow over the short term, there are many downside risks which could lead to significantly worse outcomes. On top of the negative risks outlined above (the return of political uncertainty and worsening market conditions), there is a risk that the effect of tighter fiscal policy on growth may be greater than projected, through its dampening effect on both spending and confidence. External demand would also be dampened if there was a full-blown trade war, lowering the contribution of exports to growth. But there is also upside potential. Significant pent-up demand accumulated in recent years may lead to stronger consumption and investment growth once confidence turns around. Moreover, a 'clean' bailout exit may prove to be an important shot in the arm for the economy, assuming markets are reassured that future Greek governments will continue to be committed to reforms and fiscal consolidation.

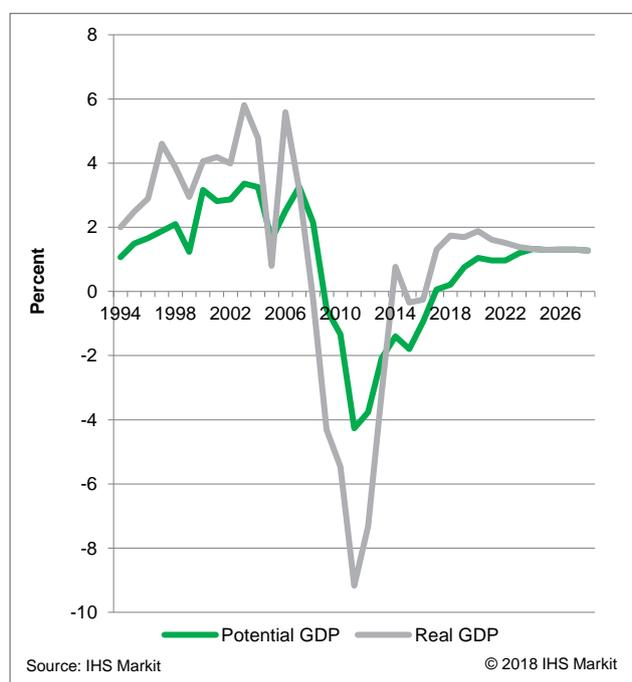
### **Medium- and Long-Term Outlook for Greece**

If the short term outlook for Greece shows a continued, gradual, improvement, albeit with upside and downside risks, the medium- to long-term outlook for Greece remains difficult. The size of the investment gap, unfavourable demographics, low productivity, and an unfavourable industry mix make further progress beyond the short term challenging. Over the longer term, growth depends on total factor productivity (TFP). Population projections suggest that the population of working age will decline, reducing TFP, all other things equal.

The contribution of capital to growth is projected to be modest, as investment spending is unlikely to recover significantly. The output gap remains large, and the financial sector struggles to deal with its structural problems (which include an extremely high level of nonperforming loans). In the absence of structural reforms and major changes in policy orientation, TFP is project to grow by 0.5 percent a year between 2025 and 2040, well below

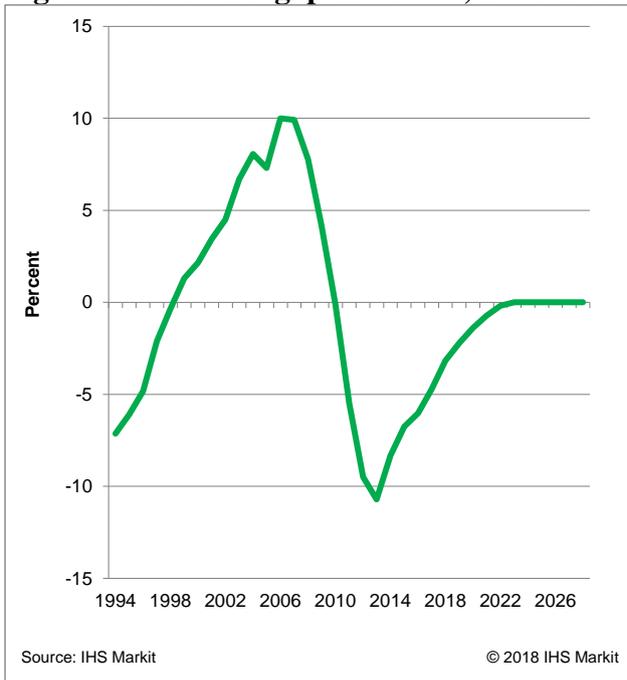
the euro zone average of almost 1 percent a year. Implementation of structural reforms has been patchy in the past; the baseline forecast does not assume significant improvements. All of these factors point to long-term real annual GDP growth in Greece falling to about 1.0 percent. This forecast means that Greece will not achieve its pre-crisis level of real GDP until 2040. The unemployment rate is projected to remain in double digits until 2036, and only reach its pre-crisis level in 2041. The implications for the debt-to-GDP ratio are not favourable.

**Figure 8 Actual and potential real GDP growth in Greece, 1994–2028**

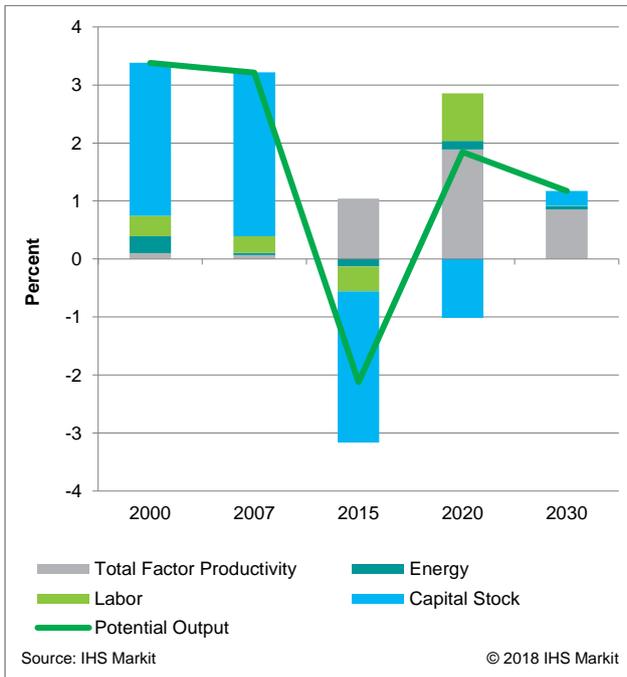


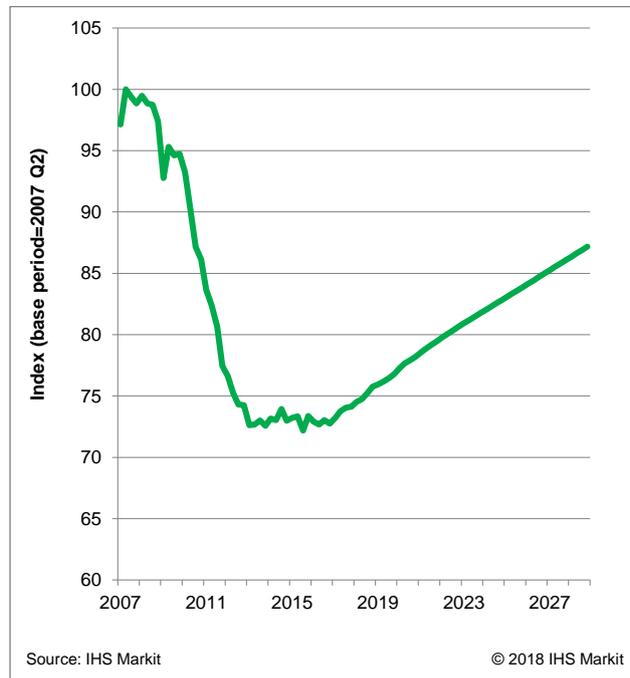
**The real GDP gap—the difference between actual and potential GDP—is projected to close by 2023 (Figure 9). However, the narrowing of the gap reflects the collapse in investment, which reduced potential supply growth from the pre-crisis levels, rather than a significant recovery of demand. The decomposition of potential growth shows a negative contribution of the capital stock in 2015 continuing into 2020; the contribution of labour shifts from slightly negative in 2015 to positive in 2020, as labour market participation rates increase thanks to the stronger economy (Figure 10). The bulk of the acceleration in potential growth is the result of higher total factor productivity growth, itself a result contingent on structural reforms being implemented and stronger private sector-led growth (Figure 11).**

**Figure 9 Real GDP gap in Greece, 1994–2028**



**Figure 10 Projected contribution to potential output growth in Greece, 2000–30**



**Figure 11 Actual and projected index of GDP in Greece, 2007–28**

Over the medium term, a large output gap and high unemployment should offset any inflationary pressures. Although nominal wages are likely to increase as the economic recovery continues, they are likely to do so only gradually, given the significant labour market slack. Given Greece's growth prospects, this slack labour market should keep wage inflation muted for a prolonged period. As a result, core inflation (excluding volatile items such as food and energy) is projected to remain well below the headline rate of inflation over the medium term. Table 1 shows the medium-term baseline forecast for Greece.

**Table 1 Baseline macroeconomic forecast for Greece, 2017–22**

<i>Item</i>	<i>2017(*)</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>2022</i>
<i>Percentage change year on year</i>						
Real GDP	1.3	1.7	1.7	1.9	1.6	1.5
Private Consumption	0.1	0.6	1.2	1.8	1.6	1.2
Govt Consumption	-1.2	-0.4	0.9	1.2	1.4	1.4
Fixed Investment	9.7	7.2	4.9	3.2	2.2	2.6
Exports of goods & services	6.9	7.6	3.5	3.3	3	2.8
Imports of goods & services	7.5	2	3.2	3	2.9	2.6
CPI Inflation	1.1	1.1	1.6	1.9	1.9	2
<i>Level</i>						
Unemployment rate (%)	21.5	20.3	18.8	16.6	15.1	14.5
Government revenue as a share of GDP	49.7	50	50	49.7	49.4	49.1
Government expenditure as share of GDP	50.4	49.5	49.2	49.9	50.1	50.2
Primary surplus as a share of GDP	2.5	3.2	3.3	2.3	1.8	1.4
Budget balance as share of GDP	-0.6	0.5	0.7	-0.2	-0.7	-1
Current account balance as share of GDP	-1	-1	-1.1	-1	-0.9	-0.8

(\*) *Provisional data for 2017*

Source: IHS Markit © 2018.

### **Implications for Public Finances**

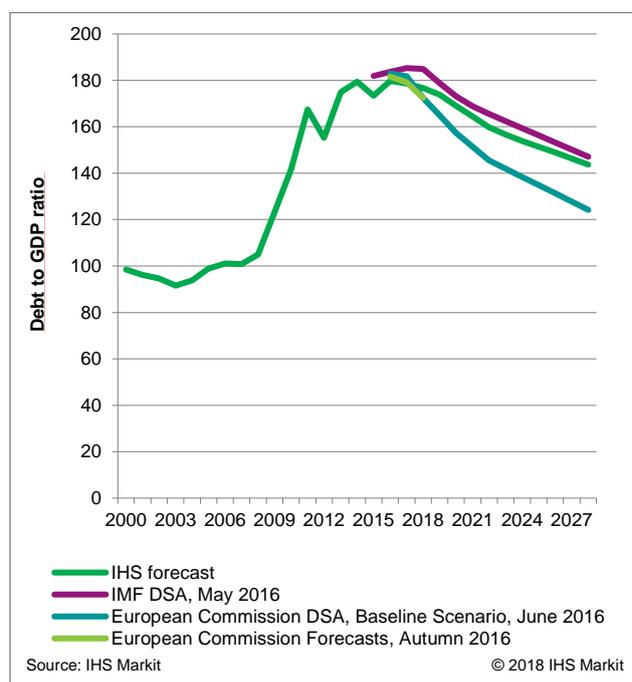
Weak growth and inflation prospects have important implications for public finances. Given the extremely high stock of public debt (178.6 percent of GDP in 2017) and the lack of faster inflation, Greece will need to run large primary surpluses for a prolonged period in order to reduce the debt ratio to 60 percent of GDP, as required by EU fiscal rules. According to the current bailout agreement, the primary surplus is expected to stand at 3.5 percent of GDP up to 2022 and 1.5 percent afterwards. There are historical cases of countries posting large primary surpluses for a prolonged period (Italy's surplus averaged 3.1 percent of GDP between 1992 and 2008), but it will be extremely difficult for Greece to achieve these targets in a politically feasible way given the weak growth outlook.

Our projections of weaker growth are not the only reason why we are less upbeat regarding the outlook for public finances than the official forecast. Most of the fiscal adjustment has been done on the revenue side, particularly through higher taxes. Higher taxes have acted as a

disincentive for investment and consumption and have increased the tendency for tax evasion and out-migration of people and capital. They have had a negative impact on economic growth.

We are also sceptical about the government's ability to reform the public sector to achieve a sustainable reduction in spending. Primary spending fell markedly in recent years, with sectors such as health care severely hit. However, the cuts were not fully backed up with reforms in the way the public sector operates, which suggests that pressure to increase spending will intensify. The aging of the population is also expected to put pressure on public finances, despite reforms to the pension system enacted since 2010.

On a more positive note, Greece's debt structure paints a more benign picture than suggested by the debt-to-GDP ratio (Figure 12 ). The average maturity of Greek public debt other than IMF loans is more than 16 years, and Greece does not have to start repaying official loans until 2022. The bulk of Greece's debt is owned by official creditors; the conditions for repayment were negotiated with them and scheduled over several decades. Moreover, the average interest rate on official loans, which account for most of the debt, is very low. For example, the interest rate on European Stability Mechanisms (ESM) loans is only 10 basis points above that on German bonds, and the rate on the European Financial Stability Facility (EFSF) loans is just 1 basis point above EFSF's borrowing rates. Higher primary budget surpluses than planned in 2016 and 2017 drove the debt to GDP ratio today below the IMF path of May 2016. Nevertheless, in the absence of stronger economic growth or further debt relief, gross financing needs will increase from 2022 onwards and may exceed the current agreed threshold (15 percent of GDP until 2030 and 20 percent thereafter) by the end of the next decade.

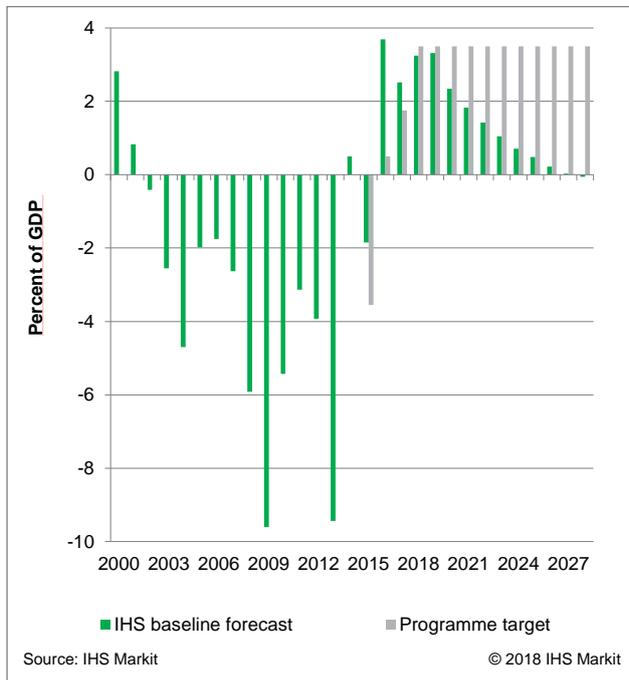
**Figure 12 Actual and projected debt-to-GDP ratio in Greece, 2000–28**

The baseline forecast projects a gradual reduction of the debt-to-GDP ratio over the medium to long term. The ratio, which is lower than the IMF May 2016 Debt Sustainability Analysis (DSA), thanks to the better-than-expected fiscal balance of 2016 and 2017, nevertheless remains above the European Commission's June 2016 baseline scenario (Figure 13).

In summary, the baseline scenario forecasts a mild and very gradual improvement of Greece's economic situation, with continued risks on the public finance side. We expect the primary surplus to stay high in 2019 but then gradually trend downwards, standing well below targets (Figure 13). The debt-to-GDP ratio will decline gradually and will still be well above 140 percent by 2028 (Figure 12). Real GDP that year still be 10 percent below the pre-crisis level.

Even this mild recovery depends heavily on a number of relatively optimistic assumptions—namely, that there will be political and policy stability over the medium term and that official creditors will continue to keep funding the economy as long as bond markets remain closed to it. Political instability because of continuing high unemployment and mounting fiscal pressure could lead to worse outcomes.

**Figure 13 Actual and projected government primary surplus as share of GDP, 2000–28**



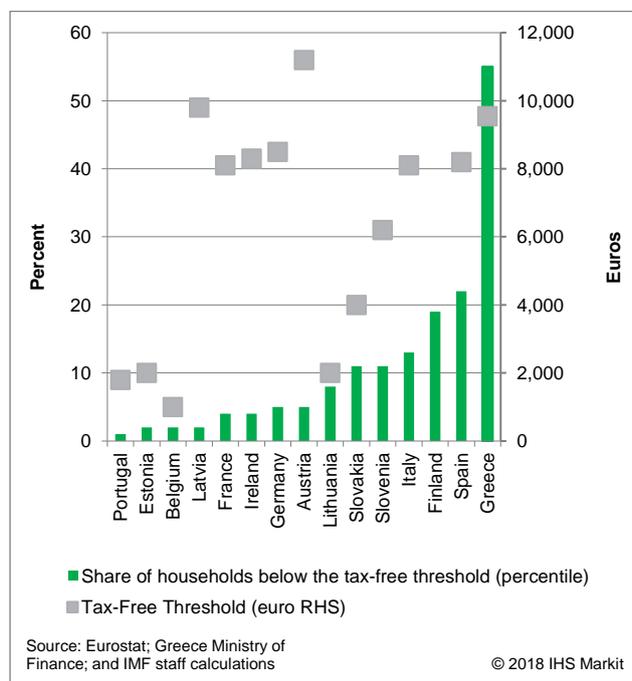
## 5 Effects of Alternative Policies

### Public Sector Revenues and Expenditures in Greece

Could a different policy mix foster a private sector–led recovery in Greece? This section examines the sources and uses of the government’s resources and explores the impact of a fiscally neutral package that reduces the corporate income tax, the personal income tax, and the VAT rate to a single flat rate of 20 percent. To offset the reduction in public sector revenue, expenditures are also cut.

In 2015 total corporate tax revenue amounted to just €2.975 billion, barely 3.9 percent of general government revenue and 1.7 percent of GDP. In 2017 the revenue intake was similar, with total corporate tax revenue amounting to €2,691 billion, 3.4 percent of general government revenue. Even cutting the corporate tax rate in half would, therefore, not have a high positive multiplier effect on the economy.

**Figure 14 Tax-free income threshold in euro area countries, 2014**



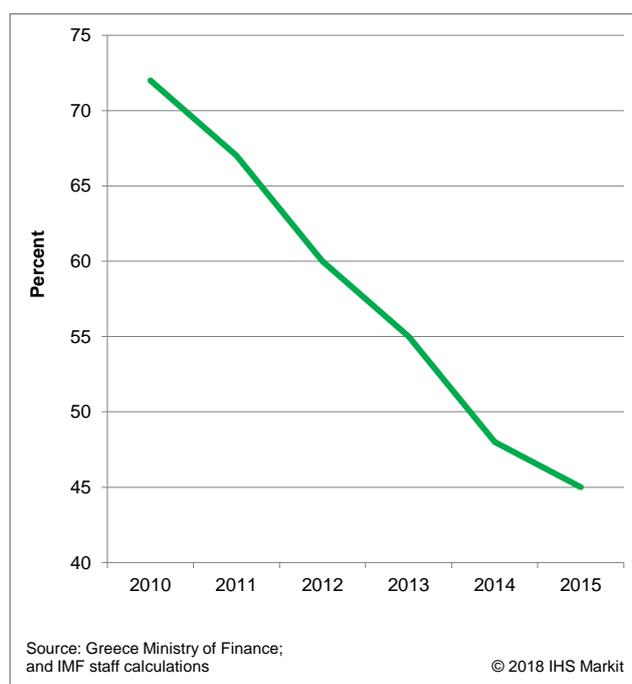
Personal income taxes accounted for 11 percent of general government revenues in 2015, and 10.8 percent in 2017. The effect of a cut in the personal income tax is more complicated than cuts in the VAT and corporate income tax, because the burden of this taxation is unevenly distributed. The bulk of the tax intake comes from about 40 percent of households, because the income level above which one starts to pay taxes (around €10,000 before 2016, then falling but remaining above €8,000 even after reform efforts) is high. In fact, it is higher in Greece than in other European countries (Figure 14). Reducing the income tax rate would

thus apply only to those households who earn more than the threshold, who have (comparatively) low propensities to consume.

In the past four to five years, when the income tax rate was raised, revenue collected did not increase accordingly. In fact, tax collection rate fell continuously, from almost 72 percent in 2010 to a little less than 45 percent by 2015 (IMF 2016) (Figure 15). This decline in the tax collection rate partly reflects the fact that the increase in marginal income taxes stimulated out-migration, particularly by high-income households.

In the scenario, to assess the impact of lowering the income tax rate, we calculated the ex ante impact on the (average) propensity to consume and imposed that impact upon the model.

**Figure 15 Tax collection rate in Greece, 2010–15**



It is impossible to estimate the amount by which tax evasion would slow if the tax rate were reduced, or the number of people who have left Greece who would return if taxes were lowered. The model therefore assumes stable tax compliance and a population that evolves in line with demographic trends.

With respect to indirect taxation, reducing the VAT rate is a good way to stimulate private consumption, because it immediately reduces prices which increases households' purchasing power. However, the cost to the budget is high. In Greece, where VAT revenue amounted to €12.9 billion in 2015 (7 percent of GDP or 17 percent of general government revenue), a

reduction in the VAT rate from 24 percent to 20 percent leads to a 4.8 percent reduction in general government revenue, the equivalent of 1.9 percent of GDP. In 2017, indirect tax revenue reached €14.6 billion or 18.4 percent of general government revenue. To avoid a further deterioration of public finances if the indirect tax rate were to be cut, the measure would have to be accompanied by cuts in government expenditures or increases in other taxes, at least in the short run. Indeed, although the lower VAT rate is likely to trigger increases in consumption and stimulate activity in consumer-oriented industries, thereby leading to a slight positive impact on direct tax revenue, this impact would fall well short of offsetting the loss from lower indirect tax revenue.

The magnitude of the net impact of fiscal changes on the economy depends on which expenditures are reduced to offset the revenue shortfall. If, for example, the expenditure cuts apply to infrastructure investment or military equipment, the negative multiplier effect is likely to be higher than the positive effect of lower indirect taxes on personal consumption. The same would not hold if direct transfers to households were lowered, as shown below.

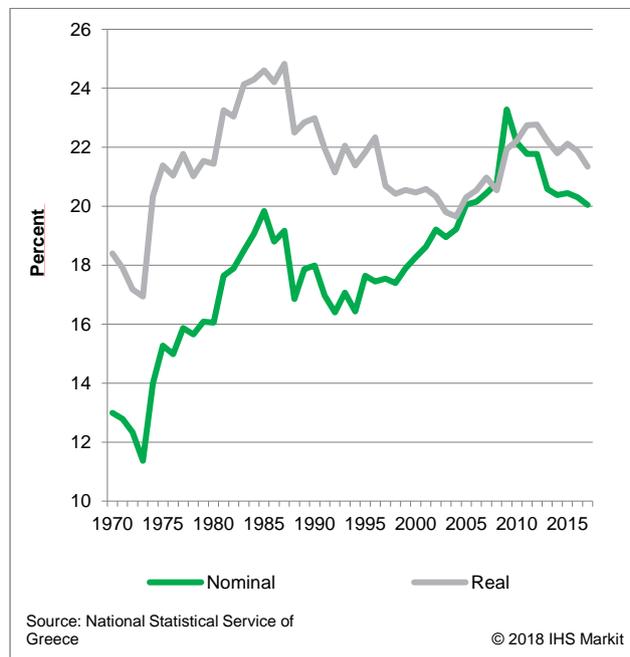
The need to compensate for the reduction in the VAT rate by lowering expenditure implies that the net effect of the tax reduction is likely to be small. Even when the tax reduction is not compensated for by an equivalent reduction in government expenditures, the tax cut does not durably stimulate growth, because of the high import content of final consumption and because VAT rate cuts provide a one-time as opposed to a lasting boost to consumption.<sup>9</sup>

Turning to other components of the public sector accounts, we find that, despite the cuts in government spending that took place since 2010, the share of nominal government consumption in GDP remains much higher than in the 1980s and 1990s, at 20 percent in 2017 (Figure 16).

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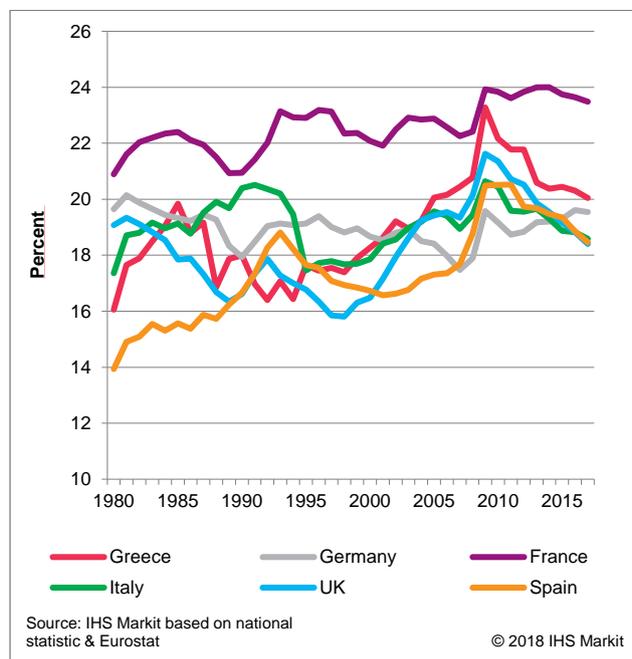
<sup>9</sup> This result is in line with the ECB analysis conducted for 19 countries, including Greece (see Kilponen et al. 2015).

**Figure 16 Actual and projected government expenditure as share of GDP in Greece, 1970–2017**



Nominal government expenditure as a share of GDP in Greece is higher than in most other European countries (Figure 17). Spain, Italy and the UK experienced significant reductions in government current expenditures as a share of GDP after the global financial crisis. In France, this share did not fall much and remains well above average. In Germany, the ratio of government current consumption to GDP increased after 2007, but remains below 20 percent. In Greece, although the share of government consumption in GDP declined significantly after the crisis, it remains above that of many other European countries. The efforts made by Greece are thus not unparalleled.

**Figure 17 Actual and projected government expenditure as share of GDP in selected European countries, based on nominal values, 1980–2017**



The comparison of public sector expenditures as a percentage of GDP in several European countries, based on OECD data for 2016, shows the budget areas for which the expenditure shares in Greece are higher than the EU average. These spending categories are social protection (20.7 percent of GDP, the second highest after France), general public services (9.2 percent), defence (2.1 percent), and environmental protection (1.6 percent) (Table 2). Cuts in spending since 2014 have reduced the total expenditure share in GDP, however. Based on the OECD's harmonized accounting system, total (as opposed to current) government spending in 2014 accounted for 50 percent of GDP in Greece, 57 percent in France, 52 percent in Portugal, and 44 percent in Spain. In 2016, the share had decreased further, by -0.2 points to 49.8% in Greece, but the decline was much more pronounced in the other countries (-0.6 in France, -7.1 in Portugal, -1.8 in Spain). These results suggest that there is room for Greece to cut government spending further.

**Table 2 Public sector expenditure as percent of GDP in selected European countries, 2016**

<i>Sector</i>	<i>France</i>	<i>Greece</i>	<i>Portugal</i>	<i>Slovenia</i>	<i>Ireland</i>	<i>Spain</i>
General public services	6.1	9.2	8.3	6.6	3.7	6.1
Defence	1.8	2.1	0.9	0.9	0.3	1.0
Public order and safety	1.6	2.2	1.8	1.7	1.0	1.9
Economic affairs	5.6	3.8	3.2	4.5	2.3	3.9
Environment protection	0.9	1.6	0.6	0.6	0.3	0.8
Housing and community amenities	1.1	0.2	0.5	0.4	0.5	0.5
Health	8.1	4.9	5.9	6.7	5.2	6.0
Recreation, culture and religion	1.2	0.8	0.8	1.4	0.5	1.1
Education	5.4	4.3	4.9	5.6	3.3	4.0
Social protection	24.4	20.7	18.0	16.7	9.9	16.8
Total function	56.4	49.8	44.9	45.1	27.1	42.2

Source: OECD.

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Two areas where additional savings appear to be possible because of the disproportionately large share of total government expenditures are defence and social protection (primarily pension outlays). With respect to military expenditures, a word of caution is in order, however. The expenditure figure reported in the general government accounts in 2014 for example (€4.758 billion) largely exceeds the figure provided by the sector itself.<sup>10</sup> The discrepancy seems to relate to pension payments, which are reported in the defence spending figure in the general government accounts. Removing pensions, the share of military expenditures in Greece may not be much higher than in other countries.

Policy makers could consider cutting social benefits, as well as transfers and purchases of goods and services. Transfers amounted to €21.1 billion in 2015, compared with €12.8 billion for wages and salaries, €504 million for subsidies, and €38.6 billion for social benefits, including €31.5 billion in pension payments. In 2017 expenditures amounted to €13.1 billion for wages and salaries, €1.8 billion for subsidies, and €39.2 for social benefits, including €30.2 billion in pension payments.

The Greek Ministry of Finance data on General Government Consolidated Accounts provides more detailed and up-to-date information on the structure of government revenue and expenditures. The breakdown differs from the breakdown used by the OECD (which groups

<sup>10</sup> This figure comes from the general government expenditures published by Eurostat.

revenues and expenditures in comparable categories across countries in order to allow for international comparisons) (Table 3), but the overall trends are the same.

**Table 3 Public sector revenues as percent of GDP in selected European countries, 2016**

<i>Revenue category</i>	<i>France</i>	<i>Greece</i>	<i>Portugal</i>	<i>Slovenia</i>	<i>Ireland</i>	<i>Spain</i>
Taxes on products	11.5	13.8	13.3	13.5	7.7	10.0
Other taxes on production	4.6	3.5	1.6	1.3	1.0	1.8
Taxes on income	11.4	9.1	9.9	6.8	10.2	9.5
Taxes on individual or household income including holding gains	8.7	5.9	6.8	5.2	7.5	7.3
Taxes on the income or profits of corporations including holding gains	2.6	2.5	3.1	1.6	2.7	2.3
Other current taxes	1.1	1.2	0.4	0.6	0.4	0.4
Capital taxes	0.6	0.1	0.0	0.0	0.1	0.6
Actual social contributions	-	-	9.1	14.5	-	11.5
Total tax receipts and actual social contributions	46.0	38.8	34.3	36.6	23.3	33.8
Capital transferred from government, taxes and social contributions unlikely to be collected	0.3	0.0	-	0.0	0.0	0.3
Tax burden: Total receipts from taxes and compulsory social contributions, various amounts	45.6	38.8	34.3	36.6	23.3	33.3
Imputed social contributions	1.9	3.2	2.5	0.3	-	0.7
Total receipts from taxes and social contributions less various amounts	47.6	42.1	36.8	36.9	23.8	34.1

Source: OECD.

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Personal income taxes accounted for only 10.8 percent of total government revenue in 2017 against 11.0 percent two years earlier (Figure 18). Corporate taxes accounted for 4.0 percent of total government revenue in 2015, and 3.4% in 2016. For VAT the shares in 2015 and 2017 are 17.2 percent, and 18.4 percent respectively.

**Figure 18 Sources of general government revenue in Greece, 2017**

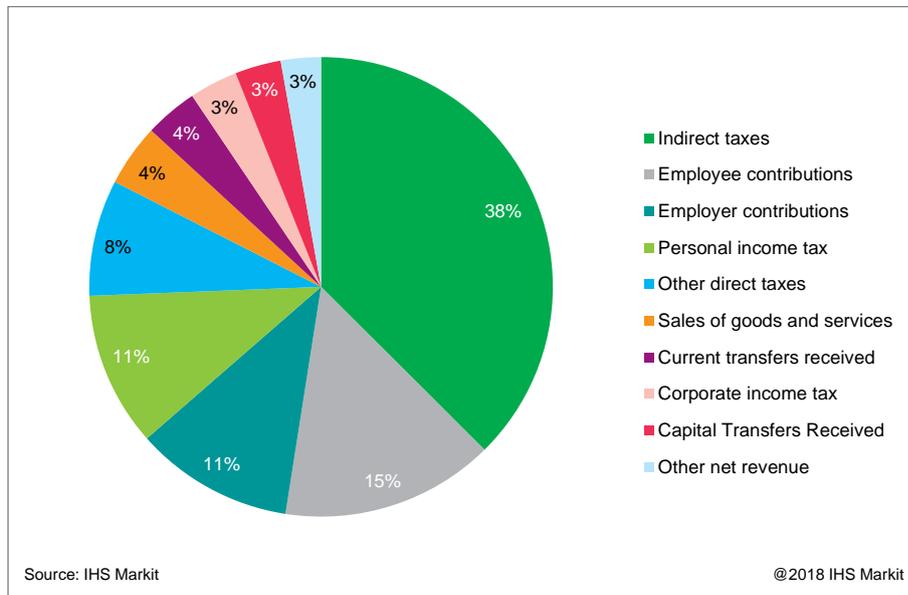
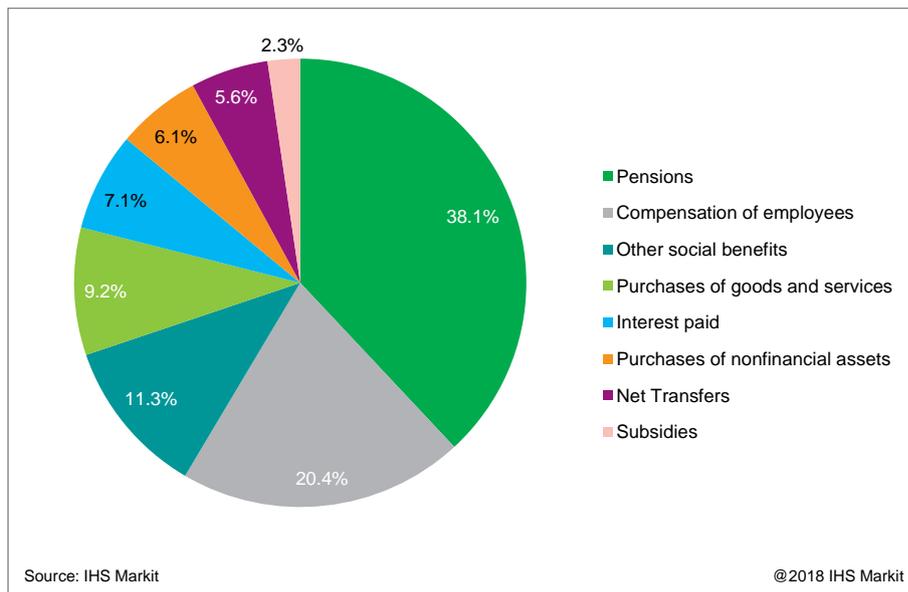


Figure 19 reveals the small share of government employees compensation (20.4 percent in 2017), following cutbacks implemented in recent years. Total compensation of public sector employees accounted for just over half the share of pensions (38.1 percent of total expenditures). Interest payments represented 7.1 percent of total government expenditures.

**Figure 19 Categories of general government expenditure in Greece, 2017**



## Multiplier Effects of Selected Policy Changes

This section examines the impact, on the economy and on public finances, of six fiscal policy measures, with a view to identifying a policy package that would help Greece transition to a more sustainable growth path. The measures consist of:

- lowering the VAT rate to 20 percent
- lowering the corporate tax rate to a flat 20 percent
- lowering the personal income tax rate to a flat 20 percent
- eliminating social contributions to the state pension fund paid by employers
- eliminating pension contributions paid by employees
- replacing the current pension payment system with a flat monthly pension payment of €700 per person and raising the retirement age to 67.

Each of these changes was simulated to have been introduced in the third quarter of 2018. Unless otherwise stated, government expenditures were kept at the baseline level, except interest payment on the debt, which adjust based on the level of debt and the interest rate paid on it. We keep other government expenditures constant at the baseline levels for consistency.

Two of these measures—eliminating social contributions paid by employers and eliminating social contributions paid by employees—have large effects on real GDP. Both lead to significant increases in households' purchasing power, either indirectly, via a rise in employment (in the case of lower employer contributions), or directly (in the case of employee contributions). In the case of employer contributions, the cut lowers the wage bill and enhances Greece's competitiveness, which leads to higher employment and accelerates household income growth. It also leads to a substitution of capital in favour of labour, however, which limits the pick-up of investment. The elimination of social contributions paid by employees immediately raises personal disposable incomes, stimulating domestic demand and economic activity in general. But the loss in revenue for the public finances is significant, and it is not fully compensated by the faster employment and revenue growth. The reduction in the VAT or income tax rate leads to a more modest pick-up in activity and to a proportionately smaller deterioration of public finances.

Table 4 summarizes the results of this analysis. Reducing the personal income tax rate leads to a slower gain in real GDP when distributional effects are taken into account, because the marginal propensity to consume is lower for people at higher incomes (rows three and four related to the personal income tax change need to be summed to see the overall impact).

The last three rows show the impact of replacing current pension payments with a flat €700 a month rate and raising the retirement age to 67. This analysis, which assumes no grandfathering stage, is conducted in three steps. The first step quantifies the impact of the pension payment scheme assuming no other change. The second step assumes that half of the people who lose their pension benefits because they are under the age of 67 return to the

labour market. The third step (shown on the last line of Table 4) quantifies the marginal impact on the economy of the distributional effects of the pension change. The results show that the distributional effects of the pension change are very small, and are lower than the distributional effects of the income tax change. With a grandfathering scheme, the effects of this measure on disposable income and growth would be less negative, but the budgetary cost would amount to some 5.9bn (3.3% of GDP) a year. The next sections describe the results in more detail.

**Table 4 Projected macroeconomic and fiscal effects of selected policy instruments (differences from baseline in 2022)**

Scenario	Real GDP	Real Private Consumption	Real Fixed Investment	Real Imports	Real Exports	Employment	Government Debt	Government Revenue	Government Expenditure	Spending / Tax Cut
	(billions of 2010 euros)					(thousand persons)	(billions of euros)			
Reduction of VAT to 20 percent	2.2	3	0.4	1.6	0	22.9	16.4	-3.6	0.3	-0.1
Reduction of corporate income tax to 20 percent	0.4	0.5	0.3	0.4	0	4.4	2.5	-0.6	0	-0.1
Reduction of personal income tax to 20 percent	1.1	1.5	0.3	0.9	0	9.7	11.3	-2.5	0.2	-0.1
Reduction of personal income tax to 20 percent and distributional effects	-0.2	-0.3	0	-0.2	0	-2.1	0.1	0	0	-0.1
Reduction of employer pension contributions	13.5	15.9	1.8	10.5	0.2	299.5	44.2	-8.7	0.7	-0.1
Reduction of employee pension contributions	4.7	7.1	1.2	4.3	0	42.4	56.2	-11.4	0.9	-0.1
Fixed pension of €700 a month	-6.6	-9.3	-1.8	-5.4	0.1	-59.7	-65.7	-0.9	-17.1	19.8
Fixed pension of €700 a month plus return to the labour force of half of the 470,000 people who would lose their pensions	-6.8	-11.3	-0.4	-5.8	0.1	-65.3	-63.9	-1.3	-17.1	19.7
Fixed pension of €700 a month: marginal impact of the distributional effects	0	0.1	0	0	0	0.4	0	0	0	-0.1

Source: IHS Markit.

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### ***Reducing the VAT Rate***

The first fiscal policy measure analysed is a reduction in the top VAT rate from 24 percent to 20 percent and reduction of the lower VAT rates (13 percent on category one goods and 6 percent on category two goods) by the same proportion. As a result, total revenue from VAT falls by 17 percent (before any spill over effect works its way through the economy), and the average price of goods and services falls by 3.2 percent.

The lower price levels drive additional consumption, at least temporarily. Higher consumption stimulates fixed investment; the effect on export growth is negligible. Private consumption in Greece has a high import content. Therefore, increases in household consumption immediately lead to higher imports, limiting the stimulus to domestic activity. In addition, credit-constrained domestic producers cannot raise output enough to meet additional demand, which further raises the import content of household consumption.

Employment does not benefit much from this measure, because the VAT reduction causes a one-off change in prices but does not durably support faster growth. This temporary impact on growth is consistent with that observed by the ECB (Carroll, Slacalek, and Tokuoka 2014). Underemployment diminishes, thanks to an increase in weekly hours worked, but there is no lasting employment creation.

The cut in VAT negatively impacts public finances, as the increase in private consumption is not sufficient to offset the negative impact of the lower VAT rate. Two factors magnify the negative budgetary impact. First, the deflationary impact of the initial drop in prices means that, despite the rise in real GDP (which is €2.2 billion higher than in the baseline by 2022), nominal GDP is lower than the baseline level. Therefore, general government revenue falls more from the cut in VAT and the resulting fall in prices than it increases from stronger economic activity. With government expenditures (except for debt servicing) constant, the public sector deficit increases, which raises the debt. Second, the negative impact on nominal GDP raises the debt-to-GDP ratio. The real value of existing debt increases, while the nominal tax base—from which the debt must be financed—falls.

### ***Reducing the Corporate Tax Rate***

The second simulation assumes a reduction in the corporate tax rate from 29 percent to 20 percent, which implies a drop in corporate tax revenues of 31 percent for a given amount of corporate profits.

The reduction in the corporate tax rate stimulates real fixed investment in Greece and attracts foreign investors. Given the financing constraint, the rise in FDI constitutes an important additional stimulus. As investment picks up, so does real GDP, whilst potential output growth

benefits as the capital stock grows. The higher activity level prompts increases in incomes, which stimulates household consumption; the new investment also boosts activity in industries supplying the investment goods, as well as in related industrial and service sectors. Real GDP is €0.4 billion higher in 2022 in this scenario than in the baseline forecast. The increase is less than the boost provided by the VAT reduction but still constitutes a positive development.

Given the relatively low contribution of corporate tax revenue to general government revenue in Greece, the government revenue shortfall from this measure is small. However, it still outweighs the positive effects of higher real GDP and incomes on tax collection. Reducing the corporate tax rate lowers public sector revenue by €600 million in 2022 (and increases the debt by €2.5 billion (the impact on public debt is greater than the impact on the budget balance, because it represents the cumulative effect of higher fiscal deficits each year until 2022)).

### ***Reducing the Personal Income Tax Rate***

Income tax rates in Greece range from 22 percent to 55 percent. The first six income deciles are subject to the lowest tax bracket (22 percent), the seventh and eighth deciles fall into the second tax bracket (24.4 percent), the 9th income decile pays the third tax bracket (34 percent), and the top decile falls into the highest bracket (55 percent). The average income tax rate is about 28 percent. Reduction of this rate to 20 percent leads to an ex ante reduction in the personal income tax rate of 29 percent. These calculations include the solidarity rate surcharges, but do not account for the annual tax credits provided, which for a family with three children, would nullify the tax from almost about €8,500 of income in 2017 (the first four deciles).

The 29 percent decline in the average income tax rate raises household disposable income and therefore stimulates consumption. The higher spending on goods and services cycles back through the economy as firms hire more workers to meet the extra demand and invest, resulting in €1.1 billion of additional real GDP. Real private consumption is €1.5 billion higher in 2022, real imports of goods and services are €900 million higher, and real fixed investment is €300 million higher than under the baseline. The impact on real exports of goods and services and employment is negligible.

The reduction in the personal income tax rate causes a significant shortfall in general government tax revenue. Despite higher real GDP, by 2022 general government revenue is €2.5 billion lower than in the baseline forecast, and public debt is €11.3 billion higher. The increase in real GDP and other taxes (VAT, corporate) made possible by higher domestic spending does not fully offset the revenue shortfall generated by the personal income tax cut.

The impact of reducing the personal income tax rate was calculated assuming no change in the average propensity to consume following the tax cut. Changes in tax rates do not affect all households equally, however. Households experience a declining marginal utility of wealth and a declining propensity to consume. Therefore, an additional euro of income given to a low-income household with a high propensity to consume (low savings rate) boosts consumption by more than the same increase in income given to a wealthier household.

To calculate the change in the average propensity to consume that results from the tax cut, we used tax and income distribution data from EUROMOD (Table 5) and applied to it the progressive Greek tax rate schedule. We then calculated how much a household in each income decile currently pays and how much each would pay under the proposed flat 20 tax rate. The results indicate that average household income would increase by about €100 a month. Households in the highest decile would see their disposable income increase by almost €750 a month, and households in the lowest decile would see their income rise by €6 a month.

**Table 5 Average monthly household income and taxes in Greece, by income quintile (percent of total)**

<i>Income quintile</i>	<i>Disposable income</i>	<i>Original income</i>	<i>Benefits (means-tested and non-means-tested)</i>	<i>Public pensions</i>	<i>All taxes</i>	<i>Social contributions</i>
1	7.7	5.9	37.1	6.7	4.6	5.9
2	13.1	9.5	22.8	17.1	7.5	10.8
3	16.6	12.3	18.7	22.9	10.7	14.4
4	23.2	22.5	13.6	24.5	19.3	23.9
5	39.4	49.8	7.9	28.8	57.9	45.0

*Source:* EUROMOD, Institute for Social and Economic Research, University of Essex, 2017.

The average marginal propensity to consume is about 35 percent in Greece.<sup>11</sup> It ranges from 12 percent for the top percentile and the top two deciles, to 50 percent for the bottom five deciles. For the unemployed, the marginal propensity to consume is 62 percent. Both ends of the Greek income distribution have the highest marginal propensities to consume of the 15 countries studied by Carroll, Slacalek, and Tokuoka (2014).

<sup>11</sup> The average in Europe is 26 percent. It ranges from 18 percent in Malta to 38 percent in Spain (Carroll, Slacalek, and Tokuoka 2014).

Our analysis suggests that the highest income decile in Greece would see its disposable income increase by 18.6 percent, but only 5.6 percent of that 18.6 percent would go to increased consumption; the rest would of the windfall would go to savings. The lowest decile would see income increase by 2.0 percent, of which 1.4 percent would go to consumption. On average disposable income would increase by 8.0 percent. About 2.5 percent of that 8.0 percent would be channelled into increased consumption. If the stimulus were distributed evenly across income deciles, 2.8 percent of the 8.0 percent would be consumed. If the windfall were concentrated in the lowest decile, 5.6 percent of the 8.0 percent would be consumed.

The boost to real GDP from reduced personal income taxes is lower when the distribution effect is taken into account. The €1.5 billion additional private consumption in 2022 estimated to result from reducing the personal income tax rate to a flat 20 percent would be reduced by €0.3 billion as a result of the uneven distribution structure and higher propensity to save of higher income brackets. Real GDP would rise by just €900 million in 2022, and the debt would be €0.1 billion higher than without the distributional effects – ie €11.4 billion higher than the baseline level in 2022, because the economic boost to other tax revenue would be more muted.

### ***Reducing Employer Social Contributions***

This fiscal policy simulation assumes that all employer social contributions are eliminated but pensions and health continue to be paid out of general government revenue. Because the labour market is extremely slack, employers are expected to keep the entire windfall, leaving employee take-home pay unchanged.

In 2015 employer social contributions totalled €8.8 billion (Ministry of Finance 2018). In 2017 the amount was virtually unchanged.

Elimination of employer contributions makes employment 16 percent less expensive. This fall in the wage bill would prompt an increase in employment of 2.5 percent.<sup>12</sup> This higher employment level raises household incomes and private consumption, with private consumption rising by €15.9 billion in 2022. The increase stimulates investment but also increases imports. Exports of goods and services also increase, but not by much, because Greece's export mix is not very price sensitive and it takes time for the additional investment to transform towards more export-oriented industries.

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<sup>12</sup> This figure corresponds to an elasticity of employment to wage costs of -0.25 percent, which is consistent with the value measured in a study of labour demand elasticities across Europe (Adam and Moutos 2014).

Eventually, the increased level of economic activity brings in additional corporate tax and VAT revenue. The increase is not sufficient to offset the shortfall in employee contributions to social security, however.

Another factor increases the budgetary impact of this measure: despite the higher level of employment, the employment cost to employers falls, causing them to lower prices, which has a deflationary impact. Deflation makes it harder to pay back debt (borrowed when prices were high): it is bad for borrowers. Inflation makes debt easier to pay off.

As a result, the public sector deficit increases in this scenario, and debt is €44.2 billion higher than in the baseline outlook in 2022.

### ***Reducing Employee Social Contributions***

This simulation assumes that employee social contributions for both pension and health are eliminated, but there is no change on the expenditure side. The economic impact of this measure depends on what happens to the wages of new and existing employees. For people already employed, the cut in employee contributions lifts take-home pay, raising disposable income and purchasing power. Over time, however, the benefits to households are expected to wane, because future wage increases will most likely be less than observed in the baseline forecast and companies will offer lower wages to new employees, as a result of the strong bargaining power that companies enjoy in Greece's very slack labour market.

The net impact on real GDP and on private consumption will therefore depend on who experiences the largest benefit from this measure. When more of the reduced contribution goes into employees' pockets, the result is a stronger and more lasting improvement in private consumption. The larger the share that employers are able to negotiate away, the stronger the employment increase and the higher the investment recovery. In both cases, the positive effect on economic activity diminishes over time.

The results (shown in Table 4), rest on the assumption that 80 percent of the reduction in employee contributions remains with employees (leading to an increase in their disposable income) and 20 percent goes to employers through lower wage costs. This policy stimulates private consumption and investment and raises the level of real GDP. Part of the benefits are lost to imports, however, which mitigates the overall boost to real GDP. In 2022 real GDP is €4.7 billion above the baseline level, the second most positive result among the policy options analysed here. Real fixed investment is €1.2 billion higher, also the second most positive outcome. The net impact on public debt is negative, because the boost to activity does not fully offset the deflationary effect on nominal wages (hence on household income and personal income tax revenue). The measure increases the public sector deficit, and the debt level is €56.2 billion higher in 2022 than in the baseline outlook.

The impact of this measure would be lower – both in terms of revenue gain and in terms of budgetary cost, if only pension contributions and not health contributions were to be eliminated.

### ***Reducing Pension Outlays***

This simulation evaluates the impact of replacing the current pension payment schedule with one in which 1.8 million people over the age of 67 receive €700 a month. Younger retirees would no longer receive a pension allowance. This change would result in payments of €15.1 billion instead of the €31.5 billion paid in pensions in 2015 (€30.2 billion in 2017 - Ministry of Finance 2018).

In this fairly extreme scenario, the transition is assumed to be immediate, with no grandfathering of current pension recipients.<sup>13</sup> Grandfathering – which would be expected to occur in a real-world situation - would incur a budgetary cost of some €7.4bn (4% of GDP) and reduce the impact on GDP and employment in the first years but would not change the overall conclusions of this simulation over the long term.<sup>14</sup>

Three variants of this policy change are simulated:

- a reduction in pension transfers from government to households corresponding to the shift to €700 a month;
- an increase in the labour force participation rate, as some individuals who lose their pensions seek work;
- a change in the consumption multiplier, based on an analysis of the distributive impact of this pension reform, through the income distribution module.

The results, presented in the last three rows of Table 4, show that the impact on GDP is negative, because household disposable income falls, which depresses consumption. As private consumption weakens, so does fixed investment, leading to a net reduction of real

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<sup>13</sup> Grandfathering could take different forms: either it would occur through the progressive implementation of the measure, progressively raising the age at which people are entitled to pension payment, for example over 3 years as assumed in the combined fiscal package scenarios presented later; or, it could be implemented by providing Minimum Guaranteed Income of, say, €300 per month to those retirees who cease to receive full pension payment but are not employed.

<sup>14</sup> The effects of grandfathering only last a few years, depending on the age composition of the current retirees.

GDP of €6.6 billion. The reduction in government expenditures has a substantial positive effect on the budget balance, which lowers the debt.

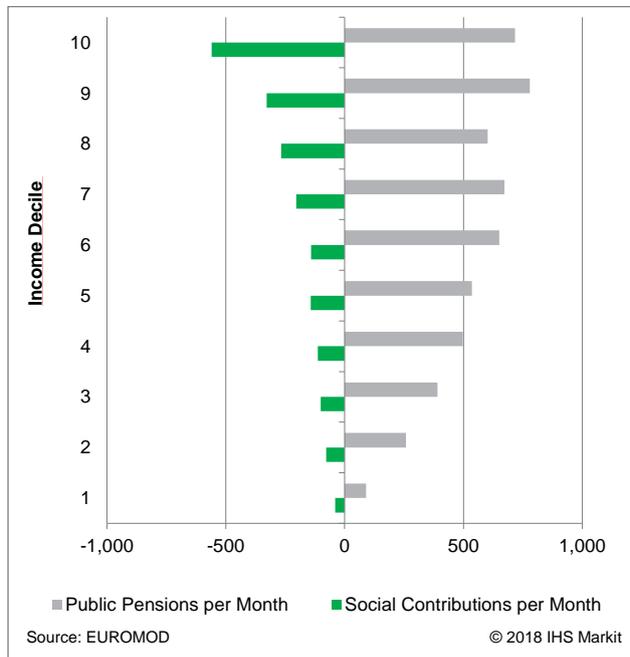
About 470,000 people in Greece under the age of 67 currently receive retirement pensions. The loss of pension income modelled here would force many of them out of retirement and back into the labour force. Many of them are already working in the grey market. This variant of the scenario therefore assumes that only half of the 470,000 return to the official labour force. The change in the size of the labour force is imposed by raising the labour force participation rate from 56.2 percent to 59.0 percent.

Taking into account the increase in the labour force associated with the return to work of some former retirees, the fall in real GDP is slightly higher, by €200 million. Private consumption also falls more in this scenario, due to the negative impact of higher unemployment on wage rates. Indeed, the immediate effect of the increase in labour supply is to raise the unemployment rate by approximately 3 percentage points, which depresses overall wage levels. Even if, over time, some former retirees find a job and become employed, in the short run the increased slack in the labour market drives down wages (or, at least, causes them to rise slower in nominal terms than in the baseline scenario). This reduces disposable income and consumption and exacerbates the deflationary effect of the policy change. After the initial disruption, however, the structural drop in unit labour costs supports a recovery of employment and of real GDP: cheaper labour increases firms' profits, stimulating investment and partly offsetting lower consumption.

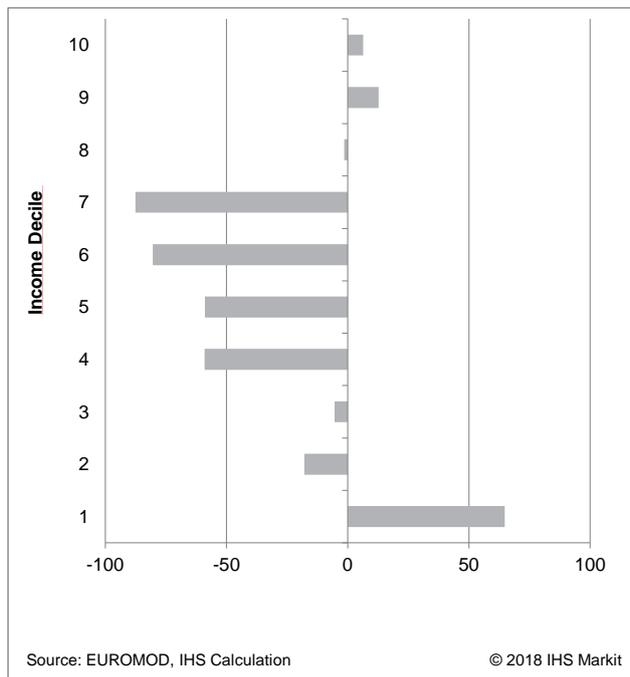
Imports decrease, and the lower price level increases Greece's external competitiveness. The effect on trade is limited, however, because the price elasticity of exports is low, and Greece's product mix is heavily tilted towards agricultural and derived products. As a result, goods exports do not increase much. The net impact on trade is not sufficient to offset the negative impact of the pension cut on domestic demand. In the absence of a significant boost to real GDP and with prices falling, nominal growth rates do not pick up much. The weaker level of nominal activity reduces tax revenue, limiting the improvement in the fiscal balance. Whereas total government expenditure was cut by €17.1 billion, taking the feedback in the model into account, the budget balance improves by €19.7 billion in 2022. Nominal debt is €63.9 billion lower in 2022 with the cut.

To estimate the marginal impact of a change in pension payments that takes into account the distributive effects on incomes (Figure 20), we calculate the impact of the change by income bracket (Figure 21). The overall effect on private consumption and GDP is mildly positive, because a flat pension is more progressive than the earnings-based status quo. The magnitude of the impact is negligible, however.

**Figure 20 Monthly social contributions and pensions in Greece, 2017**



**Figure 21 Proposed change in monthly net pensions in Greece**



In summary, the reduction in pension outlays improves the budget balance and reduces public debt, but it does not stimulate growth. On the contrary, consumer spending falls as a result of

weaker purchasing power, an effect that is exacerbated by the deflationary impact of higher unemployment on wages.

### ***Combining Multiple Pension Reforms***

This section examines the impact of a “pension package” entailing:

- elimination of employee social contributions;
- elimination of employer social contributions;
- pension reform designed to reduce the cost of the first two measures on public finances and bring some young retirees back into employment.

The first two measures are the most supportive of growth. The third would limit the negative impact on public finances while increasing the labour supply.

In 2015 total employee contributions amounted to €10.5 billion (9 percent of household disposable income). The equivalent figure for 2017 was €11.9 billion (Ministry of Finance 2018). This figure includes contributions by the self-employed as well as contributions for health coverage. Health contributions amount to approximately €5bn a year, covering 30% of total expenditure on health. This scenario cuts employee social contributions (both health and pension) by 1/12th per quarter, beginning in the third quarter of 2018 and ending eight quarters later. The move automatically increases personal disposable income. However, the slack labour market allows employers to respond by lowering wages to new hires commensurately. Employees who remain in their current position are contractually protected, however they will likely see slower wage growth in subsequent years, as many companies seek to take advantage of the fact that real incomes have gone up to limit future wage increases. Employers are also likely to be less generous with future wage increases given the lower inflation generated by this scenario. Hence both nominal and real wage growth rates would slow down.

This scenario is based on the assumption that wage income rises by only 80 percent of the amount by which employee contributions are lowered. As employment picks up but the labour market remains slack and employers do not raise wages as rapidly as they would have without the cut, unit labour costs rise more slowly than in the baseline. Beyond the initial adjustment, the effective wage index (for take-home pay) and the labour cost index are left free to adjust.

The lower employment costs lead to increased employment based on an assumed elasticity of 25 percent, similar to the assumption made in the multiplier analysis summarized in Table 4. The combined effect of this slightly higher employment but slower nominal and real wage growth is a decline in nominal household disposable income.

The second component of the pension package is the elimination of employer contributions. In 2015 total employer contributions reached €8.8 billion. In 2017, these contributions stood at €8.8 billion (Ministry of Finance 2018). In the scenario, these contributions are cut by 1/12th per quarter from the third quarter of 2018 to the second quarter of 2020. The slack in the labour market allows employers to keep the full benefit of this change rather than passing on some of it to employees in the form of higher wages. Therefore, the labour cost index is adjusted downward and the effective wage rate that determines take home pay is modified ex ante, then left free to evolve in response to other changes in the economy.

The third component of the pension package is the reduction of pension payments to €700 a month for people 67 and older and the elimination of pensions for people under 67. This change reduces annual pension payments to €15.1 billion. The €15.1 billion reduction in pension outlays (based on the 2017 budget figure) is smaller than the €20.7 billion loss in revenue from the cut in social contributions (including health contributions). As a result, before feedback effects are taken into account, this combined package increases the budget deficit by €5.6 billion<sup>15</sup>. As in the multiplier analysis, the scenario assumes that 235,000 former retirees return to the labour market, which raises the labour force participation rate and the unemployment rate. The pension package finally takes into account the distributive effects through the use of the income distribution module to calculate the change in the marginal propensity to consume.

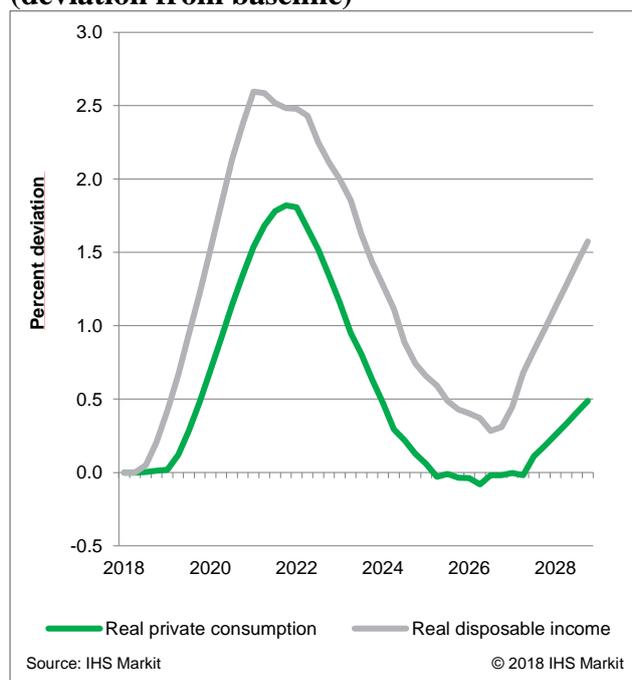
The net effects on gross and net income are such that private consumption is not significantly boosted. Figure 22 and show the net effect of the pension package on private consumption and disposable income relative to the baseline. Thanks to the boost to revenue provided by the elimination of employee social contributions and the rise in employment, and despite the reduction in pension outlays, real private consumption increases in the first years. The gain in real disposable income in the first years of the scenario comes mostly from the fall in prices which is itself induced by the reduction in labour costs, as opposed to a meaningful rise in nominal incomes. The gain is short-lived, however. The rise in employment induced by lower wage costs does not generate enough extra wage income to fully offset the decline in income from the cut in pensions. This trend is exacerbated by the slower growth in nominal wages.

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<sup>15</sup> As indicated above, the scenario assumes the elimination of all social contributions. Given the estimated €5bn contribution by household to the health system, the elimination of pension contributions only would make the package budget-neutral. Indeed, the revenue loss from the abolition of contributions would come down to approximately €15.7bn, a figure similar to the €15.1bn reduction in pension outlays hence a neutral budgetary impact ex ante.

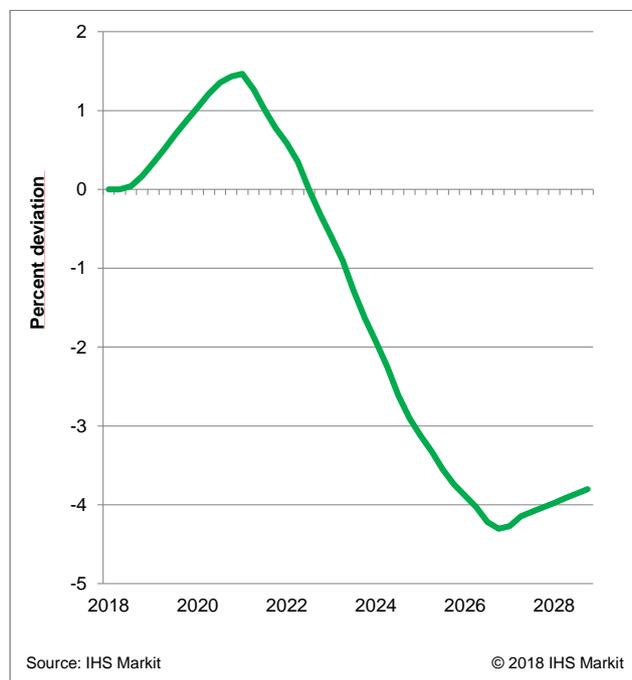
The short term boost progressively wanes, as inflation returns to the baseline rate following the one-time reduction in costs, whilst wage growth is below baseline level due to the greater slack in the labour market. The distributive effects of the cut in pension payments on the marginal propensity to consume also contribute to the weak consumption impact.

**Figure 22 Projected real private consumption and disposal income in Greece, 2018–2028 (deviation from baseline)**



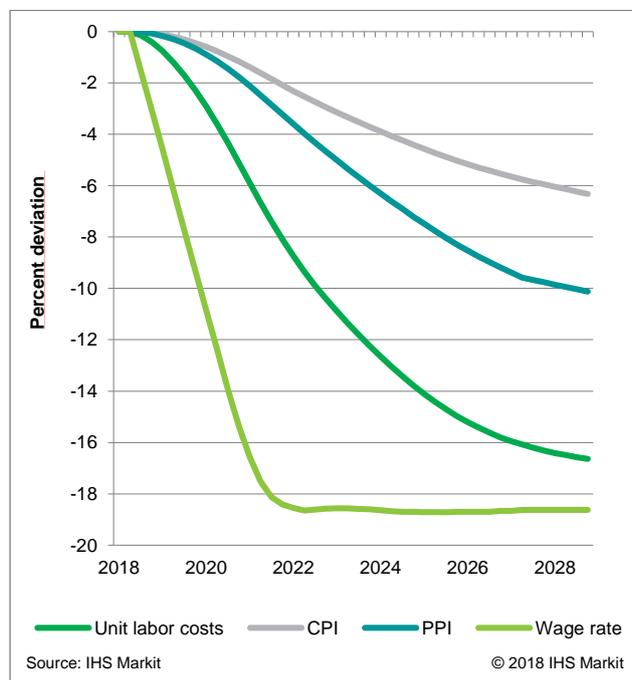
After a few years, the impact of the package is fully absorbed and the household savings rate – which increased due to precautionary saving in the first years – comes down slightly, allowing for stronger real private consumption growth. The consumption increase observed after 2026 is also facilitated by higher household real wealth, and a reduction of non-performing loans which improves financing conditions.

**Figure 23 Projected nominal disposal income in Greece, 2018–28 (deviation from baseline)**



The nominal wage rate falls by almost 20 percent in the long term (Figure 24). The bulk of the decline is a result of the elimination of employer social contribution. The impact of the contribution cut is magnified by the rise in unemployment that results from the pension reform. Unit labour costs fall less than the hourly wage rate, however, because labour productivity decreases. The lower labour costs cause a substitution of labour for capital, which prompts a stronger rise in employment than would have otherwise occurred. Because of the lower unit labour costs, producer prices are approximately 10 percent lower than in the baseline scenario by 2028, and consumer prices and the private consumption deflator are down by more than 6 percent (Figure 24). As a result, export prices grow more slowly than in the baseline scenario, with the price of service exports falling by more than that of manufactured goods' as a result of the higher labour intensity of services. By 2028, the average price of service exports (which include tourism) is 6 percent lower than in the baseline, whilst manufacturing export prices are 4 percent lower.

**Figure 24 Projected wages, unit labour costs, consumer price index, and producer price index in Greece, 2018–28 (deviation from baseline)**



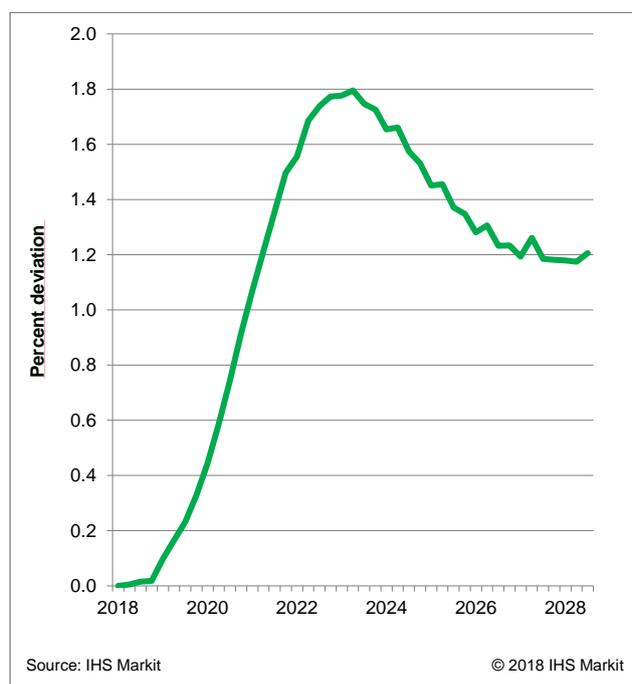
Despite the fall in prices, exports change little (goods exports exceed baseline by 1.3 percent by 2025 and services exports are 2.3 percent higher). The composition of Greece's exports today is indeed heavily tilted towards industries that are not price sensitive, such as agricultural products and tourism.<sup>16</sup> Hence, unless world demand changes significantly, the changes in export volumes triggered by improvements in Greece's external competitiveness remain limited.

The fall in production costs and the rise in profit margins made possible by the pension package stimulate investment (Figure 25). The acceleration of investment remains tepid, however, because the measures implemented mainly reduce labour, as opposed to capital,

<sup>16</sup> The low price elasticity of service exports is confirmed by a study by the Bank of Greece (Gazopoulou 2012), which seeks to explain tourist arrivals using annual data on real incomes in origin markets, prices of competitors, and prices in Greece. The measure used to calculate prices in Greece is the weighted average of the Greek consumer price index representing tourists' expenditure patterns, the prices offered by Greek hotels, and international oil prices (to capture the transportation cost of the package). The main findings are that arrivals to Greece appear to be elastic with respect to income but inelastic with respect to price. The Bank estimates the price elasticity of arrivals to be at a low 0.28, implying that price is not an effective way to increase domestic travel activity. The study's author concludes that reducing prices is less likely to increase tourism to Greece than nonprice structural factors, such as the availability and quality of the infrastructure that supports travel activity in Greece.

costs, causing a substitution of labour for capital. Given continued poor credit conditions, aggravated by the high level of non-performing loans, and the negative impact of the pension package on public debt, investment does not accelerate durably. It stabilises 1.2-1.3 percent above baseline in the long run.

**Figure 25 Projected fixed investment in Greece under the pension package scenario (deviation from baseline), 2018–28**

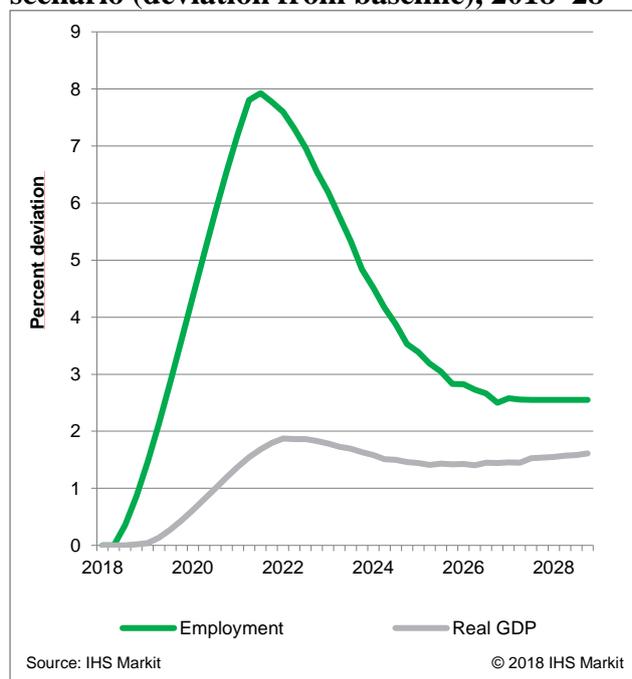


The net effect of the pension package is to cause employment to pick up, which lifts both real disposable income and consumption. The increase in employment is stronger than the rise in GDP, however, which leads to a weakening of average productivity. The average number of hours worked also falls, as former pensioners return to the labour market even if doing so means working less than full time.

The pension package raises real GDP by 2 percent above the baseline by 2022 (Figure 26). The number of persons in employment initially increases, rising close to 8 percent above the baseline in 2021, but the initial impact wanes over time and employment then stabilizes 2.6 percent above the baseline level from 2026 onwards. The initial boost results from lower wage costs. At the same time, however, higher unemployment from the expanded labour force participation rate causes wage and price deflation, pushing the consumer price index below the baseline. Lower nominal wages and lower social transfers reduce nominal disposable income, which ends 4 percent below the baseline by 2027. Real disposable income temporarily increases thanks to higher employment and lower prices, but the boost disappears over time as wage growth stays lower than baseline due to the greater labour market slack,

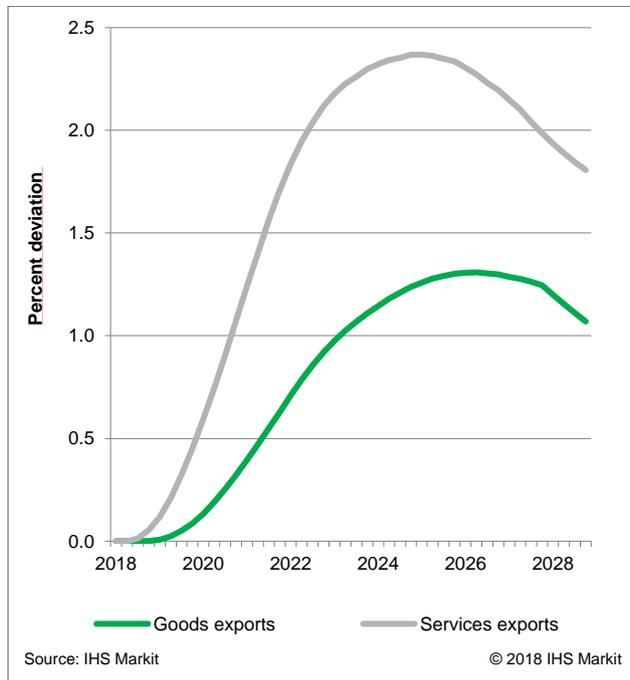
itself induced by increased labour market participation. Real private consumption increases but there is a precautionary savings' effect which limits the pickup in consumption in the first years of the scenario. Whereas the impact on employment diminishes over time, the rise in real GDP continues, thanks to lower imports and higher exports at the end of the period (Figure 27). Although the fall in domestic prices does not stimulate exports much (Figure 27 and Figure 28), it causes import substitution: domestic prices fall well below import prices, which creates a disincentive to import.

**Figure 26 Projected employment and real GDP in Greece under the pension package scenario (deviation from baseline), 2018–28**

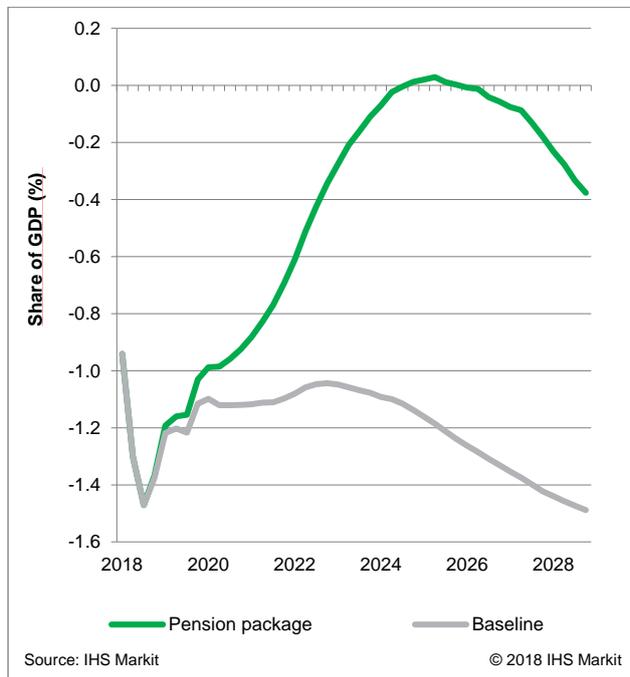


Because service exports mainly consist of tourism revenue, the fall in domestic price levels in Greece creates a favourable price differential with other tourism destination in Europe or elsewhere. Service exports increase, peaking 2.3 percent above baseline at the end of 2024. Goods exports benefit less than service exports as the passthrough of lower production costs on goods' export prices is incomplete, as Greek exporters are largely price-takers. The composition of Greece's goods exports is also heavily tilted towards products with a low price elasticity.

**Figure 27 Projected exports of goods and services by Greece under the pension package scenario (deviation from baseline), 2018–28**



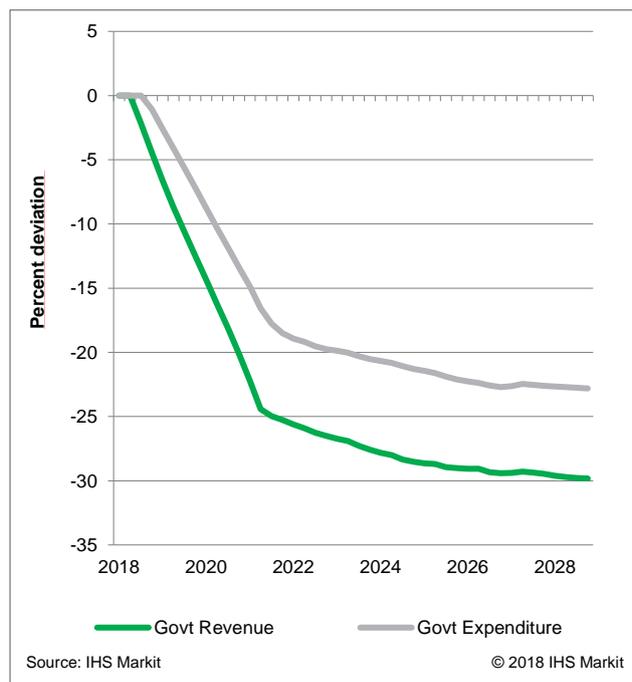
**Figure 28 Projected real net exports as share of real GDP under the baseline and pension reform scenarios, 2017–28**



Government expenditures are 22 percent below the baseline by 2027, thanks to the cut in pensions and social contributions, but government revenue falls by more (almost 30 percent) (Figure 29). As a result, by 2028 the government balance is  $-5.2$  percent of GDP, compared with  $-1.9$  percent in the baseline scenario (Figure 30). The primary balance reaches  $-3.1$  percent of GDP by 2028 compared with a balanced outcome in the baseline scenario. The fall in revenue which explains this worsened outcome results largely from the deflationary impact of the scenario, which is not compensated for by an equivalent rise in real output.<sup>17</sup> Reduced private saving (as a result of falling nominal personal incomes) combines with increased public borrowing to further restrict the ability to fund investment.

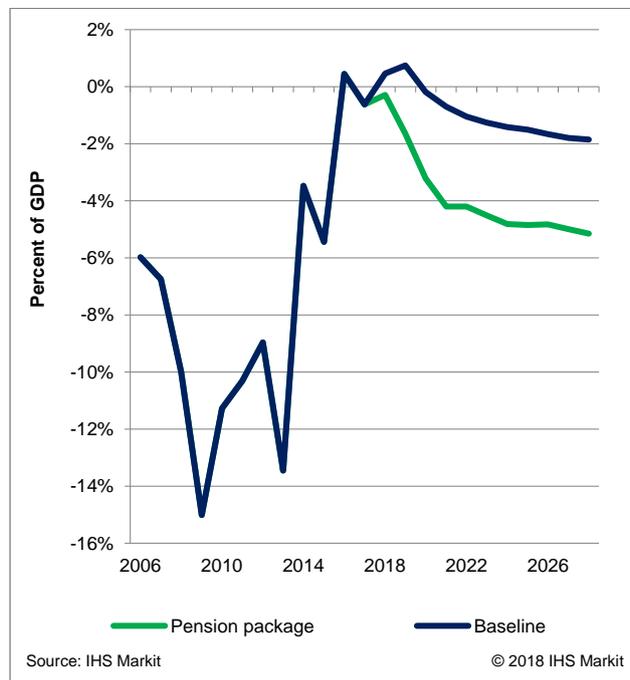
Note that a cut in pension contributions only, leaving health contributions unchanged, would have eliminated the negative impact of the package on the budget balance, but it would also have limited the benefits of the package due to the smaller boost that this would provide to disposable income. Similarly, this scenario assumes constant real government expenditures: yet, with a more positive growth outlook, one could expect a countercyclical adjustment of real government spending. This would also have mitigated the results shown here.

**Figure 29 Projected government revenue and expenditure in Greece under the pension package scenario (deviation from baseline), 2018–28**



<sup>17</sup> Government expenditures other than those modified in the scenario were left unchanged.

**Figure 30 Government balance as percent of GDP under the baseline and pension reform scenarios, 2006–28**



In summary, given Greece's depressed economy, tight financing conditions, and the unfavourable industrial mix, a fiscal package alone is not sufficient to jumpstart growth (Table 6).

**Table 6 Projected impact of pension package on key indicators, 2018–28 (year-on-year percentage change unless indicated otherwise)**

<i>Concept</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2022</i>	<i>2028</i>
<b>Real GDP</b>					
Pension Package	1.7	1.9	2.6	1.8	1.4
Baseline	1.7	1.7	1.9	1.5	1.3
Difference	0.0	0.2	0.7	0.3	0.1
<b>Private consumption</b>					
Pension Package	0.6	1.5	2.6	1.1	1.6
Baseline	0.6	1.2	1.8	1.2	1.3
Difference	0.0	0.3	0.8	-0.1	0.3
<b>Govt consumption</b>					
Pension Package	-0.4	0.9	1.2	1.4	1.2
Baseline	-0.4	0.9	1.2	1.4	1.2
Difference	0.0	0.0	0.0	0.0	0.0
<b>Fixed investment</b>					
Pension Package	7.2	5.0	3.6	3.1	1.9
Baseline	7.2	4.9	3.2	2.6	1.9
Difference	0.0	0.1	0.4	0.5	0.0
<b>Exports, goods &amp; services</b>					
Pension Package	7.6	3.6	3.6	3.2	2.3
Baseline	7.6	3.5	3.3	2.8	2.7
Difference	0.0	0.1	0.4	0.4	-0.2
<b>Imports, goods &amp; services</b>					
Pension Package	2.0	3.2	3.1	2.3	2.8
Baseline	2.0	3.2	3.0	2.6	2.7
Difference	0.0	0.0	0.1	-0.4	0.2
<b>Consumer price inflation (percent)</b>					
Pension Package	1.1	1.3	1.3	1.0	1.4
Baseline	1.1	1.6	1.9	2.0	1.8
Difference	0.0	-0.3	-0.6	-0.9	-0.4
<b>Unemployment rate (percent)</b>					
Pension Package	20.3	18.2	14.9	12.3	13.9
Baseline	20.3	18.8	16.6	14.5	13.1
Difference	0.0	-0.6	-1.7	-2.3	0.8
<b>Government revenue as a share of GDP</b>					
Pension Package	49.2	45.2	41.1	36.8	36.4
Baseline	50.0	50.0	49.7	49.1	48.5
Difference	-0.8	-4.8	-8.5	-12.3	-12.1

<i>Concept</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2022</i>	<i>2028</i>
Government expenditure as a share of GDP					
Pension Package	49.5	46.8	44.3	41.0	41.6
Baseline	49.6	49.2	49.9	50.2	50.3
Difference	-0.1	-2.4	-5.5	-9.2	-8.8
Primary surplus as a share of GDP					
Pension Package	2.5	0.9	-0.7	-1.7	-3.1
Baseline	3.2	3.3	2.3	1.4	-0.1
Difference	-0.8	-2.4	-3.0	-3.1	-3.0
Budget balance as a share of GDP					
Pension Package	-0.3	-1.6	-3.2	-4.2	-5.2
Baseline	0.5	0.7	-0.2	-1.0	-1.9
Difference	-0.8	-2.4	-3.0	-3.2	-3.3

Source: IHS Markit

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Given the need to offset the budgetary implications of the tax cuts through expenditure cuts in order to prevent a potentially larger fiscal deficit, the potential boost to domestic demand from the tax cut is limited. And since Greece's export-oriented industries are not highly price sensitive, they are not expected to benefit enough from the improvement in competitiveness to meaningfully stimulate the economy.

The pension package does not significantly reduce the public debt, either absolutely or as a share of GDP. In fact, the package is deflationary, which makes repayment of the debt more costly. By 2028, the CPI is 6.2 percent below the baseline scenario, and the real GDP deflator is 7.8 percent below the baseline level.

Greece's endogenous capacity to return to a rapid growth path is insufficient. Whether taken in isolation or combined, none of the fiscal measures analysed here is sufficient to boost the economy while simultaneously reducing public debt. The problem is the weak response of both investment and exports, as a result of an unfavourable industry mix, the low price elasticity of exports, the difficult financing situation, and weak domestic demand prospects.

### **Towards a New Package of Measures**

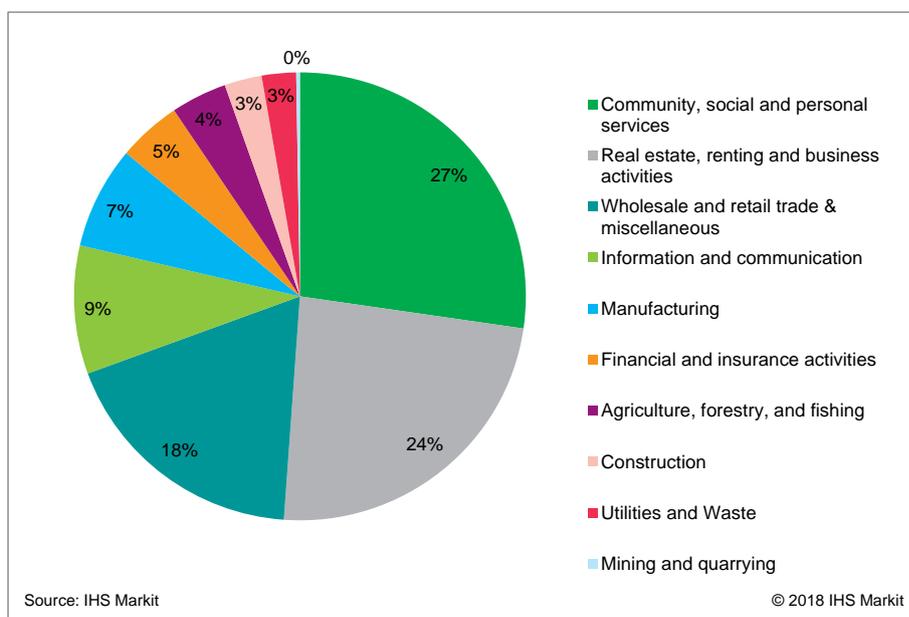
Given the above results for the various policy change scenarios, an alternative scenario was examined that focuses on attracting FDI. We first evaluate how much FDI would be needed to put Greece's economy back on a healthy growth path, both with and without pension reform. Having determined the magnitude of the required flows, we then consider the factors that might bring about such FDI inflows.

Unleashing private sector investment and triggering a private sector-led growth recovery requires a combination of reforms to stabilize the economy, improve the business climate, and restore confidence. Such reforms must stem the outflow of businesses from Greece and

encourage businesses that have exited to return and identify and attract new industries/businesses in areas in which Greece has comparative advantages (e.g., closeness to markets, availability of inputs, and availability of a skilled workforce). Focusing on export industries would build up new production capacity and stimulate investment.

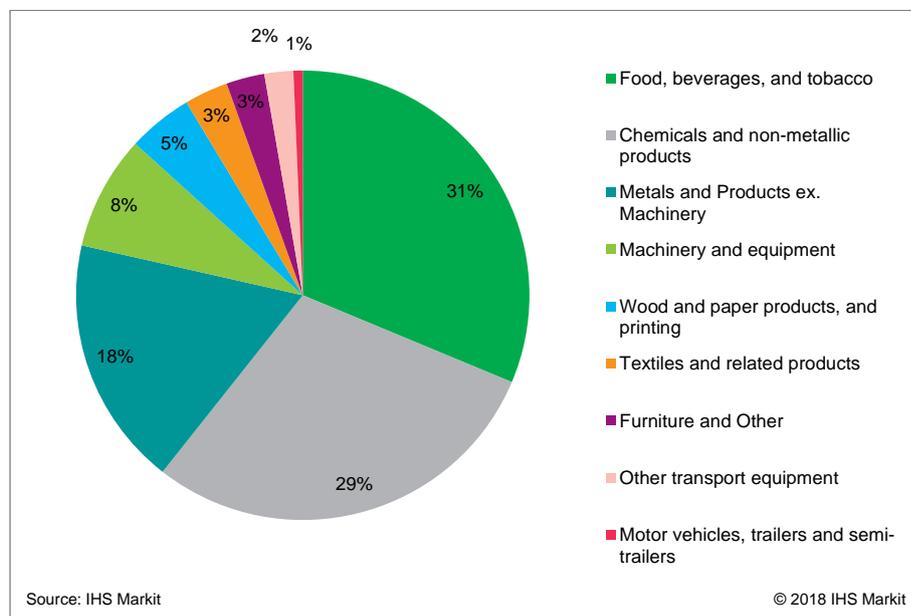
Greece's industrial structure is very unbalanced. In 2017, manufacturing accounted for only 7 percent of total value added—less than half the level in the euro zone. Excluding tourism, industries potentially serving export markets account for only 11 percent of GDP. Among the nontraded sectors, which account for the bulk of value added at factor costs, a large share relates to activities financed from the state budget, such as community, social, and personal services (27 percent of value added in 2017) (Figure 31).

**Figure 31 Sectoral composition of the Greek economy, 2017 (percent of total value added)**



Manufacturing in Greece is dominated by machinery and equipment (31 percent); chemicals and non-metallic products (29 percent of total manufacturing value added); and basic metals and fabricated metal products (18 percent) (Figure 32). All of these sectors are highly import intensive. The challenge for Greece is to transform this industry structure by developing high growth potential industries and increasing the share of export-oriented industries.

**Figure 32 Composition of Greece's manufacturing sector, 2017 (percent of total manufacturing value added)**



Given the very tight domestic financing conditions, a package designed to stimulate a recovery of investment will be more successful if focused on attracting FDI. This section estimates the impact of a package that includes the following features:

- elimination of employer social contributions;
- elimination of employee social contributions;
- elimination of pensions for people under the age of 67 years old and flat pension schedule for people 67 and over at €700 a month;
- a tax holiday on new investment;
- acceleration of the pace of reforms to restore foreign investor confidence in the economy, with firm guarantees or at a minimum some advantage for investing in Greece;
- maintenance of a stable fiscal environment (by, for example, guaranteeing that once defined, the regulatory and fiscal framework applied would not change for at least five years);
- reforms intended to boost FDI in export-oriented industries.

Industries that appear most promising in terms of their capacity to attract FDI share the following characteristics:

- They are highly export oriented.
- Greece already has (or at least once had) a presence in the industry, but the industry does not have a large share of total output or value added.

- There is a need for investment in Europe (the industry is not overbuilt).
- Capital intensity is not high.
- Investors are likely to find the right skills in Greece.

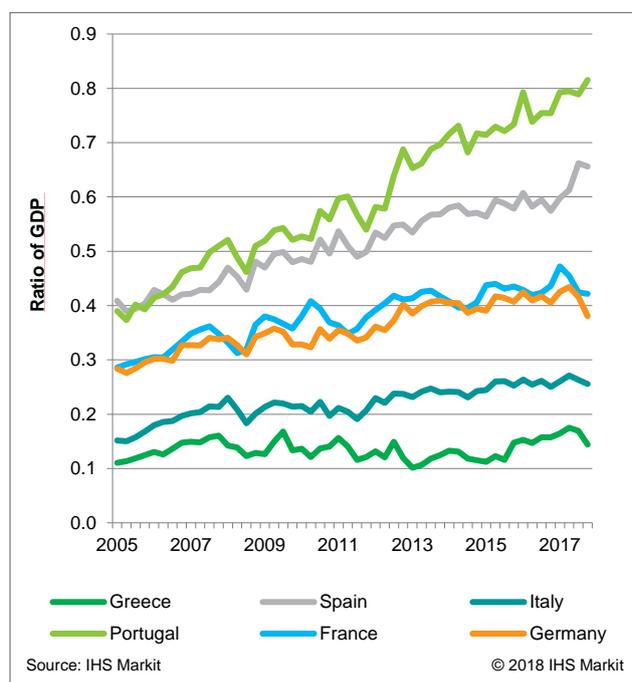
### ***Reforms Needed to Attract FDI***

Attracting FDI will play a vital role in ensuring a sustainable economic recovery. As the OECD (International Investment Perspectives, 2003) notes:

The economic benefits of attracting FDI are generally twofold. First, countries with domestic savings so low that they are insufficient to finance a strategy of economic expansion (or where weak financial intermediation has a similar effect) may harness FDI as a source of external finance. This is assumed to be particularly relevant in the case of developing and emerging economies. Second, foreign corporate presence is, as demonstrated by an ample body of economic literature, generally associated with positive externalities (“spillovers”) towards the host economy.

The channels through which the spillovers operate are at least fivefold. Foreign corporate presence may: 1) act as a trigger for transfers of technology and know-how; 2) assist enterprise development and restructuring, not least in connection with privatization; 3) contribute to fuller international (trade) integration; 4) bolster business sector competition; and 5) support human capital formation in the host country.... The presence (and magnitude) of such spillovers is of crucial importance if FDI incentives are to be economically justified.

Greece’s record in attracting FDI has been poor. Even before the crisis, FDI as a percentage of GDP was well below the EU average (Figure 33). In Portugal and Spain, the stock of FDI was about 80 percent of GDP. In 2015 alone, Ireland attracted FDI amounting to 60 percent of GDP, whereas in Greece the flow of FDI in 2016 barely reached 12 percent of GDP.

**Figure 33 Stock of FDI as share of GDP in selected European countries, 2005–17**

The sharp contraction in activity since 2008, concerns about the country's financial situation and waves of political instability have contributed to foreign investors' shunning of Greece over the last decade. Other factors also help explain Greece's poor track record in attracting FDI. Despite the reforms implemented since 2010, the economy's competitive position remains weak, and doing business in Greece remains difficult. According to the Global Competitiveness Report for 2016/17, published by the World Economic Forum, Greece ranks 86th (out of 144 countries) in terms of its economy overall competitiveness. The World Bank's Doing Business in 2017 report ranks Greece 61st out of 190 countries (down by 3 places from 2016). Removing the barriers it identifies is key to attracting more FDI.

The deterioration of Greece's relative position as a place to do business reflects both weak implementation of reforms and the sharp increase in taxes since mid-2015. A review of Greece's reform program by the OECD (Daude 2016) notes that implementation of labour market reforms was relatively strong but product market reforms were less impressive. The OECD has worked alongside the Greek government to identify areas in which reforms should focus (Box 1). It argues that the lag in implementing product market reforms has resulted in the economy continuing to allocate resources to non-productive activities. Rigidities in product markets have also discouraged potential investors and weighed on productivity. The OECD estimates suggest that full implementation of the reforms currently being implemented or planned in the Memorandum of Understanding signed with official creditors in 2015 could lift GDP by 7.8 percent over a 10-year horizon.

**Box 1 Key recommendations from the OECD on reforming the Greek economy**

1. Ease regulations in network industries and strengthen the capacity and independence of regulatory agencies.
2. Implement the 2012 Better Regulation Law.
3. Reduce delays and backload of cases in the judiciary by using more e-justice tools, training judges, implementing out-of-court settlements, model cases, and specialized competition courts.
4. Undertake an expenditure review to create fiscal space for strengthening the social safety net and expanding active labour market policies.
5. Conclude the reform of the pension system including a review of special regimes and introducing a basic pension in a fiscally sustainable way.
6. Speed up the modernization of the public employment service (OAED).
7. Implement the minimum income guarantee, a targeted school meal program for poor children and a well-targeted housing assistance program.
8. Reform labour market institutions and review the minimum wage, taking into account equity and efficiency considerations.
9. Increase reform ownership by quantifying and communicating the benefits of reforms.
10. Build capacity to assess the impact of reforms and reinforce coordination across line ministries.
11. Strengthen the Hellenic Competition Commission's advocacy work by allocating more resources to its work outside the area of law enforcement.
12. In the event of a major exogenous adverse shock, avoid as much as possible large tightening of discretionary fiscal policy, taking into account fiscal targets.
13. Facilitate licensing by implementing a one-stop shop for operating a business and reduce regulatory burden by using regulatory impact assessments and policies such as "one-in two-out" more systematically.
14. Reduce restrictions to competition in sectors such as manufacturing, construction and wholesale.
15. Increase the supply of childcare services and encourage flexible work arrangements.

*Source:* Daude 2016.

Given the potential for growth, implementation of product market reforms should be given top priority. The OECD suggests that there are significant gains in implementing reforms to network industries. In particular, introducing competition in the energy and gas industries would have significant impact on the economy. Greece's relatively low score on "ease of getting electricity" in the Doing Business report suggests that it needs to simplify processes and make tariffs more transparent. Improving the quality of transport infrastructure is also estimated to have a large positive impact on the economy. According to the OECD, the quality of Greece's rail and, at a lesser extent, road infrastructure, is poor. Good-quality transport infrastructure is key to attracting investment in export-related activities as well as boosting tourism.

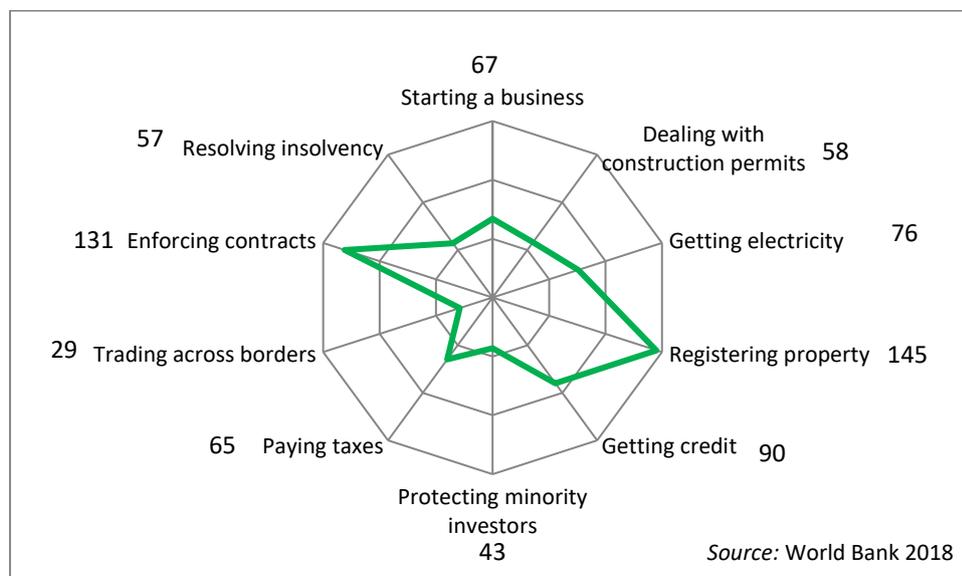
Introducing more competition in services is also projected to have a positive economic impact. Opening construction, legal, communication, architectural, and engineering services up to competition is recommended as a way to inject more competition in domestic markets. More competition would not only boost productivity, it would also make these industries more attractive to new entrants.

Reforming land planning law to clearly define where forests are and where land can be used is a precondition for foreign investors to look at Greece as an attractive investment location.

There is also a need for further labour market reforms. Despite measures introduced in recent years, Greece's labour market remains rigid, as reflected by Greece's poor performance on the Global Competitiveness Report, where it ranked 110th in terms of labour market efficiency. The report highlights flexibility of wage determination, the effect of taxation on incentives to work, and the capacity to attract and retain talent as the most pressing issues affecting the Greek labour market.

Greece's tax system is also seen as a major barrier to competitiveness and growth. The Global Competitiveness Report ranked 137th in the world in terms of effect of taxation on incentives to invest, one rank down from the previous year.

The World Bank's Doing Business 2018 notes a sharp deterioration in the conditions for starting a business over the past years. Greece also receives lower scores on many other criteria considered essential for a healthy business climate, such as dealing with construction permits, accessing electricity, registering property, accessing credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency. Registering property and enforcing contracts are Greece's two greatest weaknesses, with rankings of 131st and 145th, respectively (Figure 34). Obtaining credit and paying taxes are two other topics on which Greece scores poorly, with rankings of 90th and 65th, respectively.

**Figure 34 Greece's Doing Business rankings, 2018**

Ensuring formal property rights is fundamental, both because foreign investors require formal property transfer and registration and because informal property is not accepted as collateral for loans. The World Bank ranking is based on an analysis of the full sequence of procedures necessary for a business to purchase property from another business and transfer title to the buyer's name. It also measures the quality of the land administration system in each economy. Doing Business indicates that registering property in Greece requires 10 different procedures, takes 20 days, and costs 4.8 percent of the property value. Simplifying the procedures and reducing the costs are essential to make Greece more attractive to foreign investors.

Greece's second-lowest ranking is for enforcing contracts. According to Doing Business, contract enforcement in Greece takes an average of 1,580 days and costs 14.4 percent of the value of the claim. Improving the administration and efficiency of the courts is important as is assuring their independence from political interference.

The World Bank analysed data on credit information collected through a survey of credit registries, as well as data on the legal rights of borrowers and lenders, collected through a survey of financial lawyers and verified by analysing laws, regulations, and public information on collateral and bankruptcy laws. This analysis confirms that access to credit is poor, and economists highlight credit constraints as one of the reasons for weak investment and the slow recovery even when demand improved.

Greece's bureaucracy makes complying with tax obligations difficult. Doing Business records the taxes and mandatory contributions that a medium-size company must pay and measures the administrative burden of paying taxes and contributions and dealing with post-

filing processes. It defines a “standard case” scenario using a set of financial statements and assumptions about transactions made by a given company over the year. It also compiles information on the frequency of filing and payments, time taken to comply with tax laws, time taken to comply with the requirements of post-filing processes, and time waiting for these processes to be completed. Greece ranks 65th on ease of paying taxes.

Lowering taxes and shifting to a simpler tax structure would be a step in the right direction, but these measures would need to be complemented by major reforms of the administrative system in order to make the country more attractive to foreign investors. Temporary tax breaks for new investment could play a part in boosting investment spending. Although the literature suggests that the impact of tax breaks on attracting investment can be uncertain and potentially costly, these drawbacks could be limited by targeting industries in which Greece has a competitive advantage. Tax breaks for new investment could also send a signal that the country is open for business.

Start-ups can play a vital role in boosting growth, increasing employment, and enhancing Greece’s position as a place to do business. Greece still has a well-qualified workforce (despite the brain drain since the start of the crisis), and the relatively low operating costs that would result from implementation of the pension package should give it a competitive advantage.

Despite the crisis, the number of start-ups almost doubled between 2010 and 2015. Their position is now being threatened by higher taxes and a lack of financing. For this reason, it is highly advisable that start-ups enjoy generous tax allowances, to give them time to get established and flourish. The creation of support networks, such as StartupGreece (which is supported by the Ministry for Development), is a step in the right direction. More needs to be done to improve start-ups’ access to finance, provide training, and help them grow. Promoting Greece as a good place for start-ups could also help attract FDI in new or already established start-ups.

Lower taxes are a key factor in boosting growth and attracting FDI. But the literature suggests that investment is unlikely to be attracted without a growing, more open, and deregulated economy than Greece offers today. Adequate infrastructure and political stability are also important.

### ***Industries to Target***

Most discussions and thinking about Greece’s industrial base and the industries that should be prioritised focus on the largest industries in Greece: agriculture, food and drinks, and tourism-related industries. Focusing on these sectors may not make sense. Concentration of future investments in these industries would provide only a short-term benefit, because it would fuel continued unbalanced growth and leave Greece dependent on imports.

With a few exceptions, the industries associated with tourism are among the least diversified in terms of inputs. Real estate services; rental and leasing activities; travel agency, tour operators, and other reservation services; accommodation and food services; land transport services; water transport services; and air transport services all buy inputs from a small number of industries. Tourism therefore generates far fewer spill overs than the industries proposed below.

We defined five criteria to identify the sectors most likely to constitute engines of growth and transform Greece's industrial structure in a positive way:

- the extent of backward linkages (the magnitude of spill over effects on upstream industries)
- the size and maturity of the sector in Greece
- the industry's export intensity
- the industry's capital intensity
- the industry's need to expand capacities in Western Europe to serve growing markets.

The first criterion is analysed on the basis of Greece's input-output table, which includes 64 industries. The other four criteria are analysed based on data from IHS Markit's Comparative Industry Service, which relies on the ISIC-Rev4 classification and covers 105 industries. Using the World Industry Service's more granular data makes it possible to conduct international comparisons of sector size, export intensity, and growth potential, allowing us to identify the most promising industries for foreign investors in Greece.

The backward industry linkages concentration index measures an industry's spill over potential (Table 7). A lower index value indicates a higher spill over effect. Industries with a low index are preferred. Concentrating investments in a few industries that would magnify the positive effect of higher investment in Greece would be an effective way to trigger accelerated growth, as the target sectors would act as engines of growth for the other industries.

**Table 7 Index of backward industry linkage concentration**

Industry	Index
Products of agriculture, hunting, and related services	47.00
Products of forestry, logging, and related services	45.25
Fish and other fishing products; aquaculture products; support services to fishing	38.00
Mining and quarrying	6.75
Food, beverages, and tobacco products	40.75
Textiles, wearing apparel, leather, and related products	44.75
Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials	55.75
Paper and paper products	49.25
Printing and recording services	44.00
Coke and refined petroleum products	61.75
Chemicals and chemical products	36.75
Basic pharmaceutical products and pharmaceutical preparations	41.75
Rubber and plastic products	47.25
Other non-metallic mineral products	32.50
Basic metals	57.75
Fabricated metal products, except machinery and equipment	42.00
Computer, electronic, and optical products	22.75
Electrical equipment	48.50
<b>Machinery and equipment n.e.c.</b>	<b>38.25</b>
Motor vehicles, trailers, and semi-trailers	34.75
<b>Other transport equipment</b>	<b>24.25</b>
Furniture and other manufactured goods	17.50
Repair and installation services of machinery and equipment	21.75
Electricity, gas, steam, and air conditioning	54.25
Natural water; water treatment, and supply services	24.50
Sewerage services, sewage sludge, waste collection, treatment and disposal services, materials recovery services, remediation services, and other waste management services	18.00
Constructions and construction works	19.50

Industry	Index
Wholesale and retail trade and repair services of motor vehicles and motorcycles	29.50
Wholesale trade services, except of motor vehicles and motorcycles	7.75
Retail trade services, except of motor vehicles and motorcycles	13.25
Land transport services and transport services via pipelines	20.75
Water transport services	58.75
Air transport services	38.75
Warehousing and support services for transportation	27.50
Postal and courier services	48.75
Accommodation and food services	34.25
Publishing services	4.75
Motion picture, video and television programme production services, sound recording and music publishing; programming and broadcasting services	19.25
Telecommunications services	39.50
Computer programming, consultancy, and related services; information services	7.75
Financial services, except insurance and pension funding	22.25
Insurance, reinsurance, and pension funding services, except compulsory social security	60.25
Services auxiliary to financial services and insurance services	47.75
Real estate services	28.00
Legal and accounting services, services of head offices, management consultancy services	12.75
Architectural and engineering services; technical testing and analysis services	7.50
Scientific research and development services	18.00
Advertising and market research services	23.00
Other professional, scientific, technical services and veterinary services	26.25
Rental and leasing services	9.75
Employment services	18.25
Travel agency, tour operator, and other reservation services and related services	17.50
Security and investigation services; services to buildings and landscape; office administrative, office support and other business support services	1.00
Public administration and defence services; compulsory social security services	11.25
Education services	25.00

Industry	Index
Human health services	48.50
Residential care services; social work services without accommodation	5.25
Creative, arts, entertainment, library, archive, museum, other cultural services; gambling and betting services	59.25
Sporting services and amusement and recreation services	33.25
Services furnished by membership organisations	23.75
Repair services of computers and personal and household goods	36.25
Other personal services	52.50
<i>Note:</i> The industry classification system for the data used to compute the backward concentration index (input-output table) has less detail than the data behind the other criterion. Therefore, industries in this table are at a higher level of aggregation than Table 8. Selected industries are in bold.	

The backward concentration index of the machinery and equipment industry—which includes the manufacturing of engines and turbines, lifting and handling equipment, food and beverages machinery, machinery for textiles, and machine tools—is low, making it a good target for development (Table 8; for information on all 105 industries, see Appendix C). Stimulating investment in this sector would positively affect other industries and the economy, because the input structure of the machinery and equipment industry is highly diversified.

Another industry with a low backward concentration index (and hence broad spill over effects on other industries) is “other transport equipment.” It includes the manufacturing of aircraft, spacecraft, and ships. These activities rely on inputs from a large number of sectors in both manufacturing and services. In the first years of production, companies in these sectors would need to import most of their equipment. However, this investment would create a market within Greece, which would eventually attract more investors in supplier industries, fuelling a virtuous cycle.<sup>18</sup>

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<sup>18</sup> Other industries in this appendix with a low backward concentration index were not selected because they did not meet the other four criteria.

**Table 8 Other selection criteria for focus industries**

<i>Industry</i>	<i>Percent of manufacturing in Greece, 2016</i>	<i>Average export intensity in Western Europe, 2016</i>	<i>Capital intensity in Western Europe</i>	<i>Western Europe industries investing: CapEx<sup>a</sup>, CAGR<sup>b</sup> 2017–22</i>
Machinery and equipment not otherwise classified, among which:				
Engines and turbines	0.2	64	15	5.3
Lifting and handling equipment	0.3	136	10	7.2
Machine tools	0.7	41	11	5.4
Food and beverage machinery	0.0	77	14	6.5
Machinery for textiles	0.0	111	15	3.3
Other transport equipment, among which:				
Shipbuilding	0.1	44	23	9.9
Aircraft and spacecraft	0.7	102	23	8.2
Manufacturing industries median	0.3	61	19	4.5

Source: IHS World Industry Service © IHS Markit.

Note: Backward linkages scores are displayed separately for all industries in Table 7, as the industry classification system for the data used to compute them is grouped differently. For information on all 105 industries, see Appendix C.

<sup>a</sup> CapEx: Capital Expenditure

<sup>b</sup> CAGR: Compound Annual Growth Rate

The second criterion is the size of the industry in Greece, as measured by the value added share of total GDP at factor cost. A large industry is one in which there are already well-established players; it may be difficult to penetrate with greenfield investment. We aimed for unsaturated industries whose growth potential would be lifted once reforms are implemented.

The third criterion is the industry's export intensity (the share of Western European production that is exported). Assuming that most of the potential new investment would come from Western Europe, we searched for export-intensive industries there.

The fourth criterion is capital intensity in Western Europe, measured by the industry's gross fixed capital expenditure divided by its value added. Some industries (such as aluminium) require massive capital expenditures on an ongoing basis. Higher capital intensity in an industry is likely to discourage FDI.

The fifth criterion is the investment outlook for the industry in Western Europe. We looked for industries expected to see the fastest growth in real fixed investment in the region over the next five years. These industries do not currently have the capacity to respond to future demand and plan to add capacity or modernize and upgrade their production system to better serve their markets.

Based on these five criteria, we ranked all industries. The results indicate that aircraft manufacturing, shipbuilding, and machinery and equipment appear to be the most promising industries for FDI in Greece. Most appear in the top 10 percent on all criteria, and all appear in the top half of Western European industries by annual growth of real capital expenditure by 2020 (Table 8).

Two of these three industries did not meet one of the above criteria. The aircraft and spacecraft industry is highly capital intensive, but it is a dynamic industry with only a few producers. It is cash rich and therefore in a position to provide the funding needed (or support the provision of finance) for greenfield investments and subsequent operation.

The European aircraft and spacecraft manufacturing is expected to account for about 30 percent of world output of aircraft and spacecraft by 2020. This industry faces robust demand from airlines: Major capital expenditure will be needed to meet current commitments and future demand, as well as maintain the European industry's leading market position. Meeting environmental and safety regulations will force the aerospace industry to make continued and sustainable investments. Greek workers currently have the skills needed to support this industry. The aircraft and spacecraft production is concentrated in a few locations in Europe. They are increasingly resource constrained, as a result of growing skills shortages. Greece's status as a euro zone member makes it a possible candidate for expansion.

Shipbuilding is not as highly export intensive as aircraft and spacecraft manufacturing in Western Europe. It nevertheless remains worthy of interest because of the size of its end-market in Greece. Further, production of leisure and cruise ships would facilitate the export by Greece of tourism services. Moreover, demand is particularly dynamic in two segments in which European producers specialize: leisure boats and cruise ships.

The machinery and equipment industry was selected because of its relatively small size and low capital intensity and the expected future growth rate of the sector, in Europe and worldwide. It includes the manufacture of engines and turbines, lifting and handling equipment, machine tools, food and beverage machinery, and machinery for textiles as well as the nascent 3-D printing industry. Following years of slow investment growth in Europe after the 2007/08 financial crisis and the 2012 sovereign debt crisis, investment growth in Europe has finally started to recover, supported by accommodative monetary policy and improved confidence across Europe. Investment is also picking up in emerging markets, as commodity prices have stabilized. Brazil and Russia, which were in recession in 2015/16, have turned around, and growth prospects have improved across most of Asia. In addition to the cyclical upturn, many emerging economies are still in an investment and capacity-building phase, which will also support continued growth in machinery and equipment exports from Europe. Even China, which has significant excess capacity in many sectors, is expected to see real fixed investment growing by 4.6 percent a year until the mid-2020s.

The machinery and equipment industry is also at the forefront of technological developments, producing robots that may transform the world economy. According to IHS Markit Technology, the world market for robotics could grow from \$10.7 billion in 2014 to \$19.7 billion in 2020—an 84 percent growth in nominal terms in five years. Machinery and equipment producers are well positioned to benefit from rapid and promising technological innovation.

### ***Projected Impact of Reform***

How much output would be generated by a given amount of investment in these industries? In the aerospace and spacecraft industry in Western Europe, investment of €1 billion typically generates €19 billion of additional output. This multiplier was used to estimate the impact of FDI inflow on exports and value added.<sup>19</sup> We then calculated the spill over effects as well as the implications for public finances. How much FDI would Greece need to attract in order to increase the rate of real GDP growth by 0.5 percentage points above the baseline rate? If FDI is distributed across industries proportionately to each industry's share of total output, FDI inflows would have to increase close to €2 billion above baseline by 2021 (more than double their 2015 level) and be about €3 billion above baseline by 2025 (Figure 35).

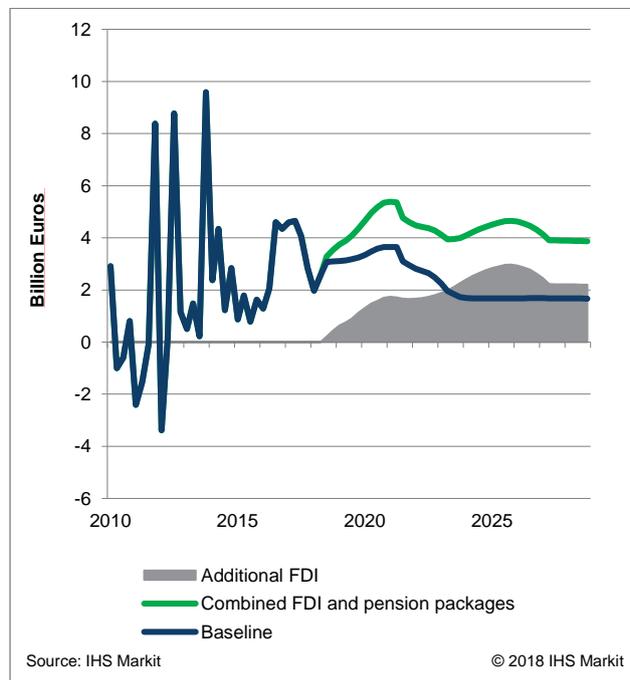
In the model, the rise in FDI was introduced by increasing the amount of incoming FDI in the first seven years of the scenario, a period assumed to correspond to the development of greenfield investment. The incremental FDI is represented by the shaded area on Figure 35. After 2025, the incoming FDI flows slow as companies shift from new investment to the maintenance of operations. Clearly, a prolonged rise in incoming new investment flows would raise real fixed investment and GDP even beyond the levels shown here, further benefit real GDP growth.

When all induced effects are accounted for, the higher FDI inflows assumed in this scenario raise Greece's real GDP by 2.5 percent in 2020, and by 7.4 percent in 2024 (Figure 37). Achieving this level of FDI is within reach. In fact, the target could even be exceeded through targeted, voluntary policies, which would raise Greece's actual and potential growth well beyond the levels indicated in this study.

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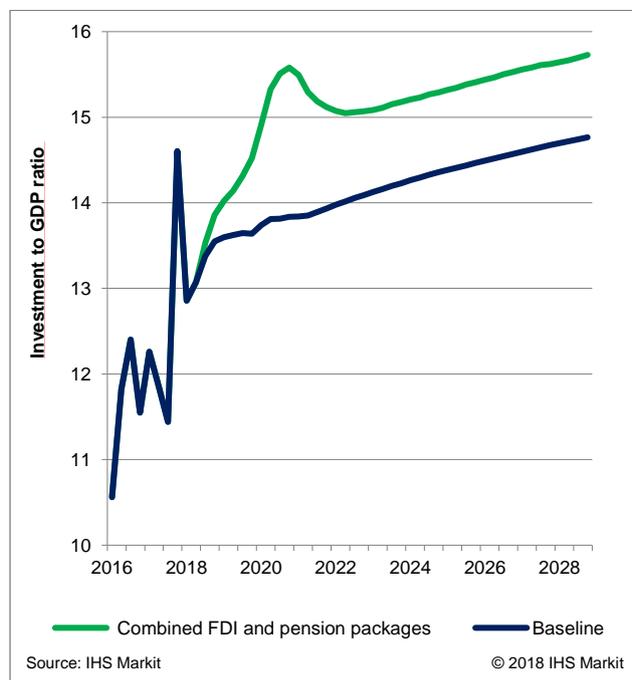
<sup>19</sup> The multipliers were calculated on the basis of data from IHS Markit's World Industry Service for 2000–08 (before the financial crisis), a stable growth period in which investment was not hurt by tight credit conditions or weak demand.

**Figure 35 Projected foreign direct investment under the baseline and the combined FDI and pension package scenarios, 2010–28**



The incremental FDI would stimulate fixed investment in Greece both directly, and indirectly (Figure 36). The direct effect would be a 7.5 percent increase in the level of real fixed investment by 2020, and 12.3 percent by 2028. The induced effect would be an additional 3 percent increase in other industries, upstream and downstream, in 2028.

**Figure 36 Projected real fixed investment as a share of GDP under the baseline and combined FDI and pension package scenarios, 2010–28**



Under the FDI increase scenario, fixed investment in Greece grows much more rapidly than under the baseline in the first years, and is 14.6 percent above baseline levels in 2021, on an average annual basis. Once the extra FDI inflow is absorbed, investment growth shifts from greenfield and capacity expansion investment to maintenance investment. The rate of growth of fixed investment temporarily slows around 2022, but remains above baseline level in the long term<sup>20</sup>. The increase in investment triggers faster real GDP growth, however, so that the ratio of fixed investment to GDP comes down slightly from the 15.5% peak recorded in 2021.

Even though there is no immediate reduction in the debt-to-GDP ratio, the reform helps Greece's economy to return to a more sustainable growth path. It breaks the vicious circle triggered by decelerating growth and rising unemployment. Real GDP grows 0.7 percentage points faster than in the baseline scenario in 2019, and 1.8 percentage points faster in both 2020 and 2021. The growth rate remains higher than in the baseline in subsequent years. In addition, the unemployment rate decreases.

<sup>20</sup> Indeed, after the investment boost of the first years, potential output in Greece increases but actual real GDP growth only slowly rises to the higher potential growth rate. Hence, the output gap temporarily widens which explains the temporary slowdown in investment growth. The latter nevertheless continuously remains well above baseline level.

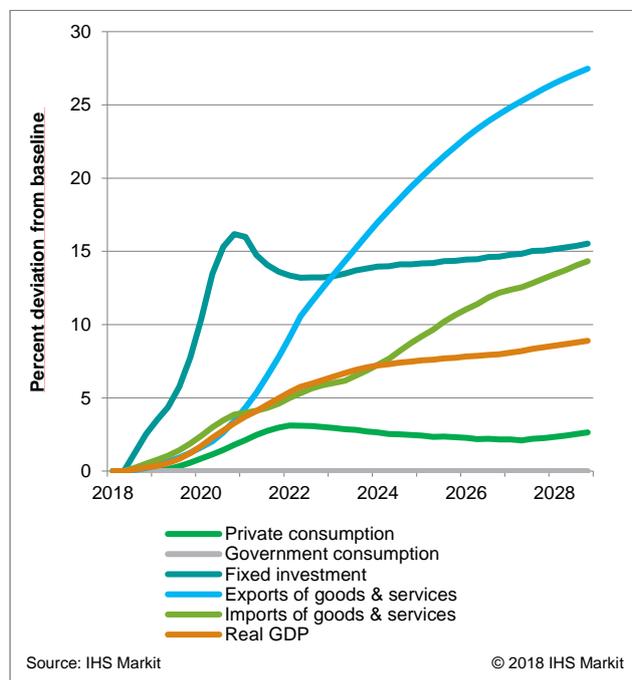
Concentrating FDI in the three industries identified triggers the following virtuous circle:

- Other industries start investing to supply the industries that benefited from the original FDI inflow.
- This induced investment creates employment, hence additional income, hence income tax revenue, while reducing unemployment subsidies.
- The direct and induced investment raises exports.
- The resulting improvement in economic conditions helps relax the credit constraint for businesses and households, gradually increasing consumer and business confidence, slowing the rate of exit of people and deposits, and eventually reversing these outflows.

This activity does not create much additional corporate tax revenue for government coffers, because one of the reasons why foreign investors chose Greece is that they benefit from a tax holiday in the first years of their activity. The rules of the European Commission prevent countries from granting tax holidays to just a few companies or industries, so the corporate tax holiday is assumed to apply to all new (greenfield) investment in Greece.

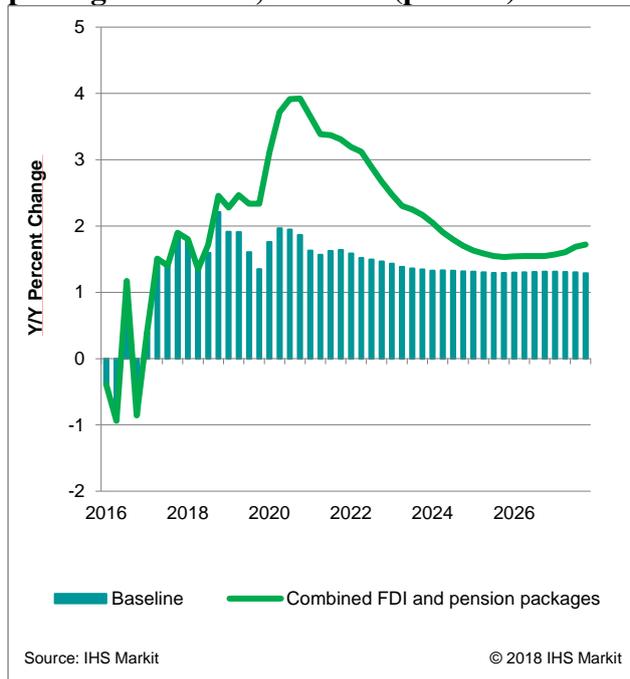
The spillover effects are nevertheless such that by 2028, real fixed investment is nearly 16 percent above baseline level, real private consumption 2.6 percent above baseline, and exports of goods and services 27 percent above baseline (Figure 37). Private consumption does not increase in line with real GDP because the rise in real incomes remains muted. Indeed, the pension reform which is assumed in this scenario causes the return to the labour market of a large number of former pensioners, which durably depresses nominal wage rates. The boost to growth from higher investment and exports only filters slowly into higher employment, given the nature of these investments.

**Figure 37 Projected real GDP and its components under the combined FDI/pension scenario, 2018–28 (deviation from baseline)**

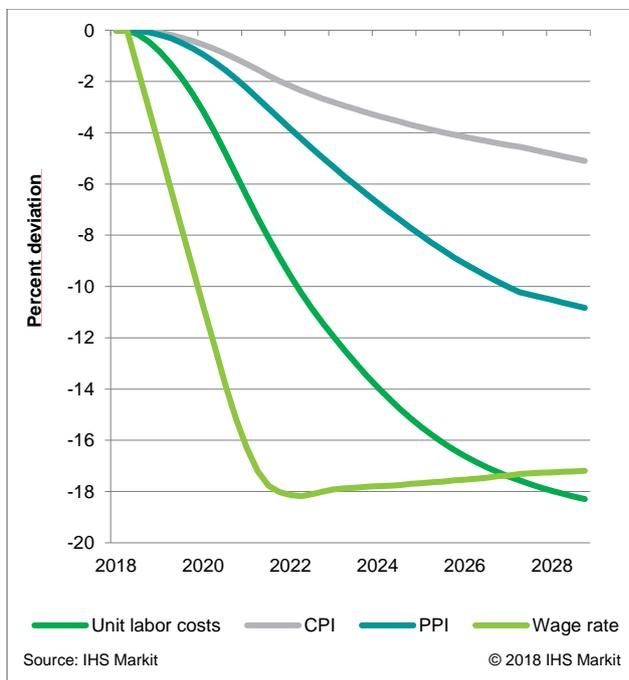


This increase in activity raises imports, but the net trade effect is positive. With faster real GDP growth (Figure 38) and labour costs contained (Figure 39), employment growth picks up, but the impact is not substantially different from that observed in the pension package (Figure 40). The difference does increase over time, however. The impact on inflation is similar to that observed in the pension package scenario, as the key drivers of the inflation response are the cuts in social contributions and the increase in labour supply (Figure 39).

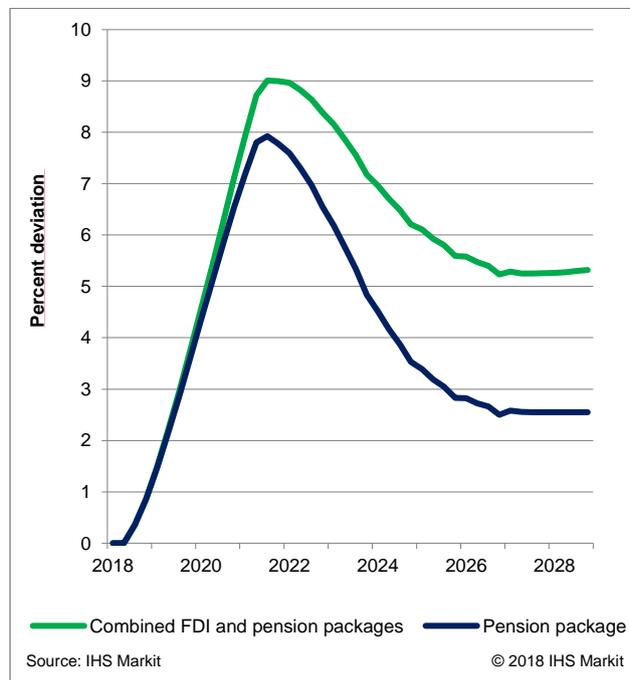
**Figure 38 Projected real GDP growth under the baseline and combined FDI/pension package scenarios, 2016–28 (percent)**



**Figure 39 Projected wages, unit costs, CPI, and PPI in Greece under the combined FDI/pension scenario 2018–28 (deviation from baseline)**

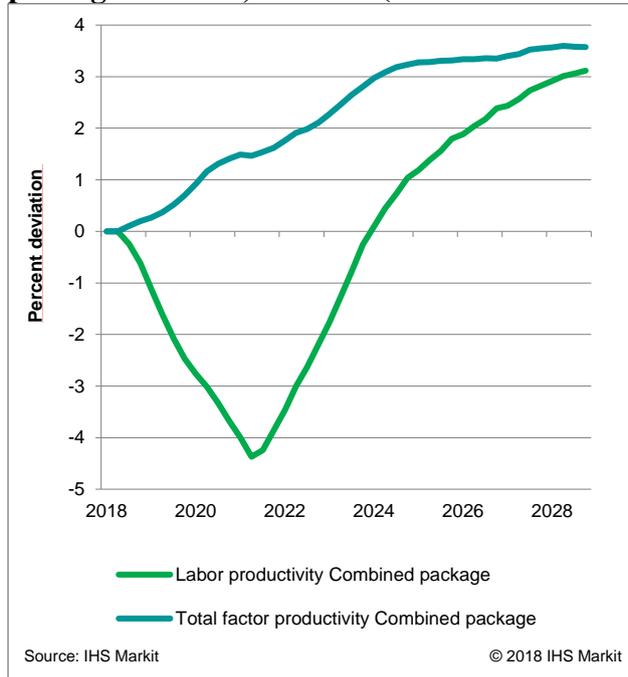


**Figure 40 Projected employment in Greece under the combined FDI/pension package scenarios, 2018–28 (deviation from baseline)**

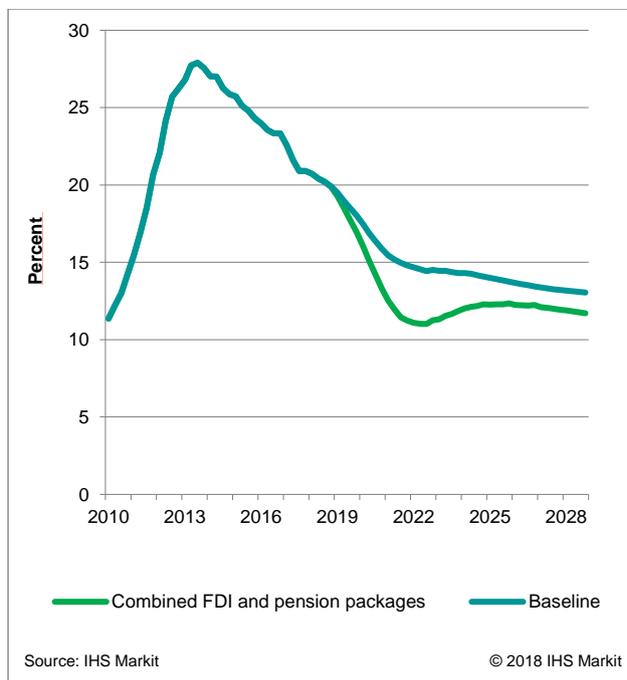


The fall in labour productivity observed in the pension package scenario makes way for a recovery of labour productivity later in the forecast period, which helps to keep labour costs in check. Both labour productivity and total factor productivity rise in this scenario (Figure 41), lifting long-term potential growth. Faster productivity growth from 2022 onwards offsets the inflationary effects of a tighter labour market (Figure 41 and Figure 42).

**Figure 41 Projected labour and total productivity under the combined FDI/pension package scenario, 2018–28 (deviation from baseline)**



**Figure 42 Projected unemployment rate under the baseline and combined FDI/pension package scenarios, 2018–28 (unemployment rate, in %)**

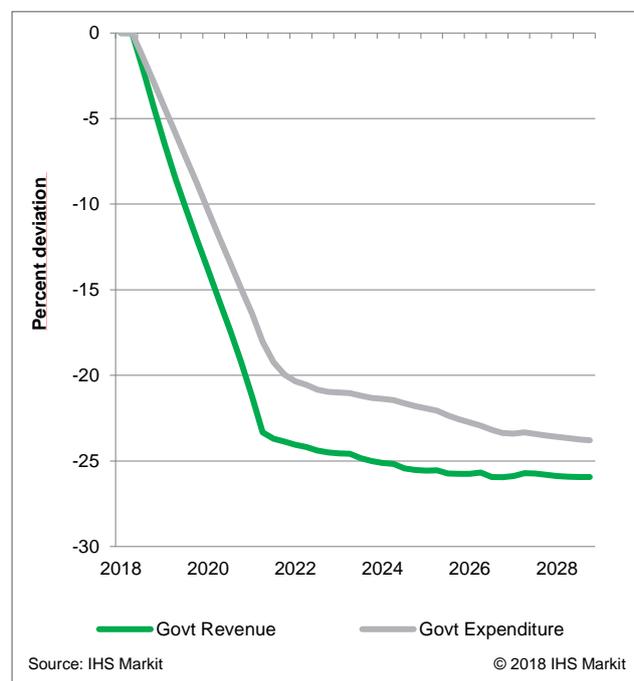


There are some leakages in the benefits. First, to invest and later produce, the industries initially have to import. Imports therefore grow faster in this scenario, rising by almost 15

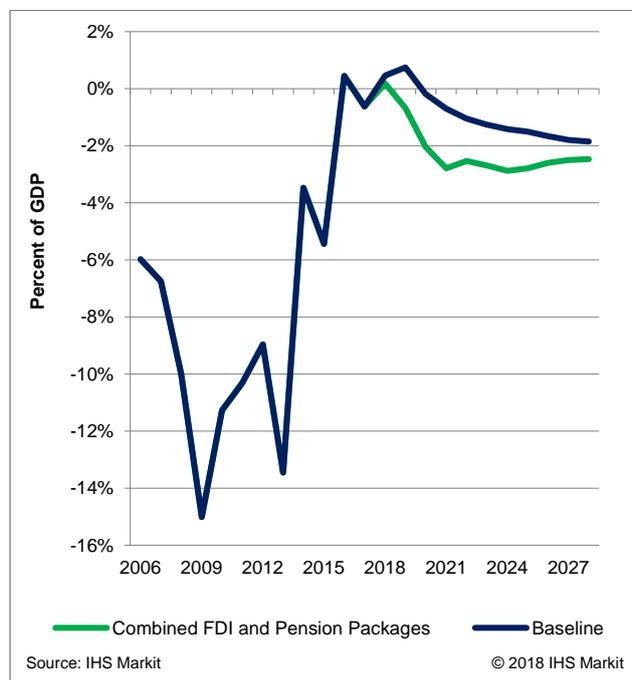
percent above baseline level. Even so, the net contribution from trade (illustrated in Figure 37) shifts from negative in the first year (as a result of the high import content of investment) to positive in later years. Net real trade amounts to -1.3 percent of GDP in 2018 but shows a surplus of 3 percent of GDP in 2028.

The second source of leakage stems from the impact on public finances. As a result of the corporate tax holiday, revenue from corporate taxes barely increases (Figure 43). The elimination of social contributions also lowers the wage bill. This combination has two effects. First, it reduces nominal household wage income; in the absence of a change in income tax structure, it therefore reduces income tax revenue. Second, combined with the reduction in pensions, the cut in social contributions eventually lowers the price level, through the mechanism detailed earlier. Even if the fiscal balance is not severely different (Figure 44), so that nominal debt does not increase much, lower prices result in lower nominal GDP, which raises the debt-to-GDP ratio. The decline in nominal GDP masks a significant increase in real GDP— which triggers increases in employment and fuels a virtuous (real) income cycle. However, this virtuous cycle takes a while to diffuse through the economy, in the form of increased consumption and investments in consumer-oriented industries, most of which are labour-intensive service sectors.

**Figure 43 Projected government revenue and expenditure under the combined FDI/pension scenario, 2018–28 (deviation from baseline)**



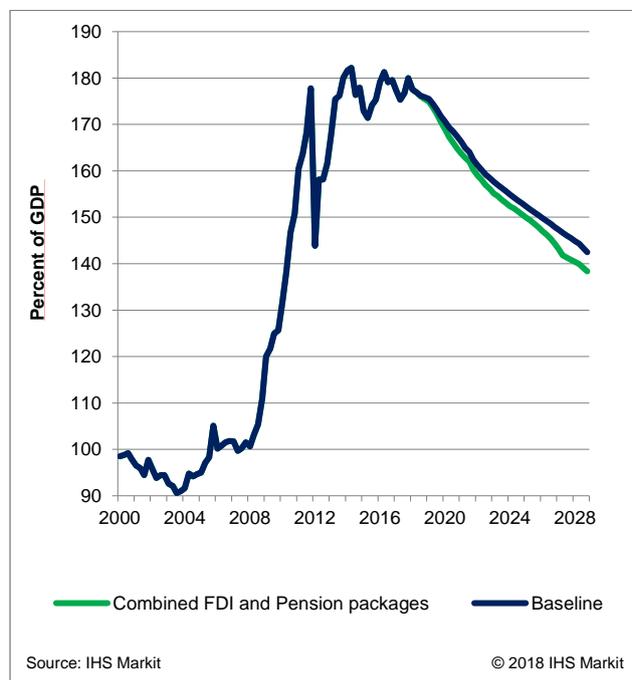
**Figure 44 Projected budget balance under the baseline and the combined FDI/pension scenarios, 2006–28 (share of GDP, in %)**



The net impact on public finances is a stabilization in the debt share of GDP. The negative impact of the pension package alone on the public deficit<sup>21</sup> is barely offset by the effect of higher growth thanks to FDI. Hence, despite much faster growth, the debt-to-GDP ratio only decreases marginally (Figure 45).

<sup>21</sup> The negative impact on the budget balance could, however, be eliminated if household contributions to the health system were maintained, yet the positive impact on employment and growth would also be slightly less.

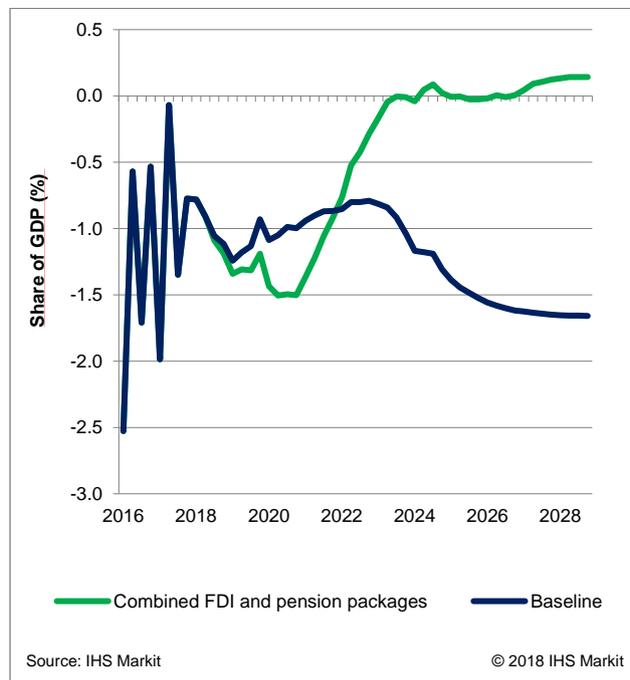
**Figure 45 Projected public debt as a share of GDP under the baseline and combined FDI/pension scenarios, 2000–28**



The rise in employment and wage income, combined with lower social contributions paid by employees, increases the nominal disposable income of those employed. At an aggregate macroeconomic level, the faster economic growth triggered by this combined fiscal package compensates after a few years for the negative effect of lower pension outlays on personal disposable income.

The current account balance also improves under this scenario (Figure 46). Exports pick up and, even if imports are higher, the net effect on the balance of payments is positive. Combined with higher capital inflows, this effect increases foreign exchange reserves and the cover ratio. This leads to improvements in banks' financial situation, allowing a progressive relaxation of the credit constraint.

**Figure 46 Projected current account balance as a share of GDP under the baseline and combined FDI/pension scenario, 2000–28**



Under the combined FDI/pension package, the economic structure starts to change in a positive way: the share of export-oriented industries picks up and that of domestically oriented activities and services decreases. The change brings Greece's industrial structure more in line with that of other EU countries. Table 9 presents the annual growth rates of real GDP and components under the two scenarios.

**Table 9 Projected annual growth rates of real GDP and its components in the baseline and combined FDI/pension scenarios, 2018–28 (percent)**

<i>Item</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2022</i>	<i>2028</i>
<i>Real GDP</i>					
Baseline	1.7	1.7	1.9	1.5	1.3
Combined FDI/pension package	1.8	2.4	3.7	3.0	1.7
<i>Difference between combined FDI/pension package and baseline</i>	0.1	0.7	1.8	1.5	0.4
<i>Private consumption</i>					
Baseline	0.6	1.2	1.8	1.2	1.3
Combined FDI/pension package	0.6	1.5	2.8	1.7	1.6
<i>Difference between combined FDI/pension package and baseline</i>	0.0	0.3	1.1	0.5	0.3
<i>Government consumption</i>					
Baseline	-0.4	0.9	1.2	1.4	1.2
Combined FDI/pension package	-0.4	0.9	1.2	1.4	1.2
<i>Difference between combined FDI/pension package and baseline</i>	0.0	0.0	0.0	0.0	0.0
<i>Fixed investment</i>					
Baseline	7.2	4.9	3.2	2.6	1.9
Combined FDI/pension package	8.2	9.4	11.5	1.4	2.3
<i>Difference between combined FDI/pension package and baseline</i>	1.0	4.5	8.3	-1.2	0.4
<i>Exports, goods &amp; services</i>					
Baseline	7.6	3.5	3.3	2.8	2.5
Combined FDI/pension package	7.7	4.2	4.9	7.6	3.8
<i>Difference between combined FDI/pension package and baseline</i>	0.1	0.8	1.7	4.8	1.2
<i>Imports, goods &amp; services</i>					
Baseline	2.0	3.2	3.0	2.6	2.7
Combined FDI/pension package	2.2	4.3	5.0	3.8	3.7
<i>Difference between combined FDI/pension package and baseline</i>	0.2	1.1	1.9	1.2	1.1
<i>CPI</i>					
Baseline	1.1	1.6	1.9	2.0	1.8
Combined FDI/pension package	1.1	1.4	1.3	1.2	1.5
<i>Difference between combined FDI/pension package and baseline</i>	0.0	-0.2	-0.6	-0.8	-0.4

<i>Item</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2022</i>	<i>2028</i>
<i>Unemployment rate (1)</i>					
Baseline	20.3	18.8	16.6	14.5	14.5
Combined FDI/pension package	20.3	18.1	14.7	11.1	11.8
<i>Difference between combined FDI/pension package and baseline</i>	0.0	-0.6	-2.0	-3.4	-2.7
<i>Government revenue (2)</i>					
Baseline	50.0	50.0	49.7	49.1	48.5
Combined FDI/pension package	49.2	45.1	40.8	36.2	35.6
<i>Difference between combined FDI/pension package and baseline</i>	-0.9	-4.9	-8.8	-12.9	-12.9
<i>Government expenditure (2)</i>					
Baseline	49.6	49.2	49.9	50.2	50.3
Combined FDI/pension package	49.0	45.8	42.9	38.8	38.1
<i>Difference between combined FDI/pension package and baseline</i>	-0.6	-3.5	-7.0	-11.4	-12.3
<i>Government primary surplus (2)</i>					
Baseline	3.2	3.3	2.3	1.4	-0.1
Combined FDI/pension package	3.0	1.9	0.5	-0.1	-0.6
<i>Difference between combined FDI/pension package and baseline</i>	-0.3	-1.4	-1.9	-1.5	-0.6
<i>Government balance (2)</i>					
Baseline	0.5	0.7	-0.2	-1.0	-1.9
Combined FDI/pension package	0.2	-0.7	-2.0	-2.5	-2.5
<i>Difference between combined FDI/pension package and baseline</i>	-0.3	-1.4	-1.9	-1.5	-0.6
<i>Government debt (2)</i>					
Baseline	176.6	173.7	169.0	159.8	143.7
Combined FDI/pension package	176.5	173.3	167.2	157.5	145.8
<i>Difference between combined FDI/pension package and baseline</i>	-0.1	-0.4	-1.8	-1.3	+2.1
<i>Current account balance (2)</i>					
Baseline	-0.97	-1.12	-1.03	-0.81	-1.16
Combined FDI/pension package	-0.99	-1.29	-1.48	-0.50	+0.64
<i>Difference between combined FDI/pension package and baseline</i>	-0.02	-0.17	-0.45	+0.31	+1.80

Notes: (1) Levels (2) as a % of GDP

Source: IHS Markit

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## 6 Conclusion

Economic conditions in Greece deteriorated sharply over the past decade, and the outlook for the economy remains grim. Waves of reforms have done little to move Greece onto a higher-growth path. Indeed, the fiscal tightening required by creditors has triggered a vicious cycle of slow growth, deflation, and weak public revenue; further tax increases and spending cuts; reduced confidence, investment, and potential growth; and increased deflation.

To determine what needs to be done to spur growth, this study assessed the likely outcomes of various fiscal reforms, including changes in the VAT, personal income, and corporate income taxes and changes in pensions. It finds that, on their own or in combination, none of these reforms will lead to sustainable long-term growth in Greece.

To get people back to work and raise incomes, Greece needs investment. But bank lending is extremely limited, and companies have few other means of funding the new investments they need to spur growth. The economy therefore remains stuck.

If the economy is to move to a higher growth path, the financing constraint must be relaxed and investment boosted. FDI is required to boost investment, which would help shift the economy towards industries with stronger growth and export potential.

Greek's current export industries (agriculture and tourism) are not industries for which world demand is dynamic. Other industries need to be developed if the economy is to grow. This report identifies three industries—aircraft manufacturing, shipbuilding, and machinery and equipment—in which Greece could attract FDI, compete globally, and increase exports, boosting growth and employment.

The targeted FDI intervention could be accompanied by a pension reform package that would raise the retirement age to 67, replace the current pension system with a flat rate monthly payment of €700 a month to remaining pensioners and eliminate pension contributions by employers and employees. Such reform would indeed provide a good complement to the FDI policy by helping make Greece an attractive location for foreign investors.

The study shows that an increase in FDI accompanied by the proposed reform leaves the Greek economy in much better shape than do the baseline or the fiscal policy scenarios, with real GDP 9 percent higher than under the business-as-usual scenario by 2028. The changed industrial mix leaves Greece better able to cope with the challenges of a financially constrained domestic economy. Additional investment in industries both upstream and downstream from the three targeted industries also help reduce the country's dependency on imports.

The projected acceleration in economic growth comes mainly from higher exports and a faster pace of growth in several industries, including industries directly benefiting from the

FDI. The direct and indirect effects of the increase in FDI trigger a positive multiplier effect on employment, income, private consumption, and consumer-oriented industries.

The economic benefits of higher FDI could be even larger than projected here as a result of spill over (and productivity growth) effects from increased consumer and business confidence, not taken account explicitly here. Deep structural reforms could also further stimulate investment and accelerate growth. However, in the absence of targeted efforts to reduce import dependency by building capacity in supplier industries, the high import content of investment and consumption means that some of the benefits could be lost through rising imports. The net effect on the economy would be higher than indicated here if more industries emerged in Greece to replace these imports.

The combined FDI/pension reform package does little to reduce the debt-to-GDP ratio, the unemployment rate remains high (11.7 percent by the end of 2028), and the elimination of social contributions reduces prices by about 4.5 percent. The Greek economy is nevertheless in much better structural shape in this scenario. After economic growth returns to a faster path and unemployment comes closer to the nonaccelerating inflation rate of unemployment, inflation will return, improving the debt situation.

Increasing FDI inflows represents one of the great challenges facing Greece. Consistent government policies, an acceleration of structural reforms, tax holidays for new investments, and reductions in the cost of labour will all work in the desired direction. Whether such measures will be sufficient remains unclear.

A combination of the package of measures proposed in this report and the debt relief granted to Greece through the June 2018 agreement with the Eurogroup could accelerate improvement of the economic situation. Debt relief alone, however, does not do much to transform Greece's industrial structure, as the failure of past debt relief exercises to spur private investment or private sector-led recovery has shown.

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## Appendix A: Main Economic Indicators for Greece

**Table 10 Projected economic indicators under baseline and FDI/pension package scenarios, 2014–28 (billions of euros, unless otherwise specified)**

Item	2014	2015	2016	2017	2018	2019	2020	2021	2022	2028
<b>Real GDP</b>										
Baseline	185.7	185.0	184.6	187.0	190.2	193.4	197.1	200.3	203.3	219.9
Year-on-year percentage change	0.77	-0.35	-0.26	1.30	1.74	1.69	1.88	1.61	1.52	1.28
Scenario	185.7	185.0	184.6	187.0	190.4	194.9	202.0	208.9	215.1	239.0
Year-on-year percentage change	0.77	-0.35	-0.26	1.30	1.83	2.35	3.67	3.43	2.97	1.71
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.11	0.78	2.49	4.29	5.80	8.69
Difference in growth rate	0.00	0.00	0.00	0.00	0.09	0.66	1.79	1.82	1.45	0.43
<b>Private Consumption</b>										
Baseline	127.6	126.9	127.0	127.2	128.0	129.6	131.9	134.0	135.6	146.1
Year-on-year percentage change	0.79	-0.54	0.07	0.13	0.62	1.24	1.78	1.57	1.24	1.29
Scenario	127.6	126.9	127.0	127.2	128.0	129.9	133.6	137.4	139.8	149.7
Year-on-year percentage change	0.79	-0.54	0.07	0.13	0.63	1.51	2.84	2.84	1.73	1.59
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.23	1.29	2.54	3.10	2.46
Difference in growth rate	0.00	0.00	0.00	0.00	0.01	0.27	1.06	1.27	0.49	0.30
<b>Government Consumption</b>										
Baseline	40.5	40.9	40.4	39.9	39.7	40.1	40.6	41.1	41.7	44.9
Year-on-year percentage change	-1.22	1.15	-1.37	-1.17	-0.43	0.88	1.24	1.36	1.35	1.15
Scenario	40.5	40.9	40.4	39.9	39.7	40.1	40.6	41.1	41.7	44.9
Year-on-year percentage change	-1.22	1.15	-1.37	-1.17	-0.43	0.88	1.24	1.36	1.35	1.15
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Difference in growth rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Fixed Investment</b>										
Baseline	21.1	21.1	21.4	23.4	25.1	26.4	27.2	27.8	28.5	32.4
Year-on-year percentage change	-4.47	-0.26	1.48	9.69	7.20	4.86	3.17	2.20	2.65	1.93
Scenario	21.1	21.1	21.4	23.4	25.4	27.8	31.0	31.9	32.3	37.4
Year-on-year percentage change	-4.50	-0.30	1.50	9.70	8.20	9.40	11.50	2.90	1.40	2.30
Percentage deviation from baseline	0.00	0.00	0.00	0.00	1.20	5.30	13.97	14.75	13.33	15.43
Difference in growth rate	-0.03	-0.04	0.02	0.01	1.00	4.54	8.33	0.70	-1.25	0.37
<b>Exports, Goods &amp; Services</b>										
Baseline	55.4	56.9	55.9	59.7	64.3	66.5	68.7	70.7	72.7	84.3
Year-on-year percentage change	7.72	2.86	-1.89	6.93	7.63	3.49	3.27	2.96	2.80	2.50
Scenario	55.4	56.9	55.9	59.7	64.3	67.1	70.4	75.0	80.7	107.0
Year-on-year percentage change	7.72	2.86	-1.89	6.93	7.70	4.25	4.94	6.55	7.59	3.75
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.90	2.47	6.08	11.00	26.93
Difference in growth rate	0.00	0.00	0.00	0.00	0.07	0.76	1.67	3.59	4.79	1.25

Item	2014	2015	2016	2017	2018	2019	2020	2021	2022	2028
<b>Imports, Goods &amp; Services</b>										
Baseline	59.8	60.1	60.8	65.4	66.7	68.8	70.9	73.0	74.9	87.5
Year-on-year percentage change	7.71	0.40	1.25	7.53	1.97	3.17	3.02	2.90	2.61	2.66
Scenario	59.8	60.1	60.8	65.4	66.8	69.7	73.2	76.1	78.9	99.6
Year-on-year percentage change	7.71	0.40	1.25	7.53	2.16	4.30	4.96	3.97	3.79	3.72
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.15	1.31	3.24	4.25	5.34	13.83
Difference in growth rate	0.00	0.00	0.00	0.00	0.19	1.13	1.94	1.07	1.18	1.06
<b>CPI</b>										
Baseline	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.2
Year-on-year percentage change	-1.31	-1.73	-0.83	1.12	1.07	1.60	1.87	1.92	1.97	1.84
Scenario	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.2
Year-on-year percentage change	-1.31	-1.73	-0.83	1.12	1.06	1.36	1.28	1.07	1.16	1.46
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.00	-0.94	-1.85	-2.73	-4.92
Difference in growth rate	0.00	0.00	0.00	0.00	-0.01	-0.24	-0.59	-0.85	-0.81	-0.38
<b>Unemployment Rate (%)</b>										
Baseline	26.5	25.0	23.6	21.5	20.3	18.8	16.6	15.1	14.5	13.1
Year-on-year change	-0.96	-1.55	-1.44	-2.06	-1.18	-1.56	-2.11	-1.55	-0.55	-0.18
Scenario	26.5	25.0	23.6	21.5	20.3	18.1	14.7	11.8	11.1	11.8
Year-on-year change	-0.96	-1.55	-1.44	-2.06	-1.18	-2.19	-3.47	-2.88	-0.68	-0.22
Deviation from baseline	0.00	0.00	0.00	0.00	0.00	-0.70	-1.90	-3.30	-3.40	-1.30
Difference in change	0.00	0.00	0.00	0.00	0.00	-0.63	-1.36	-1.33	-0.13	-0.04
<b>Government Revenue</b>										
Baseline	83.4	84.3	87.5	88.1	91.3	93.9	96.8	99.9	103.2	124.3
Year-on-year percentage change	-5.48	1.06	3.75	0.76	3.61	2.86	3.10	3.15	3.27	3.29
Scenario	83.4	84.3	87.5	88.1	89.8	85.1	80.8	76.9	78.1	92.1
Year-on-year percentage change	-5.48	1.06	3.75	0.76	1.92	-5.24	-5.04	-4.89	1.60	3.10
Percentage deviation from baseline	0.00	0.00	0.00	0.00	-1.64	-9.37	-16.5	-23.0	-24.32	-25.9
Difference in growth rate	0.00	0.00	0.00	0.00	-1.69	-8.10	-8.14	-8.04	-1.67	-0.19
<b>Government Expenditure</b>										
Baseline	89.6	93.9	86.7	89.2	90.5	92.5	97.2	101.3	105.4	129.1
Year-on-year percentage change	-20.40	4.80	-7.70	2.90	1.40	2.30	5.10	4.20	4.00	3.40
Scenario	89.6	93.9	86.7	89.2	89.5	86.4	84.9	82.7	83.6	98.5
Year-on-year percentage change	-20.40	4.80	-7.70	2.90	0.30	-3.50	-1.80	-2.60	1.10	3.00
Percentage deviation from baseline	0.00	0.00	0.00	0.00	-1.10	-6.59	-12.6	-18.4	-20.7	-23.0
Difference in growth rate	0.00	0.00	0.00	0.00	-1.10	-5.80	-6.90	-6.80	-2.90	-0.40
<b>Primary Surplus</b>										
Baseline	0.9	-3.3	6.4	4.5	5.9	6.2	4.6	3.7	3.0	-0.2
Year-on-year change	17.90	-4.10	9.70	-2.00	1.50	0.30	-1.70	-0.90	-0.70	-0.20
Scenario	0.9	-3.3	6.4	4.5	5.4	3.6	0.9	-0.6	-0.2	-1.6
Year-on-year change	17.90	-4.10	9.70	-2.00	1.00	-1.90	-2.60	-1.50	0.40	0.00
Deviation from baseline	0.00	0.00	0.00	0.00	-0.51	-2.68	-3.67	-4.33	-3.23	-1.48
Difference in change	0.00	0.00	0.00	0.00	-0.50	-2.20	-0.90	-0.60	1.10	0.20

Item	2014	2015	2016	2017	2018	2019	2020	2021	2022	2028
<b>Budget Balance</b>										
Baseline	-6.2	-9.6	0.8	-1.1	0.9	1.4	-0.4	-1.4	-2.2	-4.8
Year-on-year change	18.10	-3.40	10.30	-1.90	1.90	0.60	-1.80	-1.10	-0.80	-0.30
Scenario	-6.2	-9.6	0.8	-1.1	0.3	-1.3	-4.1	-5.8	-5.5	-6.4
Year-on-year change	18.10	-3.40	10.30	-1.90	1.40	-1.60	-2.80	-1.70	0.30	-0.10
Deviation from baseline	0.00	0.00	0.00	0.00	-0.51	-2.68	-3.68	-4.35	-3.27	-1.63
Difference in change	0.00	0.00	0.00	0.00	-0.50	-2.20	-1.00	-0.60	1.10	0.20
<b>Total Government Debt</b>										
Baseline	320.3	305.3	312.7	316.4	322.3	326.6	329.5	332.7	335.6	368.4
Year-on-year percentage change	1.47	-4.67	2.44	1.18	1.87	1.33	0.88	0.98	0.87	1.43
Scenario	320.3	305.3	312.7	316.4	322.4	327.2	330.9	335.6	339.5	382.2
Year-on-year percentage change	1.47	-4.67	2.44	1.18	1.89	1.50	1.13	1.41	1.17	1.93
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.03	0.18	0.42	0.87	1.16	3.75
Difference in growth rate	0.00	0.00	0.00	0.00	0.02	0.17	0.25	0.43	0.30	0.50

Source: IHS Markit

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**Table 11 Projected economic indicators under baseline and pension package scenarios, 2014–28 (billions of euros, unless otherwise specified)**

Item	2014	2015	2016	2017	2018	2019	2020	2021	2022	2028
<b>Real GDP</b>										
Baseline	185.7	185.0	184.6	187.0	190.2	193.4	197.1	200.3	203.3	219.9
Year-on-year percentage change	0.77	-0.35	-0.26	1.30	1.74	1.69	1.88	1.61	1.52	1.28
Scenario	185.7	185.0	184.6	187.0	190.2	193.9	198.8	203.5	207.1	223.3
Year-on-year percentage change	0.77	-0.35	-0.26	1.30	1.75	1.91	2.58	2.32	1.77	1.36
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.26	0.86	1.60	1.87	1.55
Difference in growth rate	0.00	0.00	0.00	0.00	0.01	0.22	0.70	0.71	0.25	0.08
<b>Private Consumption</b>										
Baseline	127.6	126.9	127.0	127.2	128.0	129.6	131.9	134.0	135.6	146.1
Year-on-year percentage change	0.79	-0.54	0.07	0.13	0.62	1.24	1.78	1.57	1.24	1.29
Scenario	127.6	126.9	127.0	127.2	128.0	129.9	133.2	136.2	137.8	146.7
Year-on-year percentage change	0.79	-0.54	0.07	0.13	0.63	1.47	2.60	2.25	1.12	1.60
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.23	0.99	1.64	1.62	0.41
Difference in growth rate	0.00	0.00	0.00	0.00	0.01	0.23	0.82	0.68	-0.12	0.31
<b>Government Consumption</b>										
Baseline	40.5	40.9	40.4	39.9	39.7	40.1	40.6	41.1	41.7	44.9
Year-on-year percentage change	-1.22	1.15	-1.37	-1.17	-0.43	0.88	1.24	1.36	1.35	1.15
Scenario	40.5	40.9	40.4	39.9	39.7	40.1	40.6	41.1	41.7	44.9
Year-on-year percentage change	-1.22	1.15	-1.37	-1.17	-0.43	0.88	1.24	1.36	1.35	1.15
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Difference in growth rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Fixed Investment</b>										
Baseline	21.1	21.1	21.4	23.4	25.1	26.4	27.2	27.8	28.5	32.4
Year-on-year percentage change	-4.47	-0.26	1.48	9.69	7.20	4.86	3.17	2.20	2.65	1.93
Scenario	21.1	21.1	21.4	23.4	25.1	26.4	27.3	28.1	29.0	32.8
Year-on-year percentage change	-4.47	-0.26	1.48	9.69	7.21	4.99	3.58	2.82	3.14	1.89
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.00	0.37	1.08	1.75	1.23
Difference in growth rate	0.00	0.00	0.00	0.00	0.01	0.13	0.41	0.62	0.49	-0.04
<b>Exports, Goods &amp; Services</b>										
Baseline	55.4	56.9	55.9	59.7	64.3	66.5	68.7	70.7	72.7	84.3
Year-on-year percentage change	7.72	2.86	-1.89	6.93	7.63	3.49	3.27	2.96	2.80	2.50
Scenario	55.4	56.9	55.9	59.7	64.3	66.6	69.0	71.4	73.7	85.5
Year-on-year percentage change	7.72	2.86	-1.89	6.93	7.64	3.63	3.64	3.42	3.20	2.33
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.15	0.44	0.99	1.38	1.42
Difference in growth rate	0.00	0.00	0.00	0.00	0.01	0.14	0.37	0.46	0.40	-0.17

Item	2014	2015	2016	2017	2018	2019	2020	2021	2022	2028
<b>Imports, Goods &amp; Services</b>										
Baseline	59.8	60.1	60.8	65.4	66.7	68.8	70.9	73.0	74.9	87.5
Year-on-year percentage change	7.71	0.40	1.25	7.53	1.97	3.17	3.02	2.90	2.61	2.66
Scenario	59.8	60.1	60.8	65.4	66.7	68.8	71.0	73.0	74.7	86.2
Year-on-year percentage change	7.71	0.40	1.25	7.53	1.97	3.17	3.11	2.90	2.25	2.83
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	-0.27	-1.49
Difference in growth rate	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	-0.36	0.17
<b>CPI</b>										
Baseline	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.2
Year-on-year percentage change	-1.31	-1.73	-0.83	1.12	1.07	1.60	1.87	1.92	1.97	1.84
Scenario	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.2
Year-on-year percentage change	-1.31	-1.73	-0.83	1.12	1.06	1.35	1.25	1.03	1.03	1.43
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.00	-0.94	-1.85	-2.73	-5.74
Difference in growth rate	0.00	0.00	0.00	0.00	-0.01	-0.25	-0.62	-0.89	-0.94	-0.41
<b>Unemployment Rate (%)</b>										
Baseline	26.5	25.0	23.6	21.5	20.3	18.8	16.6	15.1	14.5	13.1
Year-on-year change	-0.96	-1.55	-1.44	-2.06	-1.18	-1.56	-2.11	-1.55	-0.55	-0.18
Scenario	26.5	25.0	23.6	21.5	20.3	18.2	14.9	12.5	12.3	13.9
Year-on-year change	-0.96	-1.55	-1.44	-2.06	-1.18	-2.13	-3.25	-2.42	-0.22	-0.17
Deviation from baseline	0.00	0.00	0.00	0.00	0.00	-0.60	-1.70	-2.60	-2.20	0.80
Difference in change	0.00	0.00	0.00	0.00	0.00	-0.57	-1.14	-0.87	0.33	0.01
<b>Government Revenue</b>										
Baseline	83.4	84.3	87.5	88.1	91.3	93.9	96.8	99.9	103.2	124.3
Year-on-year percentage change	-5.48	1.06	3.75	0.76	3.61	2.86	3.10	3.15	3.27	3.29
Scenario	83.4	84.3	87.5	88.1	89.8	84.9	80.1	75.7	76.3	87.3
Year-on-year percentage change	-5.48	1.06	3.75	0.76	1.88	-5.45	-5.58	-5.57	0.76	2.78
Percentage deviation from baseline	0.00	0.00	0.00	0.00	-1.64	-9.58	-17.25	-24.22	-26.07	-29.77
Difference in growth rate	0.00	0.00	0.00	0.00	-1.73	-8.31	-8.68	-8.72	-2.51	-0.51
<b>Government Expenditure</b>										
Baseline	89.6	93.9	86.7	89.2	90.5	92.5	97.2	101.3	105.4	129.1
Year-on-year percentage change	-20.40	4.80	-7.70	2.90	1.40	2.30	5.10	4.20	4.00	3.40
Scenario	89.6	93.9	86.7	89.2	90.3	88.0	86.4	84.1	85.0	99.7
Year-on-year percentage change	-20.40	4.80	-7.70	2.90	1.20	-2.60	-1.80	-2.60	1.00	3.20
Percentage deviation from baseline	0.00	0.00	0.00	0.00	-0.22	-4.86	-11.11	-16.98	-19.35	-22.77
Difference in growth rate	0.00	0.00	0.00	0.00	-0.20	-4.90	-6.90	-6.80	-3.00	-0.20
<b>Primary Surplus</b>										
Baseline	0.9	-3.3	6.4	4.5	5.9	6.2	4.6	3.7	3.0	-0.2
Year-on-year change	17.90	-4.10	9.70	-2.00	1.50	0.30	-1.70	-0.90	-0.70	-0.20
Scenario	0.9	-3.3	6.4	4.5	4.6	1.7	-1.3	-3.3	-3.5	-7.4
Year-on-year change	17.90	-4.10	9.70	-2.00	0.10	-2.80	-3.00	-2.00	-0.20	-0.60
Deviation from baseline	0.00	0.00	0.00	0.00	-1.37	-4.50	-5.87	-7.00	-6.45	-7.20
Difference in change	0.00	0.00	0.00	0.00	-1.40	-3.10	-1.30	-1.10	0.50	-0.40

Item	2014	2015	2016	2017	2018	2019	2020	2021	2022	2028
<b>Budget Balance</b>										
Baseline	-6.2	-9.6	0.8	-1.1	0.9	1.4	-0.4	-1.4	-2.2	-4.8
Year-on-year change	18.10	-3.40	10.30	-1.90	1.90	0.60	-1.80	-1.10	-0.80	-0.30
Scenario	-6.2	-9.6	0.8	-1.1	-0.5	-3.1	-6.3	-8.5	-8.7	-12.4
Year-on-year change	18.10	-3.40	10.30	-1.90	0.60	-2.60	-3.20	-2.20	-0.20	-0.70
Deviation from baseline	-0.01	-0.03	0.02	0.00	-1.35	-4.50	-5.93	-7.07	-6.50	-7.64
Difference in change	0.00	0.00	0.00	0.00	-1.30	-3.20	-1.40	-1.10	0.60	-0.40
<b>Total Government Debt</b>										
Baseline	320.3	305.3	312.7	316.4	322.3	326.6	329.5	332.7	335.6	368.4
Year-on-year percentage change	1.47	-4.67	2.44	1.18	1.87	1.33	0.88	0.98	0.87	1.43
Scenario	320.3	305.3	312.7	316.4	322.4	327.5	331.8	337.6	343.1	402.1
Year-on-year percentage change	1.47	-4.67	2.44	1.18	1.89	1.56	1.32	1.74	1.64	2.03
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.03	0.28	0.70	1.47	2.23	9.15
Difference in growth rate	0.00	0.00	0.00	0.00	0.02	0.23	0.44	0.76	0.77	0.60

Source: IHS Markit

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**Table 12 Projected sectoral GDP under baseline and FDI/pension package scenarios, 2014–28 (billions of euros, unless otherwise specified)**

Item	2014	2015	2016	2017	2018	2019	2020	2021	2022	2028
<b>GDP: Agriculture, forestry, fishing, and hunting</b>										
Baseline	7.1	6.9	6.3	6.4	6.9	7.1	7.2	7.3	7.4	7.6
Year-on-year percentage change	8.44	-2.85	-8.76	1.31	8.37	2.10	2.03	1.38	0.99	0.64
Scenario	7.1	6.9	6.3	6.4	6.9	7.1	7.2	7.3	7.4	7.6
Year-on-year percentage change	8.44	-2.85	-8.76	1.31	8.37	1.99	1.78	1.16	0.96	0.71
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	-0.14	-0.28	-0.55	-0.68	-0.26
Difference in growth rate	0.00	0.00	0.00	0.00	0.00	-0.11	-0.25	-0.22	-0.03	0.07
<b>GDP: Construction</b>										
Baseline	4.4	4.0	5.0	4.7	5.1	5.4	5.4	5.5	5.7	6.5
Year-on-year percentage change	-12.00	-9.60	26.50	-7.30	8.20	6.70	0.70	2.00	2.70	1.90
Scenario	4.4	4.0	5.0	4.7	5.1	5.6	6.1	6.3	6.5	7.8
Year-on-year percentage change	-12.00	-9.60	26.50	-7.30	9.00	10.50	8.20	3.90	2.70	2.50
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.79	4.46	12.18	14.29	14.26	19.41
Difference in growth rate	0.00	0.00	0.00	0.00	0.80	3.80	7.50	1.90	0.00	0.60
<b>GDP: Industry excluding construction</b>										
Baseline	18.9	19.2	20.2	21.5	20.4	21.2	21.8	22.5	23.1	25.5
Year-on-year percentage change	-4.29	1.53	4.97	6.77	-5.33	3.87	3.23	3.01	2.73	1.26
Scenario	18.9	19.2	20.2	21.5	20.4	21.4	22.3	23.2	24.2	27.6
Year-on-year percentage change	-4.29	1.53	4.97	6.77	-5.22	4.75	4.42	3.79	4.34	1.38
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.94	2.29	3.11	4.76	8.24
Difference in growth rate	0.00	0.00	0.00	0.00	0.11	0.88	1.19	0.78	1.61	0.12
<b>GDP: Manufacturing</b>										
Baseline	13.8	14.2	15.4	16.0	15.4	16.0	16.3	16.4	16.5	16.6
Year-on-year percentage change	-2.04	2.94	8.47	3.60	-3.59	4.01	1.83	0.91	0.21	0.25
Scenario	13.8	14.2	15.4	16.0	15.4	16.2	16.6	16.9	17.2	17.9
Year-on-year percentage change	-2.04	2.94	8.47	3.60	-3.47	4.88	2.95	1.60	1.74	0.38
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	1.25	1.84	3.05	4.24	7.83
Difference in growth rate	0.00	0.00	0.00	0.00	0.12	0.87	1.12	0.69	1.53	0.13
<b>GDP: Services</b>										
Baseline	135.8	135.4	131.9	133.1	138.5	140.6	143.1	145.4	147.6	159.9
Year-on-year percentage change	1.24	-0.26	-2.57	0.87	4.09	1.51	1.75	1.64	1.50	1.29
Scenario	135.8	135.4	131.9	133.1	138.6	141.4	146.0	150.6	154.8	172.7
Year-on-year percentage change	1.24	-0.26	-2.57	0.87	4.16	2.03	3.19	3.18	2.81	1.72
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.07	0.57	2.03	3.58	4.88	8.01
Difference in growth rate	0.00	0.00	0.00	0.00	0.07	0.52	1.44	1.54	1.31	0.43

Source: IHS Markit

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**Table 13 Projected sectoral GDP under baseline and pension package scenarios, 2014-28 (billions of euros, unless otherwise specified)**

Item	2014	2015	2016	2017	2018	2019	2020	2021	2022	2028
<b>GDP: Agriculture, forestry, fishing, and hunting</b>										
Baseline	7.1	6.9	6.3	6.4	6.9	7.1	7.2	7.3	7.4	7.6
Year-on-year percentage change	8.44	-2.85	-8.76	1.31	8.37	2.10	2.03	1.38	0.99	0.64
Scenario	7.1	6.9	6.3	6.4	6.9	7.1	7.2	7.3	7.4	7.6
Year-on-year percentage change	8.44	-2.85	-8.76	1.31	8.37	2.09	1.95	1.35	1.03	0.69
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.14	-0.26
Difference in growth rate	0.00	0.00	0.00	0.00	0.00	-0.01	-0.08	-0.03	0.04	0.05
<b>GDP: Construction</b>										
Baseline	4.4	4.0	5.0	4.7	5.1	5.4	5.4	5.5	5.7	6.5
Year-on-year percentage change	-12.00	-9.60	26.50	-7.30	8.20	6.70	0.70	2.00	2.70	1.90
Scenario	4.4	4.0	5.0	4.7	5.1	5.4	5.5	5.6	5.8	6.6
Year-on-year percentage change	-12.00	-9.60	26.50	-7.30	8.20	6.80	1.10	2.70	3.20	1.90
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.19	0.55	1.27	1.76	2.31
Difference in growth rate	0.00	0.00	0.00	0.00	0.00	0.10	0.40	0.70	0.50	0.00
<b>GDP: Industry excluding construction</b>										
Baseline	18.9	19.2	20.2	21.5	20.4	21.2	21.8	22.5	23.1	25.5
Year-on-year percentage change	-4.29	1.53	4.97	6.77	-5.33	3.87	3.23	3.01	2.73	1.26
Scenario	18.9	19.2	20.2	21.5	20.4	21.2	21.9	22.6	23.3	25.7
Year-on-year percentage change	-4.29	1.53	4.97	6.77	-5.33	3.92	3.44	3.26	2.84	1.30
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.44	0.87	0.78
Difference in growth rate	0.00	0.00	0.00	0.00	0.00	0.05	0.21	0.25	0.11	0.04
<b>GDP: Manufacturing</b>										
Baseline	13.8	14.2	15.4	16.0	15.4	16.0	16.3	16.4	16.5	16.6
Year-on-year percentage change	-2.04	2.94	8.47	3.60	-3.59	4.01	1.83	0.91	0.21	0.25
Scenario	13.8	14.2	15.4	16.0	15.4	16.0	16.3	16.5	16.6	16.8
Year-on-year percentage change	-2.04	2.94	8.47	3.60	-3.59	4.06	2.03	1.15	0.30	0.29
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.61	1.20
Difference in growth rate	0.00	0.00	0.00	0.00	0.00	0.05	0.20	0.24	0.09	0.04
<b>GDP: Services</b>										
Baseline	135.8	135.4	131.9	133.1	138.5	140.6	143.1	145.4	147.6	159.9
Year-on-year percentage change	1.24	-0.26	-2.57	0.87	4.09	1.51	1.75	1.64	1.50	1.29
Scenario	135.8	135.4	131.9	133.1	138.5	140.9	144.1	147.3	149.9	162.3
Year-on-year percentage change	1.24	-0.26	-2.57	0.87	4.09	1.68	2.31	2.24	1.77	1.37
Percentage deviation from baseline	0.00	0.00	0.00	0.00	0.00	0.21	0.70	1.31	1.56	1.50
Difference in growth rate	0.00	0.00	0.00	0.00	0.00	0.17	0.56	0.60	0.27	0.08

Source: IHS Markit

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## Appendix B: Public Finances

**Table 14 Projected public finances under the baseline scenario, 2014–28 (billions of euros, unless otherwise specified)**

Item	2014	2015	2016	2017	2018	2019	2020	2025	2028
<b>Revenues</b>	76.0	75.2	80.1	79.7	82.6	84.9	87.6	102.4	112.4
Taxes	44.2	43.8	48.5	47.8	52.9	54.1	55.3	64.7	71.4
Direct taxes	19.2	17.7	18.6	17.8	20.3	20.7	21.2	24.9	27.8
Indirect and other taxes	25.0	26.1	29.9	29.9	32.6	33.3	34.1	39.8	43.5
Social contributions	19.0	19.3	19.8	20.7	22.9	24.1	25.5	30.7	34.4
Transfers (nongovernment)	8.1	7.5	7.3	5.5	3.8	3.7	3.5	3.6	3.5
Current transfers received	3.2	2.9	20.5	3.0	3.4	3.4	3.4	3.6	3.5
Capital transfers received	5.0	4.6	4.3	2.6	0.4	0.3	0.1	0.0	0.0
Sales of nonfinancial assets	0.4	0.3	0.1	1.3	2.3	1.3	0.8	0.8	0.9
Other Revenue	4.3	4.3	4.4	4.4	0.6	1.7	2.4	2.7	2.3
<b>Expenditures</b>	79.6	76.9	80.5	79.4	80.5	82.3	86.5	103.9	114.8
Compensation of employees	15.6	15.6	15.7	16.2	15.7	16.1	17.1	21.4	23.0
Purchases of goods and services	7.2	6.6	7.6	7.3	8.6	8.7	9.2	11.0	11.8
Interest paid	5.6	5.7	5.3	5.6	3.4	3.1	3.0	3.1	3.7
Subsidies	0.6	0.5	1.5	1.8	0.4	0.5	0.5	0.5	0.5
Transfers (nongovernment)	3.9	3.3	4.4	4.4	6.1	6.3	6.6	7.7	8.3
Current transfers paid	3.2	2.8	2.9	3.2	3.4	3.4	3.6	4.4	4.7
Capital transfers paid	0.8	0.4	1.5	1.2	2.7	2.9	3.0	3.4	3.6
Social benefits	39.8	38.6	39.9	39.2	39.3	40.5	42.6	50.5	56.0
Purchases of nonfinancial assets	6.8	6.6	6.1	4.8	6.9	7.1	7.6	9.6	11.6
Other expenditures	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Overall fiscal balance</b>	-3.6	-1.7	-0.4	0.3	2.1	2.6	1.1	-1.5	-2.4
<b>Primary fiscal balance (percent of GDP)</b>	0.5	-1.8	3.7	2.5	3.2	3.3	2.3	0.5	-0.1

Source: IHS Markit, Greek Ministry of Finance

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**Table 15 Projected public finances under the pension package scenario, 2014–28**  
(billions of euros, unless otherwise specified)

Item	2014	2015	2016	2017	2018	2019	2020	2025	2028
<b>Revenues</b>	76.0	75.2	80.1	79.7	81.2	76.8	72.5	72.9	79.0
Taxes	44.2	43.8	48.5	47.8	56.6	58.6	57.6	59.3	64.8
Direct taxes	19.2	17.7	18.6	17.8	21.9	22.9	22.6	22.9	25.3
Indirect and other taxes	25.0	26.1	29.9	29.9	34.7	35.7	35.0	36.4	39.5
Social contributions	19.0	19.3	19.8	20.7	13.3	8.1	5.9	6.1	6.5
Transfers (nongovernment)	8.1	7.5	7.3	5.5	4.0	4.0	3.7	3.3	3.8
Current transfers received	3.2	2.9	20.5	3.0	3.6	3.7	3.6	3.3	3.8
Capital transfers received	5.0	4.6	4.3	2.6	0.4	0.2	0.1	-	-
Sales of nonfinancial assets	0.4	0.3	0.1	1.3	2.5	1.4	0.8	0.7	0.8
Other revenue	4.3	4.3	4.4	4.4	4.8	4.7	4.4	3.5	3.1
<b>Expenditures</b>	79.6	76.9	80.5	79.4	80.3	78.3	76.9	74.9	75.6
Compensation of employees	15.6	15.6	15.7	16.2	17.4	18.2	18.8	19.0	19.7
Purchases of goods and services	7.2	6.6	7.6	7.3	9.5	9.8	10.1	9.8	9.8
Interest paid	5.6	5.7	5.3	5.6	3.8	3.5	3.4	2.9	3.0
Subsidies	0.6	0.5	1.5	1.8	0.4	0.5	0.5	0.4	0.3
Transfers (nongovernment)	3.9	3.3	4.4	4.4	6.7	7.1	7.3	6.9	6.8
Current transfers paid	3.2	2.8	2.9	3.2	3.7	3.8	4.0	3.9	3.9
Capital transfers paid	0.8	0.4	1.5	1.2	3.0	3.2	3.3	3.0	2.9
Social benefits	39.8	38.6	39.9	39.2	34.8	31.1	28.4	27.2	27.3
Purchases of nonfinancial assets	6.8	6.6	6.1	4.8	7.7	8.0	8.3	8.6	8.7
Other expenditures	0.0	0.0	0.0	0.0	-	0.0	-	(0.0)	-
<b>Overall fiscal balance</b>	(3.6)	(1.7)	(0.4)	0.3	0.9	-1.5	-4.4	-1.9	3.4
<b>Primary fiscal balance (percent of GDP)</b>	0.5	(1.8)	3.7	2.5	2.5	0.9	(0.7)	(1.6)	(1.7)

Source: IHS Markit, Greek Ministry of Finance

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**Table 16 Projected public finances under the combined FDI/pension package scenario, 2014–28 (billions of euros, unless otherwise specified)**

Item	2014	2015	2016	2017	2018	2019	2020	2025	2028
<b>Revenues</b>	76.0	75.2	80.1	79.7	81.2	77.0	73.1	76.2	83.3
Taxes	44.2	43.8	48.5	47.8	56.6	58.7	58.1	61.9	68.3
Direct taxes	19.2	17.7	18.6	17.8	21.9	23.0	22.8	23.9	26.3
Indirect and other taxes	25.0	26.1	29.9	29.9	34.7	35.8	35.3	38.0	42.0
Social contributions	19.0	19.3	19.8	20.7	13.3	8.1	6.0	6.4	6.8
Transfers (nongovernment)	8.1	7.5	7.3	5.5	4.0	4.0	3.7	3.4	3.7
Current transfers received	3.2	2.9	20.5	3.0	3.6	3.7	3.6	3.4	3.7
Capital transfers received	5.0	4.6	4.3	2.6	0.4	0.3	0.1	-	-
Sales of nonfinancial assets	0.4	0.3	0.1	1.3	2.5	1.4	0.9	0.8	0.8
Other Revenue	4.3	4.3	4.4	4.4	4.8	4.8	4.5	3.6	3.3
<b>Expenditures</b>	79.6	76.9	80.5	79.4	79.6	76.8	75.5	80.8	96.2
Compensation of employees	15.6	15.6	15.7	16.2	17.2	17.9	18.5	20.5	25.2
Purchases of goods and services	7.2	6.6	7.6	7.3	9.4	9.6	10.0	10.6	12.4
Interest Paid	5.6	5.7	5.3	5.6	3.8	3.4	3.3	3.2	3.7
Subsidies	0.6	0.5	1.5	1.8	0.4	0.5	0.5	0.5	0.4
Transfers (nongovernment)	3.9	3.3	4.4	4.4	6.7	7.0	7.1	7.4	8.6
Current transfers paid	3.2	2.8	2.9	3.2	3.7	3.8	3.9	4.2	4.9
Capital transfers paid	0.8	0.4	1.5	1.2	3.0	3.2	3.2	3.2	3.7
Social benefits	39.8	38.6	39.9	39.2	34.4	30.6	27.9	29.3	34.9
Purchases of nonfinancial assets	6.8	6.6	6.1	4.8	7.6	7.9	8.2	9.3	11.1
Other expenditures	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Overall fiscal balance</b>	(3.6)	(1.7)	(0.4)	0.3	1.6	0.1	-2.4	-4.6	-13.0
<b>Primary fiscal balance (percent of GDP)</b>	0.5	(1.8)	3.7	2.5	3.0	1.9	0.5	(0.8)	(0.6)

Source: IHS Markit, Greek Ministry of Finance

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## Appendix C: Industry Criteria

**Table 17 Criteria for selecting industries to develop**

<i>Sector</i>	<i>Value added in Greece (2016, millions of euros)</i>	<i>Export intensity Western Europe average (percent)</i>	<i>Western Europe industries investing: Capex<sup>a</sup>, CAGR<sup>b</sup> 2017–22 (percent)</i>	<i>Western Europe capital intensity (percent)</i>
Agriculture	5,639	30	6	34
Coal mining	58	76	0	41
Oil & gas mining	7	76	2	38
Mining of metals & stone	658	98	1	40
Food products	4,170	29	3	16
Beverages	687	45	2	20
Tobacco products	419	34	0	11
Textiles	215	60	0	14
Wearing apparel	216	126	2	10
Leather & footwear	31	120	2	15
Wood products (ex. furniture)	71	17	1	17
Paper & pulp	172	50	2	20
Printing & reproduction	188	18	0	12
Coke oven products	5	59	-8	40
Refined petroleum products	292	43	3	31
Basic chemicals	111	99	1	31
Paints & varnishes	119	31	0	14
Soap, cleaning, and cosmetics	464	61	0	18
Other specialty chemicals	56	160	1	26
Synthetic fibers	14	40	-1	12
Pharma: drugs and medicines	584	99	5	42
Rubber products	8	76	2	20
Plastics products	355	46	2	20
Glass ad glass products	110	35	2	18
Pottery, china, and earthenware	10	172	0	43
Cement, concrete, lime	370	9	3	21
Other mineral products	339	20	3	11
Iron & steel	426	61	4	20
Nonferrous metals	1,228	162	6	19
Structural metal products	270	17	2	13
Weapons and ammunition	68	0	3	16
Metal coating & related	1,025	11	2	16
Semiconductors, CBs, and LCDs	36	66	-2	41
Computers and related equipment	0	216	-9	64
Transmitters, routers, telephony	12	141	4	32
Receivers, players, sound systems	39	40	3	38

Sector	Value added in Greece (2016, millions of euros)	Export intensity Western Europe average (percent)	Western Europe industries investing: Capex <sup>a</sup> , CAGR <sup>b</sup> 2017–22 (percent)	Western Europe capital intensity (percent)
Measuring, testing, navigation equipment	67	97	4	28
Watches and clocks	19	680	4	20
Electromedical, irradiation and related	11	150	2	17
Optical and photographic	5	27	2	34
Electric motors and electricity distribution	117	74	4	24
Batteries and accumulators	18	173	4	21
Wiring and devices	69	18	2	15
Electric lighting equipment	63	48	2	14
Domestic appliances	43	48	4	19
Electrical equipment n.e.c.	36	55	2	13
<b>Engines and turbines</b>	<b>24</b>	<b>64</b>	<b>3</b>	<b>15</b>
Bearings, gearing and driving	2	105	3	26
<b>Lifting and handling</b>	<b>48</b>	<b>136</b>	<b>5</b>	<b>10</b>
Fluid power, compressors, valves	13	91	3	24
Office equip., power-tools, ovens	143	43	-1	21
Agricultural machinery	41	78	2	23
<b>Machine tools</b>	<b>99</b>	<b>41</b>	<b>3</b>	<b>11</b>
Metallurgy, machinery, & casting	43	14	1	10
Mining & construction machinery	117	79	2	15
<b>Food &amp; beverage machinery</b>	<b>2</b>	<b>77</b>	<b>4</b>	<b>14</b>
<b>Machinery for textiles &amp; other</b>	<b>5</b>	<b>111</b>	<b>1</b>	<b>15</b>
Motor vehicles	9	63	-1	44
Coachwork & trailers	9	16	3	16
Parts and accessories	70	96	1	22
<b>Shipbuilding</b>	<b>16</b>	<b>44</b>	<b>7</b>	<b>23</b>
Railroads & equipment	11	44	5	18
<b>Aircraft &amp; spacecraft</b>	<b>109</b>	<b>102</b>	<b>6</b>	<b>23</b>
Motorcycles, bicycles, transport. equip.	0	73	6	19
Furniture	284	23	1	6
Fire & safety, brushes, other	92	218	2	28
Repair & installation	689	—	1	13
Electricity, gas, AVAC	2,856	—	3	47
Water treatment & supply	526	—	2	53
Sewerage, waste & remediation	1,513	—	5	30
Construction	4,179	—	3	12
Retail/wholesale of motor vehicles	2,162	—	3	11
Wholesale trade	8,218	—	5	10

<i>Sector</i>	<i>Value added in Greece (2016, millions of euros)</i>	<i>Export intensity Western Europe average (percent)</i>	<i>Western Europe industries investing: Capex<sup>a</sup>, CAGR<sup>b</sup> 2017–22 (percent)</i>	<i>Western Europe capital intensity (percent)</i>
Retail trade (excl. motor vehicles)	5,105	—	5	10
Pipeline transport	71	—	4	20
Land transport	2,991	—	3	21
Water transport	5,320	—	6	29
Air transport	695	—	4	56
Warehousing & transportation support	1,811	—	4	37
Post & courier services	421	—	2	14
Hotels & restaurants	8,963	—	4	9
Publishing	551	—	5	27
Audiovisual & broadcasting	303	—	4	29
Telecommunications	3,517	—	2	33
IT & information services	668	—	8	18
Banking & related financial	5,645	—	4	12
Insurance & pensions	1,025	—	4	9
Market administration, sell side	659	—	4	12
Real estate	27,696	—	5	53
Legal, accounting, consultancy	3,368	—	5	10
Architectural, engineering, testing	549	—	5	16
Scientific R&D	534	—	2	56
Advertising & market research	387	—	3	10
Professional, scientific, veterinary	572	—	4	8
Rental & leasing	340	—	3	68
Travel agency & tours	367	—	4	9
Security, buildings, employment	1,430	—	5	10
Education	9,530	—	6	15
Health & social services	6,956	—	8	10
Arts, entertainment & culture	1,839	—	2	19
Sports, amusement & recreation	259	—	4	29
Public admin. & defense, other services	19,271	—	5	18

Source: IHS Markit World Industry Service/

Note: Backward linkages scores are displayed separately for all industries in Table 7, as the industry classification system for the data used to compute them is different.

<sup>a</sup> Capex: Capital Expenditure

<sup>b</sup> CAGR: Compound Annual Growth Rate

— Data on trade in services is not available

Industries in bold indicate IHS Markit selected industries.

## Appendix D: Description of the Model

The model used in this study is an expanded version of the Greek model included in the IHS Global Link Model (GLM). The full GLM covers 68 countries plus several regional aggregates. It is designed to assess the cross-country spill over effects of different types of shocks on the global economy. For the purpose of this study, the Greek model in GLM was extended to make it possible to quantify the impact of changes in taxes and public expenditures at both the macroeconomic and sectoral levels. Like other country models, the Greek model is a time series–based econometric model, which makes it possible to generate forecasts on a large number of economic dimensions and to assess alternative scenarios.

The stock Global Link Model comprises 55,625 variables, of which 20,481 are endogenous (i.e., determined by the model) and 28,175 are exogenous levers to be pulled in defining scenarios. Among the 28,175 exogenous variables, 21,284 (76 percent) are trade shares, of which 4,489 are aggregate trade shares. Each trade share by commodity groups represents the share of each country's export in the relevant commodity group going to each of the other 67 countries in the GLM. The four commodity groups are agricultural products, non-agricultural commodities, energy and manufactured goods. Trade shares by commodity group are used to calculate a trade-weighted index of import demand addressed to each country's exporters. The aggregate trade shares provide the share of each country's total trade with all other countries and are used to calculate nominal effective exchange rates. This leaves 2,060 exogenous variables, which include population by age bracket in the 68 countries, 92 energy and commodity prices, and a number of policy levers for each country. Monetary and fiscal policy and exchange rates are endogenous in the 68 countries' GLM, meaning that developments in the world economic situation and shocks occurring anywhere in the world automatically trigger policy responses. These policy responses can be bypassed or neutralized at any time by the model user, who has the option to define the policy response to any type of shock.

The expanded model for Greece includes 792 variables, of which 402 are endogenously determined. The sectoral module forecasts 10 variables for 57 sectors (another 570 variables in total). All of them are endogenously determined, making a total of more than 1,200 concepts covered.

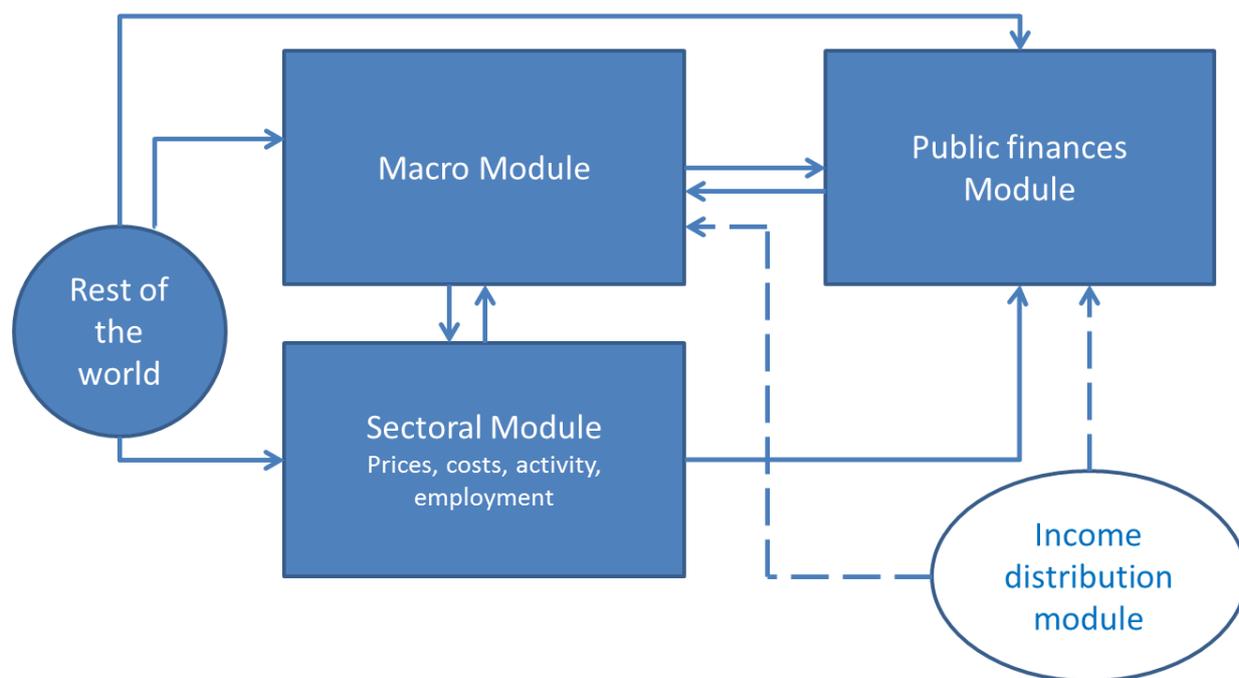
Some of the variables that are exogenous in the Greek model are determined within the full GLM. This is the case of the euro exchange rate, the European Central Bank intervention rate, the money market interest rate, and a number of variables representing developments in the rest of the world. Changes in economic developments in Greece will flow through trade and financial linkages and feedback elsewhere in the model where appropriate.

The Greek model comprises five modules:

- The core macroeconomic module looks at trends in final demand and aggregate supply. It derives the impact of changes on labour markets, prices, wages, trade, the balance of payments, household and government accounts, and debt.
- The public finances module details government revenue and expenditure by category. This module is fully integrated with the macroeconomic module. It is based on data from the Greek Ministry and Finance and is linked to the OECD-based data, which are used in the macroeconomic block in order to be consistent with the data used in other GLM countries.
- The industry module describes developments in 65 industries and is linked to the macroeconomic model via Input-output tables. These tables break down total final demand from different categories of stakeholders (households, companies, government, and rest of the world) into final demand in each sector. This final demand then generates intermediate demand. Sectoral activity drives sectoral employment and compensation, which feeds back into the macroeconomic model. Through its reliance on input-output tables, the sectoral model takes into account the specific multiplier effects associated with each industry, in order to define which industries would be most appropriate to focus on, if horizontal policies are supplemented by vertical (sectoral) policies in order to accelerate the transformation of the economy. The industry model also makes it possible to see how employment creation evolves. Some industries are more labour intensive than others, hence they will generate different spill over effects on the rest of the economy. The industry model also tracks the impact of different growth patterns on total factor productivity (TFP), a key driver of long-term growth.
- The international module contains all other countries in GLM. This international module provides information on (a) trends in world demand met by Greek exporters, by commodity group; (b) trends in real disposable income in countries from which tourists originate, which influences how much they spend in Greece; (c) trends in competitor prices (i.e., benchmarks that define whether cost and price developments in Greece that result from changes in fiscal policy will enhance Greece's price competitiveness on world markets); (d) trends in the euro and other exchange rates and in the overall monetary policy stance in Europe.
- The fifth module takes into account the specificities of the Greek economy with respect to income distribution and propensity to consume by income bracket. The macroeconomic model assumes an average consumer earning an average income. The share of income that will be consumed or saved depends on the level of income of each household. It is important to identify the impact on consumption of a tax cut implemented across the board from that of a tax cut focused on higher-income households. The income distribution module is a microsimulation tool that makes it

possible to quantify consumption multipliers based on a set of predefined assumptions. This module is used in parallel, in order to determine the impact of changes in tax structure on the aggregate propensity to consume.

**Figure 47 Interaction among the five modules of the model**



The interactions among the modules operate as follows:

- The rest of the world affects the macroeconomy through the monetary policy stance and the exchange rate, as well as through the level of demand for Greek exporters, world prices, and costs that affect Greece's relative competitiveness. The rest of the world situation also affects public finances, through the effect on the debt and overall fiscal policy. It affects sectoral performance in Greece through the channelling of FDI into different industries.
- Macroeconomic developments in Greece affect the outlook by industry via total demand in each sector from households (private consumption), the government, fixed investment, inventory change, and exports and imports. The need to take into account all the linkages between Greece and the rest of the world means that exports and imports are defined in the core macro module. Trade flows are broken down into four goods categories (agricultural commodities, non-agricultural commodities, energy, and manufactured goods) plus services. Each of these categories drives sectoral demand. The macro outlook also influences sectoral performance through labour costs (determined centrally, as the labour market situation influences the wage index); the monetary policy stance; and overall lending conditions.

- Macroeconomic developments also affect public finances, through tax revenues (both direct and indirect) and lending capabilities.
- The sectoral performance affects the macroeconomy, because the sum of sectoral value added is equal to total value added at factor cost, which is itself equal to real GDP at market prices plus indirect taxes minus subsidies. In addition, activity by sector drives employment by sector, which sums up to total employment, which affects incomes, unemployment rates, labour costs.
- The sectoral outlook affects public finances through the payment of corporate taxes.
- The public finance situation affects the macroeconomic module through the different categories of government revenue and expenditures, which enter into household income and influence final demand, which trigger demand in each sector. It also affects the macroeconomy, by triggering automatic stabilizers, described below, which can be neutralized as needed.
- The income distribution module runs in parallel to the modelling system. It is designed to assess the impact of different types of fiscal policy changes on the aggregate propensity to consume.

There is no direct link between the public finance block and the industry module, because the links between the two operate via the macroeconomic module and the impact of fiscal policy on final demand and lending conditions.

The GLM uses the Gauss-Seidel algorithm to converge on a solution in simultaneous blocks of the model. This allows appropriate feedback to reach equilibrium between prices, quantities, and the different modules where trade, industry, and the public sector interact simultaneously.

### **Core Macroeconomic Module**

The model's simulation properties are consistent with economic theory and a priori expectations. All interrelationships within the model are spelled out in such way as to appropriately describe their correlational and causal effects on the economy. The direction of causality is defined a priori in order to make it possible to quantify policy changes. For example, exchange rate depreciations benefit exporters after a short adjustment period and lead to an increase in real GDP level, even though the inflationary effect of the depreciation initially lowers purchasing power. Employment increases, thanks to higher exports and lower imports. Similarly, in commodity-importing countries like Greece, a rise in oil prices has a negative effect on the balance of payments and raises domestic inflation.

The macro module contains nine interrelated blocks to forecast trends in:

- potential output
- GDP and final demand components

- employment and the labour force
- prices and wages
- household income
- the balance of payments
- interest rates
- public finances (at the aggregate level).

The full list of variables included in the model is presented in Appendix I. The detailed equations are listed in Appendix: H (which will be available in a separate volume and on the website).

### ***Potential Output***

Potential GDP is a function of the capital stock, the labour supply (taking into account demographic developments), energy capacity, and total factor productivity (TFP). Actual GDP that is below potential exerts downward pressure on prices and causes companies to invest less. Actual GDP that exceeds potential exerts upward pressures on prices as well as increases in investment and labour force participation.

Four factors determine potential GDP: labour supply, the capital stock, energy input, and TFP:

- The long-term trend in the labour supply depends on demographic trends by age cohort, participation rates by age group, structural trends in weekly hours worked, and the nonaccelerating inflation rate of unemployment (NAIRU).
- The capital stock is estimated based on the trend in gross fixed investment and depreciation. The historical data come from the OECD; the forecast assumes a constant rate of depreciation of 2.5 percent. This is rate higher than observed in other European countries, including France (1.9 percent), Spain (1.5 percent), Portugal (1.2 percent), and Germany (2.0 percent). It reflects the depth of the crisis and the high rate of depreciation of equipment that has aged because of lack of investment. The trend in the depreciation rate could be expected to fall to a level more in line with the rest of Europe in the alternative scenario, as investment recovers and industry structures start evolving.
- The energy input into production is defined as the capacity of the economy to bring energy to the final (domestic) user. The model takes into account the power generation capacity of different sources times utilization rates minus losses on the network; oil, gas, and coal import and distribution capacity; and refinery capacity.
- Over the historical period, TFP is calculated based on the Congressional Budget Office (CBO) methodology. In the forecast, it is assumed to slow in line with the trend observed in other countries, reflecting the increasing domination by the service sector of the economy. In the baseline forecast for Greece, the trend in TFP is

expected to fall from approximately 1.2 percent a year in the first forecast years to 0.5 percent a year by about 2040. This trend is similar to what is expected in other advanced economies.

Short-term deviations in real GDP can occur, reflecting changes in the global economy, changing industry structures within Greece, or other changes to which the economy can take a few quarters/years to adjust before returning to its long-term growth path.

In the short run, market imbalances can have multiple causes. For example, lack of financing can cause fixed investment to fall below the levels needed to maintain a given rate of growth, leading to weaker short-term increases in economic activity. Appreciation of the effective exchange rate of the euro can negatively affect the external competitiveness of Greece (and other Euro zone countries), causing a decline in real exports and weakening domestic activity, as import substitution increases.

What happens in the short term affects the long-term potential. A period of underinvestment, as occurred in Greece in the past years, will lower the potential growth rate, because the capital stock will have grown more slowly (or even decreased).

### ***Final Demand Components***

The final demand block describes the trend in the headline components of real GDP—namely, private consumption, public consumption, fixed investment, changes in inventory, and exports and imports of goods and services.

#### ***Private consumption***

In the short term, aggregate real private consumption per household is determined by the trend in disposable income, the labour market situation, transfers from abroad through migrant remittances, real wealth and credit conditions. An increase in real disposable income of 1 percent leads to a rise in real private consumption of 0.11 percent in the same quarter and another 0.17 percent in the following quarter. The coefficient may seem small, but it assumes that all other things are equal, in particular interest rates, credit to households, and unemployment. If the rise in disposable income is caused by higher employment hence lower unemployment, the effect will be higher, because change in the unemployment rate directly enter the equation. Of course, the full impact is determined when running the entire model in a simultaneous simulation exercise, which takes into account all feedback loops.

In the scenario simulation, the average propensity to consume was replaced by the coefficient calculated “out of model” with the income distribution module.

Credit conditions influence private consumption in two ways: (a) easier monetary conditions lead to a rise in loans to consumers, which increases their capacity to spend and (b) an

increase in the cost of credit reduces consumption, given the expectation of higher debt servicing and the opportunity loss associated with spending today as opposed to saving.

Labour market conditions also affect private consumption, as rising unemployment causes more cautious spending. Conversely, a rise in net wealth will stimulate consumption.

### *Public consumption*

In the baseline forecast, real government consumption depends on the trend in public sector employment and the average wage rate, along with a four-quarter moving average of the debt to GDP ratio, to account for the fiscal situation. In the scenario analysis, public consumption was exogenized at levels consistent with the scenario assumptions.

### *Fixed investment*

Real fixed investment is a function of financing conditions, the output gap, and real FDI and remittances. Two types of credit influence the trend in fixed investment: total credit to households for housing purposes and total bank loans to nonfinancial corporations. The change in long-term bond yields also enters the equation, to capture changes in the cost of credit. The ratio of non-performing loans also enters the equation directly to capture lending conditions. The stock of FDI in Greece is determined within the model and depends on the national saving of partner countries as well as the growth differential between major world regions and an aggregate risk score, which represents the risk to which investors who do business in the country are confronted. This risk score is assessed by IHS Markit's Risk Center. It takes into account political, economic, legal, tax, operational, and security risks in 205 countries.

### *Inventories*

Inventory change is a negative function of long-term interest rates and a positive function of the GDP gap. In the short run, if real GDP increases beyond potential GDP value, inventories build up. If GDP falls even farther below the potential GDP, companies will prioritize reducing inventories over producing more.

### *Trade*

Exports and imports of goods and services are disaggregated into five categories: agricultural commodities, non-agricultural commodities, energy, and manufactured goods and services.

For the goods categories, real exports by commodity group are a function of an index of world demand for Greece's exports, and relative prices. The world demand index is a weighted average of import demand from Greece's trading partners', where the weights represent the share of goods exported by Greece to each partner country, based on UN COMtrade data. The weights evolve over time, thereby taking into account changes in the

geographic orientation of exports. Relative export prices and capacity constraints are additional explanatory factors. Relative prices are the ratio of Greece's export price relative to world competitor prices, the latter being a trade-weighted average of the export prices of Greece's competitors in each commodity grouping.

For example, for manufacturing exports:

$$DLOG(XMFR_{GRC}) = 0.0676 + 0.487 * DLOG(JTWMMFR_{GRC}) - 0.07076 * DLOG\left(\frac{JPXMF_{GRC(-1)}}{JPTWXMFR_{GRC(-1)}}\right) - 0.0242 * \left( LOG(XMFR_{GRC(-1)}) - LOG(JTWMMFR_{GRC(-1)}) \right)$$

where JTWMMFR is the trade-weighted index of world demand for Greece's manufacturing exports, whilst JPXMF is the export price index of Greece's manufacturing exports, and JPTWXMFR is the trade-weighted index of competitor prices in this category.

For services, Greek exports are a function of EU real GDP growth. Relative prices were not found to be a significant determinant of the trend in real service exports.

Real imports of goods by commodity group depend on gross domestic demand plus exports (given the high import content of some of Greece's exports), and on relative prices. Here, the relative prices are defined as the ratio of import prices to domestic prices, where import prices by commodity group are a function of a trade-weighted average of the export price of those countries from which Greece imports. For manufactured goods, we find:

$$DLOG(MMFR_{GRC}) = -0.0569 + 0.881 * DLOG(INDPRODMF_{GRC}) - 0.5811 * DLOG\left(\frac{JPMMF_{GRC(-1)}}{PPI_{GRC(-1)}}\right) - 0.0317 * \left( LOG(MMFR_{GRC(-1)}) - LOG(GDDR_{GRC(-1)} + XR_{GRC(-1)}) \right)$$

The full list of equations is presented in Appendix H.

Total exports (imports) of goods are a function of the sum of goods exports (respectively imports) by commodity group, and total exports (imports) of goods and services are the sum of goods and services exports (imports).

### ***Employment and Labour Force***

Once the level of activity is determined by the confrontation of (short-term) demand and supply, this triggers changes in employment. Total employment is the sum of employment in agriculture, salaried private sector employment, salaried public sector employment and self-employment. Each of these employment categories is driven by the level of activity in the relevant area (for example, agricultural value added for agricultural employment), and by the relative cost of labour, measured by unit labour costs (i.e. nominal wages divided by productivity), where significant.

Private sector non-agricultural employment, for example, is a function of economic activity and unit labour costs.

Once total employment is calculated as the sum of agricultural, government, private sector salaried employment plus self-employment, this is confronted to the trend in labour supply (which can vary based on higher or lower participation rates) to determine unemployment and the unemployment rate. The participation rate is a function of the previous period's participation rate, taking into account the discouragement effect of a high unemployment rate, and the encouragement effect of a positive GDP gap: when demand exceeds supply, companies will seek to recruit more people to meet the higher demand level. Labour force is therefore an identity, equal to population of working age multiplied by the average participation rate.

The nonaccelerating inflation rate of unemployment, or NAIRU, is a function of a moving average of the unemployment rate, over several quarters. The NAIRU typically reflects a long-term trend in unemployment rate, around which the actual unemployment rate is bound to fluctuate.

### ***Prices and Wages***

The labour market situation is one of the factors influencing prices in the model, via wages. Prices are all determined based on a “markup” approach, which assumes that they follow the trend in input costs plus a profit margin that can be squeezed when times are difficult or increased if there is excess demand in the economy. The input costs are energy, raw materials, intermediate inputs used in production, and wages. These costs are used to create a “production cost index,” a weighted average of these input costs, for which the weights come from the input-output table for Greece (Figure 48). All prices deflators are then estimated as a function of this production cost driver. A few variables can, however, cause actual price levels to depart from the trend in production costs. These are: financial market stress, the GDP gap and market interest rates. When financial stress increases, companies will tend to squeeze margins to avoid accumulating inventories, should demand falter. The GDP gap is another variable causing occasional departures from the trend in production costs: a positive GDP gap means that the level of demand is greater than potential output, hence there will be upward pressures on prices, and conversely with a negative GDP gap.

CPI is a weighted average of core, energy and food CPI, where the energy and food CPI are linked to the relevant energy and commodity price trends in global markets, whereas core CPI depends more on domestic factors and on the possible existence of excess demand or excess supply in the economy.

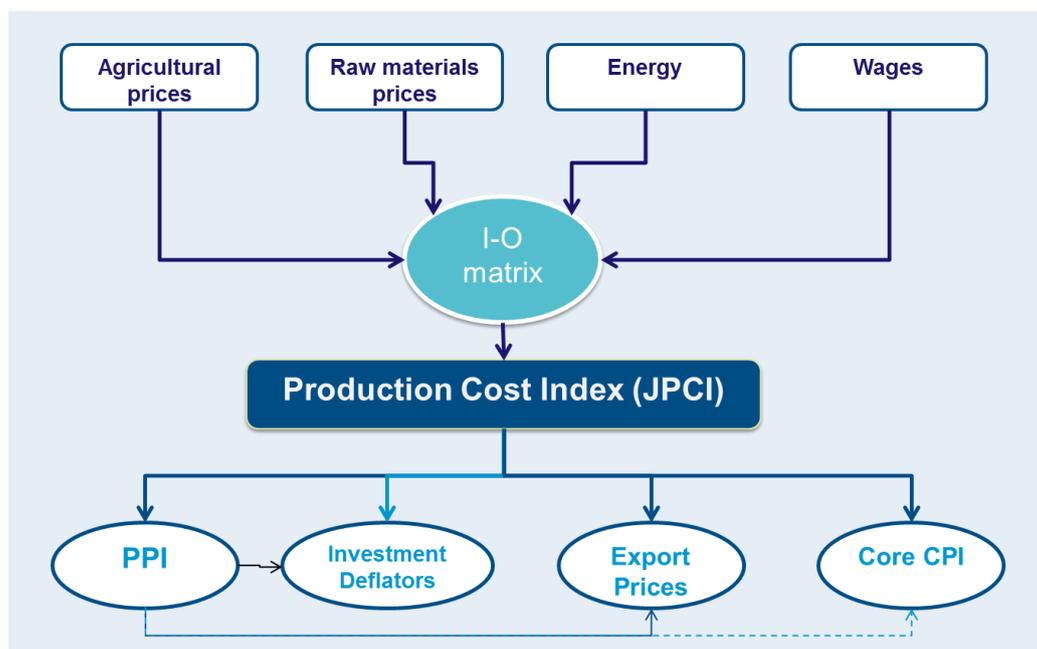
All deflators are linked to the relevant price and cost drivers: the private consumption deflator depends on the trend in CPI, the government consumption deflator depends on the trend in

CPI and on the wage rate (given the high share of public sector compensations in current government consumption), the investment deflator is linked to producer prices and to interest rates, and export prices are linked to domestic producer prices and to international prices, since Greece is more a price taker than a price maker in world markets. Import prices are of course directly linked to the export prices of all the countries from which Greece imports.

The wage rate is a function of past CPI (which reflects a catch-up effect when inflation accelerates, or a slower adjustment of wages when prices decelerate), as well as productivity and labour market conditions. A high rate of unemployment will, all other things being equal, lead to slower increases in nominal wage rates. In the long run, a country (or region)'s real wage is expected to grow at the same rate as total factor productivity, as unemployment converges to its natural rate. In Greece, the assumption is that nominal wages will grow at 40 percent of the rate of productivity growth times inflation. This is a relatively low rate, as nominal wage rates usually align to the growth in labour market productivity times inflation, but it reflects the trend observed in Greece in the past decade.

Producer prices are determined by unit production costs with unit long-run elasticity, but allowing for short-term deviations depending on the output gap. The presence of an output gap in the price equations provides a key adjustment mechanism between nominal and real sectors of the economy. The unit production cost is the weighted average of unit labour costs and other (agricultural, commodity and energy) prices in the model.

In Greece the change in the level of financial market stress also influences producer prices. This reflects the fact that, when financial stress goes up, companies squeeze margins to avoid accumulating inventories when demand turns around. Another variable is the unit cost of labour, which appears to have grown in importance over time. Indeed, its weight today is higher than that given by the fixed input-output table.

**Figure 48 Production Cost Index**

### ***Household Income***

Nominal household disposable income is the sum of wage and nonwage incomes, plus net transfers to households minus taxes and contributions paid by households. In the model it is estimated as a function of wage income and the tax rate. Real disposable income is equal to nominal disposable deflated by the private consumption deflator, itself a function of CPI.

Changes in rate of taxation, or in the level of transfers, automatically result in changes in nominal disposable income, hence in real disposable income. This feeds back into the model via private consumption.

Wage income per person employed depends on the average hourly wage rate and on the number of hours worked. Total wage income is thus equal to wage income per person employed times total employment. Non-wage income includes transfers and other income, the latter consisting of revenue generated from assets held by households, such as rents received, interest from savings accounts and other revenue generated from financial assets.

In the scenario analysis, the changes in wage and total nominal disposable income were controlled to be fully consistent with the scenario assumptions.

### ***The Balance of Payments***

The current account balance is the sum of the balance of goods and services plus net foreign investment income and net transfer income. Net foreign investment income is the sum of net income from FDI plus net portfolio investment income and net other investment income. Net

FDI income is income from foreign direct investment assets less payment on foreign direct investment liabilities.

Similarly, net foreign portfolio investment income is derived as income from foreign portfolio investment assets less payments on foreign portfolio investment liabilities. The flow of foreign direct investment assets (outbound FDI) depends on the relative return on investment, represented by the real interest rate differential (versus US), the growth potential, the country risk score and other variables as relevant. The flow of portfolio investment assets (outbound portfolio investment) depends on the nominal long-term interest rate differential, relative change in stock market prices where relevant, and economic growth potential. Inward FDI and other capital flows are determined in a similar way.

A deficit on the current account balance means a need for (net) capital inflows to prevent falling external reserves. On the top part of the current account balance, besides the goods and services' balance, is an important item that feeds into the demand side of the model: emigrant remittances. Given the high number of Greeks resident abroad, and the increase in outmigration induced by the prolonged crisis, the transfer by non-residents of savings generated from incomes earned abroad is an important variable driving personal consumption and investment (mainly residential investment). This variable is linked to developments in the rest of Europe, and feeds both private consumption and fixed investment.

On the lower part of the balance of payments are all the capital flows, broken down into inward and outward FDI, inward and outward portfolio investments, and inward and outward “other” capital flows. The most important of these for the purposes of the study are inward and outward FDI, because they feed into total fixed investment and reduce (or worsen) the domestic liquidity constraint.

### ***Interest Rates***

In Greece the central bank base rate is the ECB rate. As elsewhere in GLM, the administered interest rate is modelled on the basis of the Taylor rule, where the central bank is assumed to use the interest rate to achieve its growth and inflation targets.

The long-term interest rate is a function of other market rates (both domestic and foreign), central bank rates, financial market stress and liquidity and the debt to output ratio relative to its steady state value. Crowding-out caused by government borrowing is accounted for in the model.

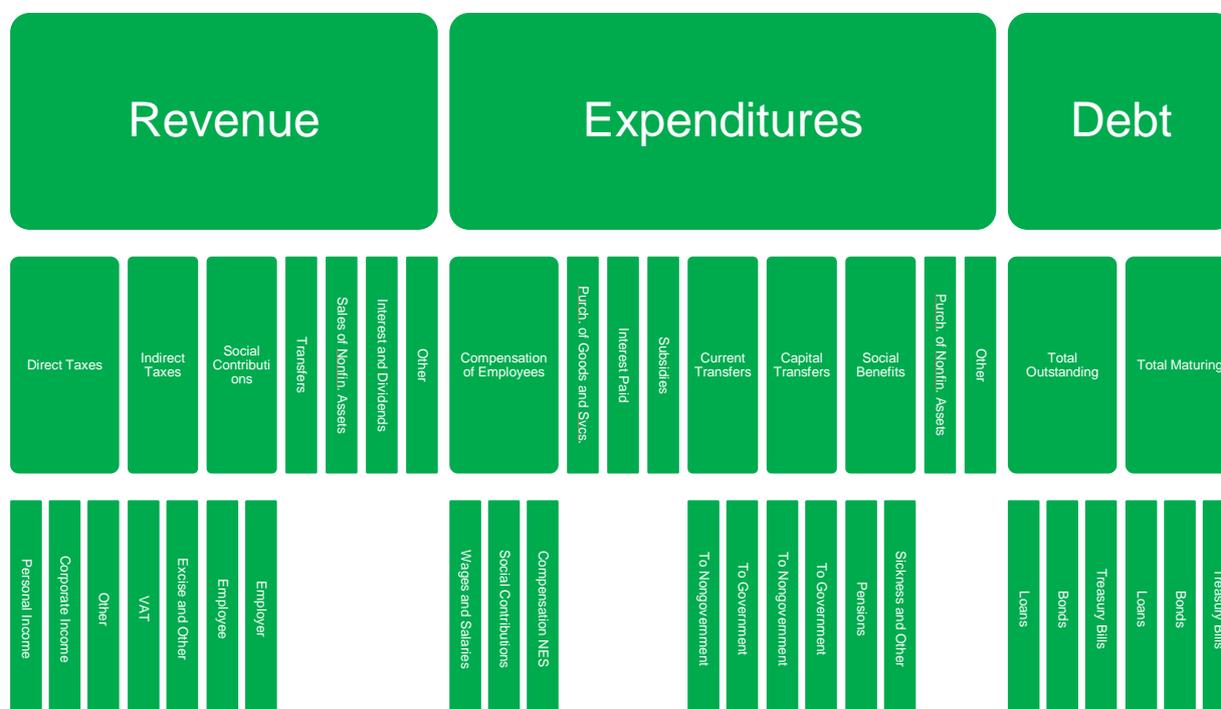
As with the exchange rate, the policy rate for Greece is the ECB intervention rate. Domestic interest rates included in the model are the prime rate, the short-term interest rate and the long-term government bond yield: these are determined on the basis of the policy rate, domestic conditions, and financial stress. In a liquidity constrained economy like Greece, it is not so much the level of interest rates but overall credit conditions which impact the real

economy; as a result, we generally find low “multiplier” effects of interest rates in the economy, compared with other countries.

### Public Finances

This module governs the central and general governments’ revenues, expenditures, and debt. Figure 49 outlines the source of revenue, expenditure, and debt of the Greek public finance system.

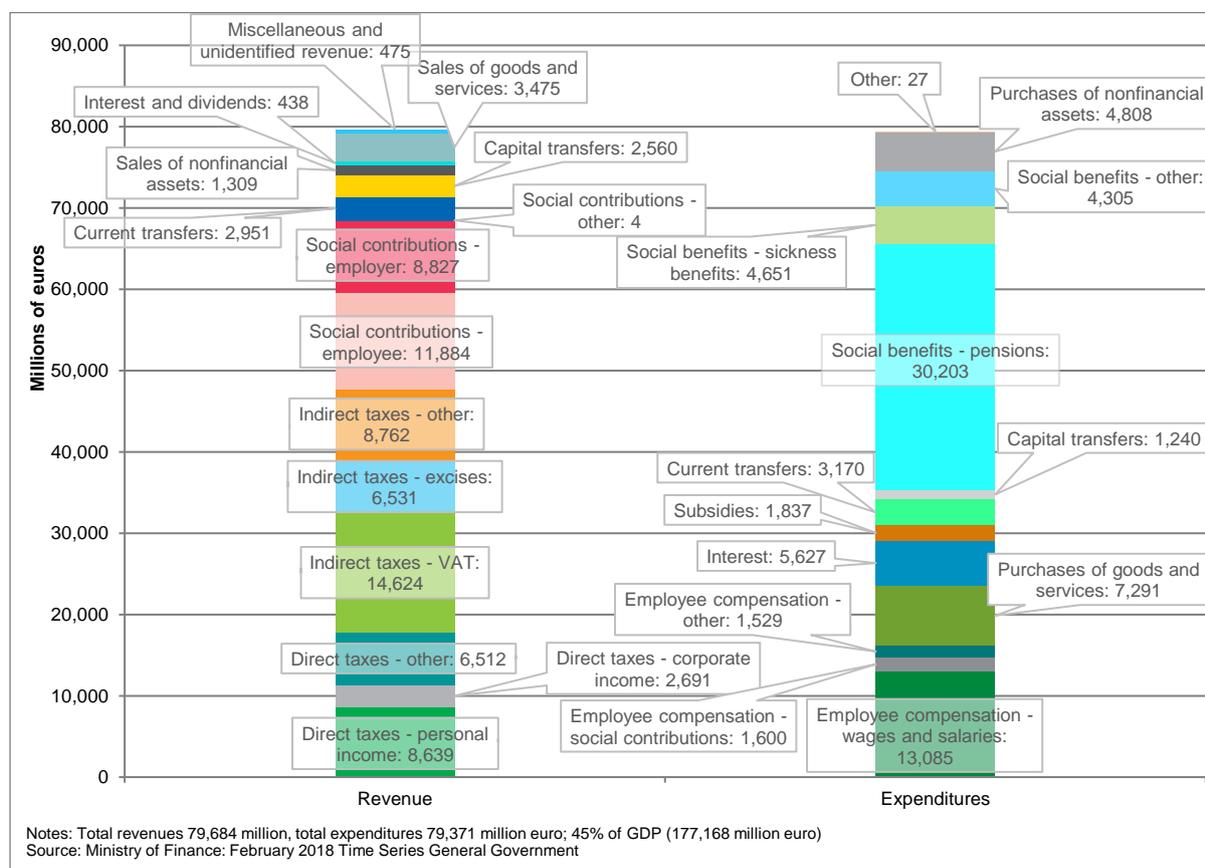
**Figure 49 Model representation of the Greek public finance system**



### Government Sector Breakdown

The following figures present the breakdown of public sector revenue and expenditures in Greece. The first graph presents the revenue and expenditures breakdown for the general government (Figure 50). This shows the consolidated government accounts, which net out transfers between parts of government.

The public sector accounts data published by the Ministry of Finance differ from the OECD in the way expenditures and revenues are allocated across categories. In the public finance module, we use the consolidated government accounts to improve comparability of data, hence the levels of the revenue and expenditure differ from the OECD–source data used in the macro module. The trends are nevertheless very similar, which means that one can easily link the two sources.

**Figure 50 General government consolidated revenues and expenditures in Greece, 2016**

In Figure 50, the totals for “taxes” given by the OECD and the Ministry of Finance data differ, because the OECD taxes are the sum of direct taxes plus indirect taxes plus social insurance receipts, while the Ministry of Finance aggregated taxes are only the sum of direct and indirect taxes.

- For direct plus indirect taxes, the aggregated and consolidated tables are identical, and are equal to the OECD equivalent figure (i.e. less social insurance receipts). Some taxes reported as “indirect and other” by the Ministry of Finance are, however, classified as direct taxes by the OECD. But the sum of the two is identical in the two sources.
- Social contributions and social insurance receipts are reported differently by the OECD and the Ministry of Finance, but the trend is similar. The OECD’s social insurance receipts concept indeed covers more than social contributions strictly speaking, whereas the stricter definition is used by the Ministry of Finance. For this line in the Ministry of Finance tables, the aggregated and consolidated tables are identical.

- Transfers received are much lower in the consolidated tables shown here than in the aggregated tables (€5,511 million instead of €30,728 million) because transfers between branches of government are netted out (removed from both transfer receipts and transfer expenditures).
  - This netting-out explains essentially all of the top line difference between the aggregated and consolidated revenue totals (€105.3 billion versus €79.7 billion), but that still leaves a large difference with the OECD reported revenue totals. Much of this difference is the net capital transfers.
- Sales of nonfinancial assets are identical between the aggregated and consolidated Ministry of Finance tables.
- Other revenue—consisting of interest, dividends, sales, and miscellaneous—is lower in the consolidated tables than in the aggregated tables (so €4,389 rather than €4,835 million). The discrepancies on the expenditures side are the same, all coming from the fact that transfers in the aggregated files do not net out transfers between levels of government.

There are two big discrepancies on the expenditures side that do not come from the aggregated/consolidated difference. There is a difference in the way subsidies are reported by the OECD and the Ministry of Finance. The same holds for the level of social benefits.

Despite these differences, the headline concepts that are key to this study are either identical (sum of direct and indirect taxes) or follow the same trend (social contributions, current government expenditures and social transfers).

Applying tax or expenditure changes in the public finances' module that is based on the Ministry of Finance aggregated data will thus make it possible to derive the overall implications on revenue and expenditure under the OECD definition used in the macro model, as well as generate all the spill over effects on the economy.

### *Revenues*

In the macroeconomic module, government revenues are generated through taxes on stocks and flows. The revenue collected is determined by multiplying the implicit tax rate (defined as the ratio of actual taxes paid to the relevant tax base, after calculating all deductions, credits, exceptions, etc.) with the relevant tax base, which itself is associated with the proper measure(s) of economic activity. Hence we do not model the actual tax rates and tax base, given the multiple changes that have taken place over the years in both of these, but we rather model the implicit tax rates measured by dividing tax revenue by a tax base as close as possible to the actual. Indeed, in Greece as elsewhere, tax structures have changed over time, so these implicit tax rates represent a “reduced” form of the historically varying regimes which automatically integrate different levied rates and different levels of compliance.

In the baseline forecast, the forecast trend in tax rates is a function of different economic variables among which the debt to GDP ratio (a higher debt ratio generally leading to increases in taxation). In the alternative scenario and in simulation exercises, the tax rates were defined a priori then kept exogenous. For example, the decision to increase the statutory household income tax rate was simulated by calculating “out-of-model” the ex-ante induced effect on the implicit tax rate, then raising the equivalent implicit tax rate accordingly. This has two consequences in the model: government revenues through that channel will increase, but disposable income (the amount of income remaining to private citizens after taxes are paid) will fall commensurately, resulting in some mixture of lower consumption and savings. As explained later when we present the income distribution module, the net effect depends on which citizens the tax falls upon; a tax on the wealthy will result in a smaller reduction in consumption, as they reduce their savings rates, but a tax on the poor is likely to have a much greater impact on consumption, as households these have almost no savings rate cushion.

### *Expenditures*

While taxes have a negative impact on the private sector’s ability to spend and save, the revenues that they provide enable government expenditures, which have the opposite effect. At the macroeconomic level, current government expenditures and public sector investment are part of nominal and real GDP. Hence, increases in these expenditures (in real terms) raise the level of GDP. Part of this will filter through to imports, limiting the boost to real GDP. In addition, government consumption and investment generate demand addressed to the different sectors, which leads to increased production, and as a result, employment. The sectors that benefit from this increased “public consumption” include: transport, education, health, but also machinery and equipment, and many others.

A large share of current government expenditures consists of wages and salaries to public sector employees. Employment by the government generates income to households, which flows back through the economy via disposable income. And of course, the government uses its funds to provide public goods that will not otherwise be supplied to the economy.

Whereas taxes appear as deficits in disposable income, the government also provides positive transfers to households and businesses. Cuts in pensions will lower disposable income and have a detrimental impact on consumption, but the impact of such a measure will vary depending on the distribution of pensions across income groups and the way the pension cut is orchestrated. Similarly to income tax changes, one can expect a cut in pensions (or a rise in income taxes) to have a smaller impact on savings and a larger impact on consumption when these are applied to lower income households. Indeed, wealthier households have a lower propensity to spend. Again, the income distribution module allows us to model this effect.

The public finances’ model finally provides levers to determine the need for a budget surplus, or willingness to deficit spend. This determines the relationship between total revenues and

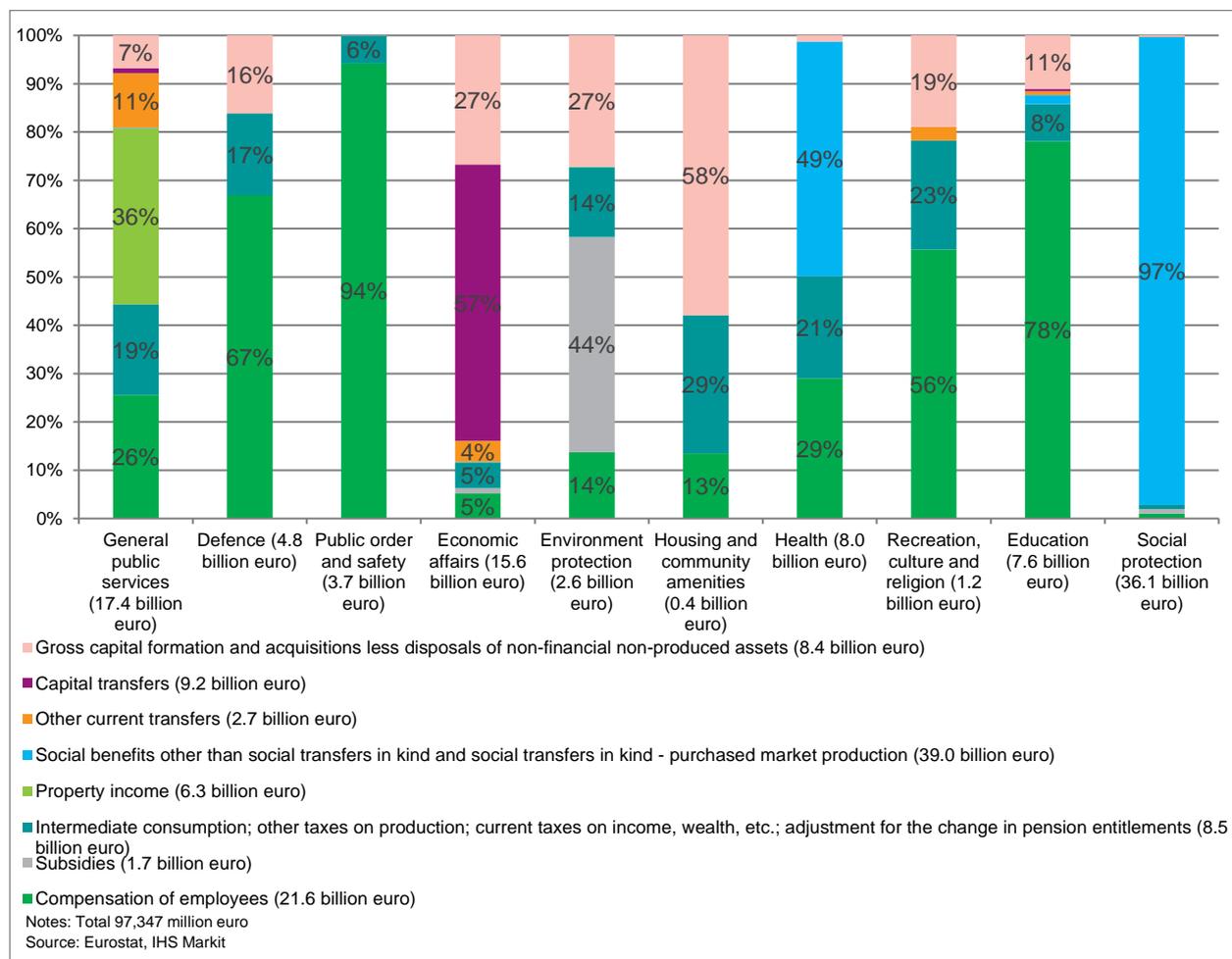
total expenditures. Automatic adjustments come into play if future outcomes translate into higher public sector deficits. These automatic budget stabilisers were neutralized in the scenario simulations in order to quantify the budget impact of the given fiscal policy changes without any correction mechanism.

Once determined in the macro model based on underlying developments in the labour market, in activity and in prices, expenditures are allocated according the following budget areas, according to the choices made in defining the scenario:

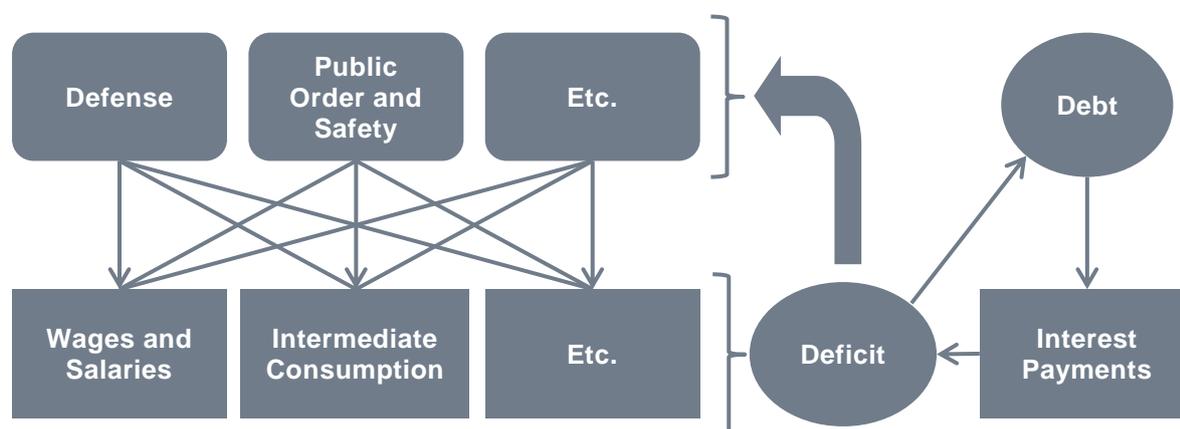
- social protection
- general public services
- health
- education
- economic affairs
- defence
- public order and safety
- environment protection
- recreation, culture, and religion
- housing and community amenities.

Each budget area, in turn, has its own pattern of spending on the following:

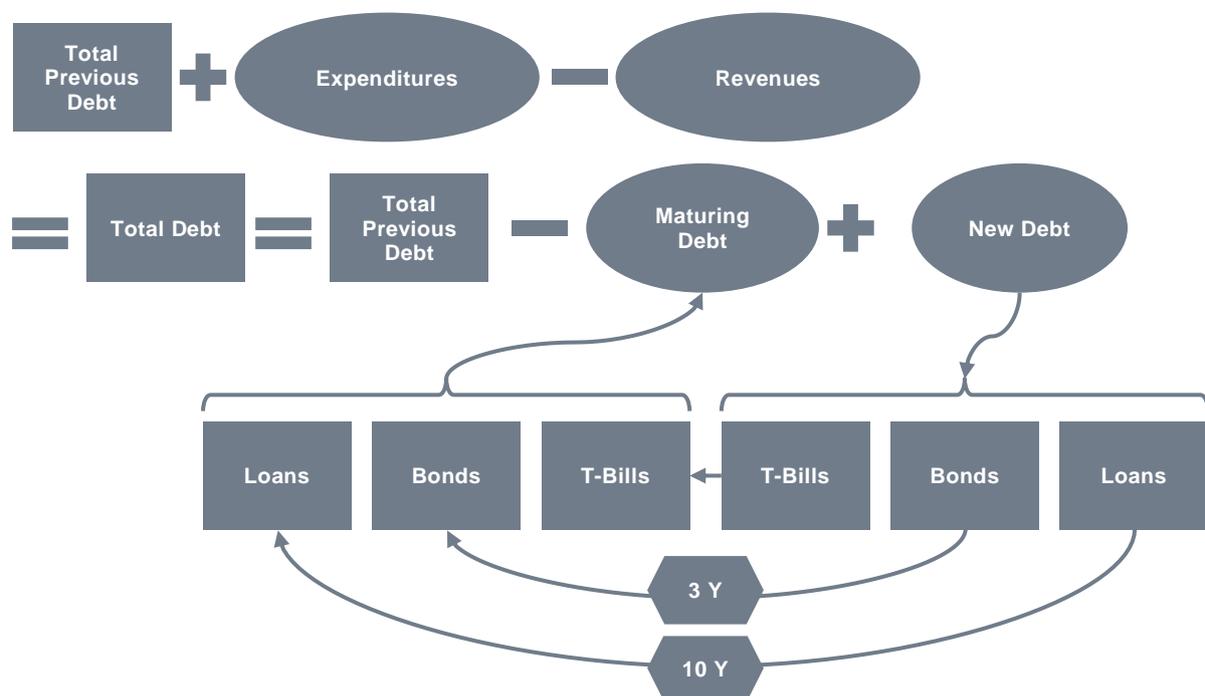
- subsidies
- property income
- intermediate consumption
- compensation of employees
- social benefits
- other current transfers
- gross capital formation
- capital transfers.

**Figure 51 General government expenditures in Greece, by function, 2016**

To illustrate how the model works, let us take the example of education. This expenditures category represents 8 percent of total government expenditures, four-fifths of which are employee compensations. Shifting spending from education to housing and amenities, which spends less than one-fifth of its budget on wages, but almost three-fifths on gross capital formation and nearly a third on intermediate consumption, will result in the government as a whole transferring less money to employees through wages and salaries. This will lower employment and increase the amount of slack in the labour market, with follow-on effects on wage rates. At the same time, it would increase the level of government investment and government consumption, which directly constitute demand for output from the Greek economy and indirectly stimulate private employment.

**Figure 52 Flows between spending by function and spending by type*****Debt***

The public finances module includes equations to forecast future trends in government debt. Indeed, the government must service its current debt as well as any new debt issued as a result of deficit-spending. The public finance module simulates this change in debt, as well as the composition of new debt issued and maturing debt. The level of outstanding debt as well as the interest rate that applies to outstanding debt dictate the level of interest rate payments. This can, in turn, reduce the government's ability to spend in ways that benefit the economy, or require additional taxation. Figure 53 is a simplified outline of the model's representation of Greece's debt structure.

**Figure 53 Model structure of public debt distribution**

Given the above, the overall impact of a tax cut on the economy in the Greece model depends on the balance between the effects on the parts of the economy that bear the burden of the tax, and the parts of the economy that see the benefits of the expenditures that this tax allowed. The same holds true for changes to transfers and expenditures: unless the automatic correction mechanisms built into the baseline scenario are neutralized, changes in the levels of transfers or other expenditures will result in both a benefit and a detriment to different components of the economy; if those mechanisms are neutralized, then the debt burden will increase.

### Industry Module

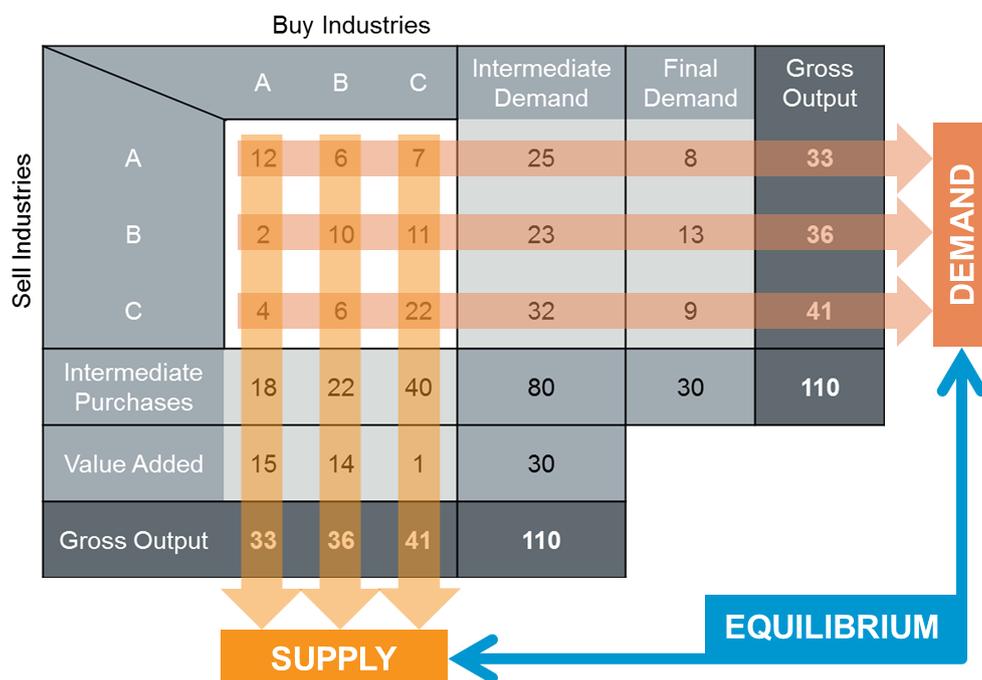
The industry module is structured under the Leontief input-output framework. This framework depicts the relationships amongst the different industries within an economy, by tracking how the output of one industry may become the input of another. In other words, this framework shows the dependence of every industry on its customers—whether these are other industries or final users such as households, government, companies for investment purposes or rest of the world—and with its suppliers (input flows). For example, if we consider final consumer demand for food and beverages, this is demand addressed to the retail industry, which in turn will buy supplies from the food and beverages' industry, but also from the transport industry, among others. To produce the food and drinks required to respond to the demand from the retail industry, the food and beverages' industry will buy

inputs from the agricultural industry, from the chemical industry, from the pulp and paper industry, from the plastics industry, from the non-metallic minerals industry (for glass), etc. It will also buy machinery and equipment, energy, etc. Some of this intermediate demand will be imported goods, materials and services.

All of these intersectoral flows are kept track of and recorded in the input-output matrix presented below.

In the input-output accounting matrix, the flows recorded in rows track demand, while the flows in columns depict supply. Looking at a given line in the table, and continuing with the food and beverages example, the flows represented are all the sales made by the food and beverages industry to all the other economic sectors, and to the final users (these being: private consumption, government consumption, investment, rest of the world). Looking at the table down the columns, the numbers on each line in a given column represent all the purchases that a given industry (the sector at the top of the column) is making from other industries. Down at the bottom of the table are “wages and salaries” corresponding to the labour inputs used in production.

Given that this is an accounting model, the double-entry system dictates that uses must equal sources; that is, the total value of inputs must equal the total value of outputs. This condition characterizes an equilibrium situation where supply matches demand. Since the total value of outputs is equivalent to the total value of sales, or turnover, hence the matrix allows to determine gross operating surplus as the difference between total production value minus the sum of inputs used in production (whether goods, services or labour costs).

**Figure 54 Simplified depiction of the input-output model**

Input-output matrices are country specific and represent the interrelationships between sectors at a given point in time. The technical coefficients (or share of inputs needed to produce a given output) depend both on the exact product mix of each sector, and on the technology used to produce these.<sup>22</sup> For example, if the machinery industry evolves from producing machinery for the food and beverages industry to producing an increasingly large share of machinery for the auto or shipbuilding industries, the types of inputs that the sector will buy will vary. Yet, although we recognize that all input-output coefficients are product-mix and technology dependent, the analysis of different input-output tables over time in a given country shows that the changes in coefficients are usually fluid and can be “traced” by following different input-output tables over time. Hence, in this study, the use of several input-output tables for Greece, relating to different years.

Given the collapse of the economy since 2007, it is obvious that the total value of many sectors production has gone down dramatically and not by the same amount across sectors.

<sup>22</sup> Standard input-output conventions assume that the technology of production as reflected by the matrix of direct input coefficients, A, remains relatively stable over time. In addition, production processes are assumed to be linear and exhibit constant returns to scale with no possibility for substitution among inputs. However, these restrictions apply for the calculation of demand by industry only. In practice, equations for output by industry include factors which statistically offset these restrictive assumptions.

Yet, the composition of inputs for a given level of output has not changed dramatically as the collapse has been widespread and did not lead to a complete change in the product mix of each sector: indeed, the sectoral detail that we use is quite granular, which explains the relative stability in the technical coefficients over time. To take an example, paper and paper products remain paper and paper products however low the production has fallen to, and the structure of inputs they use to produce is unlikely to have changed much. The same holds for pharmaceutical products, for rubber and plastics, etc.

Nonetheless, in the forecast, a distinction has been made between the baseline scenario and the alternative scenario:

- In the baseline scenario we do not assume a radical transformation of the economy of Greece, given the very slow rate of recovery and the continued tight liquidity problems to which companies will be faced. Although the rates of growth of different sectors vary, there is no radical shift in the product composition of these sectors.
- This is not the case in the alternative scenario, however. The alternative scenario quantifies the impact of a very different mix of public policies that is designed to focus on the development of the private sector via a recovery of investment – with support from foreign direct investment. These foreign investors will not invest in the same sectors and activities that Greece offers: in fact, foreign investors will contribute to radically change Greece's industrial fabric, opening new plants, restructuring others, changing the nature and type of products and services on offer. Hence a need, in the alternative scenario, to adjust the input-output matrix to reflect the changing structure of production. This was done by modifying ex-ante the technical coefficients of the input-output matrix by taking into account the input structure of “parallel” countries, specialized in the goods and services that Greece will develop in the alternative scenario. HIS Markit' world industry service has similar input-output tables for 75 countries, and 95 sectors per country. These provided the basis from which the Greek input-output coefficients were adjusted.

### ***The Input-Output Table for Greece***

Greece follows the NACE v2 industrial classification and the corresponding Classification of Products by Activity (CPA) 2008 used by the Hellenic Statistical Agency for their reported 2010 input-output table. This classification has a breakdown of 65 industries, presented below. The input-output tables used are from the years: 2005, 2008, 2009, 2010, from EUROSTAT, and 2010 from the Hellenic Statistical Agency.

The industry model itself relies on data for 57 industries, based upon the ISIC-Rev4 classification. These 57 industries are aggregates of IHS Markit's Comparative Industry Service forecasts of 105 industries, in order to generate forecasts of production, real value added and employment in the three scenarios analysed.

### *Industry variables forecast*

The industry model provides forecasts of production by industry, as well as employment (hence productivity), employee compensations and gross operating surplus.

Profitability by industry is defined in history as gross operating surplus, equal to Value Added by sector minus the imputed wage bill of that industry. In the forecast, productivity by industry is estimated as a function of long-term total factor productivity and past trend in labour productivity within the industry considered. The equation structure allows short-term deviations between actual productivity and trend productivity, reflecting the phase of the business cycle that the economy is in. Immediately after turning points, the changes in activity levels typically result in changes in labour productivity as opposed to immediate responses in employment. For example, at the peak of a cycle, when the economy switches around, employment does not immediately collapse, so productivity falls. Conversely, when a recovery starts, companies typically delay new hires to ensure that the uptick in growth lasts long enough to justify this addition to costs.

Treating productivity by industry as a stochastic variable as opposed to defining it as a ratio of output to employment also makes it possible to simulate, in the alternative scenario, the impact of technological changes and of structural changes in the composition of output on employment. The changes to the employment intensity of value added of given industries—in particular, in those industries receiving inflows of FDI—was assessed “out of the model” based on the average number of persons per unit of output in other countries producing similar products.

Once productivity is determined, employment by industry is derived through the regular formula linking production, employment and labour productivity (i.e., via an identity).

Labour costs are then equal to the average hourly wage cost including social contributions paid by employers, times the average number of hours worked, divided by productivity.

The average hourly wage rate including social contributions is defined as the total wage bill at national level divided by salaried employment times hours worked.

### *Links with the macroeconomic model*

The input-output block in the Greece industry model translates the macroeconomic forecasts of final demand (private consumption, government consumption, investment, exports and imports) into demand by industry.

This is carried out in two steps. First, the vector of economic expenditures from the macroeconomic model (the components of GDP) is converted into a vector of industrial deliveries to final demand. A fixed bridge matrix, constructed from the Input-output benchmark table, is used in this conversion. The term *fixed bridge* means that the allocation

of final demand—say, private consumption—to the different sectors does not change over time. This constraint can be lifted either by assuming a trend change in the coefficients applied to each final demand component/industry combination, or by applying the method described below, which consists in defining a “generated demand” equivalent and then estimating the link between actual output and generated demand as opposed to assuming an identity between the two.

Once the final demand vector has been calculated, standard Input-output techniques are used to derive estimates of the industry output required to produce this bill of goods for final use.

In the Greece industry model, in order to relax the constraint imposed by fixed Input-output coefficients, the estimates of gross output that result from applying the strict, constant, input-output technical coefficients, were treated as demand proxies and used as drivers in the actual output equations. The structure of the industry output equations is thus as follows, where actual output by industry is a function of the generated demand and a number of other variables, as opposed to be equal exactly to the input-output generated demand. Once output is estimated by industry, total production is generated by summing across all industries, and calibrated to the value derived in the core macro module.

Another link with the macroeconomic module is via prices and costs. Indeed, these impact trends in final demand (domestic and export demand), and in imports, as well as the relative share of inputs that are imported. As prices in Greece increase faster/slower than in the rest of the world, the relative share of imports in total inputs used in production is indeed bound to vary.

As indicated earlier, the core macro model breaks down imports of goods into four product categories: agricultural products, non-agricultural products, energy products and manufactured goods. Services form the last category. Each of these import categories depends on trends in domestic demand and on relative prices. The relative share of inputs that will be imported in each commodity group is given by these import equations.

## **International Module**

The international block houses the economies of each of the other countries, the linkages between them, and their linkages with Greece through trade and financial flows.

### ***Exchange Rates***

In GLM, each country’s bilateral exchange rate to the US dollar is set to converge to purchasing power parity in the long run. In the short-run, the exchange rate varies with the interest rate differential (country/region versus US), the change in the net foreign asset position, inflation differential with the US plus other variables as needed to reflect explicit or implicit “peg” systems. The euro is no exception. Being determined within the overall GLM,

however, the euro is exogenous to the Greek model. Effective exchange rates are determined as a trade-weighted average of partner countries' exchange rates, the trade shares being those used by the IMF to calculate effective exchange rates.

### ***Interest Rates***

The ECB's intervention rate is endogenous in GLM, meaning that it adjusts to changes in market conditions. In the baseline forecast, the ECB's key intervention rate is exogenous and defined by IHS Markit's Chief European economist, consistently with the ECB's meeting decisions. In the longer term it follows a Taylor rule. The ECB's key intervention rate then drives the eurozone money market rate as well as other market interest rates.

Short term interest rates are a function of the money market or policy rate, inflation, financial market stress and liquidity. The relative weight of each of these variables changes by country: in Greece, the ECB intervention rate and financial market stress are the two determinants of short-term interest rates.

The prime rate is explained by the money market or policy rate, inflation, financial market stress and liquidity. In Greece, the prime rate is explained by the policy rate and liquidity.

The long-term bond yield of each country is explained by the money market or policy rate, inflation, and the share of debt in GDP (or the fiscal balance in GDP). In Greece, it is explained by the ECB intervention rate, the change in the share of debt in GDP (a rise in debt leading to a rise in the long-term bond yield), and by the country risk score which measures the relative ease/difficulty for foreign investors to do business in the country.

The long-term government bond yield affects the implicit rate of interest on the public debt. In the baseline forecast, however, the actual interest rate expected to be paid on the government debt is calculated outside the model in order to take into account the scheduling of debt servicing agreed with institutional investors. The equation remains in the model in the alternative scenario, however, with relevant add factor, so that when Greece will return to markets it will be possible to capture the impact on debt servicing costs of changes in the European situation and in the Greek debt situation.

Another interest rate which plays a role in the Greece model—beyond European interest rates—is the US Fed policy rate which has a sizable influence on balance of payments' capital flows.

### ***World Prices***

The international price module encompasses several agricultural, non-agricultural and energy prices. For energy, prices are by fuel and by main region, in order to capture the impact of changes in energy prices on relative price competitiveness in each country. The commodity

and energy prices impact domestic prices pro-rata to how much the economy uses these inputs, as given by the input-output table.

### ***Flow of Funds***

The flows of funds measure all financial transactions between the following four types of stakeholders: households, nonfinancial corporations, government, and financial corporations. Their inclusion in the model makes it possible to better capture the constraints imposed by lack of funding, and to take into account trends in non-performing loans (NPL), as well as wealth.

Taking fixed investment as an example, the amount that will be invested by companies is not only a function of the companies' desire to invest given growth prospects and the expected rate of return on investment, but it also depends on whether companies can pull together the funding needed for this investment. Similarly, households' spending decisions are not only determined by the trends in disposable income, but also depend on whether they are able to borrow to finance their consumption or residential investments. Their ability to borrow is itself dependent on financial institutions' situation, as well as trends in household and corporate wealth, which depends on trends in asset prices and savings' patterns.

Below, we present the main variables that relate to credit to the Greek private sector.

Total domestic loans are split into different categories, based on the type of credit and on the lender. We separate individuals and private non-profit institutions, using the acronyms HH for households, NFC for nonfinancial corporations and INS for insurance companies. The segmentation available from the Bank of Greece, originally at monthly frequency, but converted to quarterly frequency in the model, is as follows:

For households:

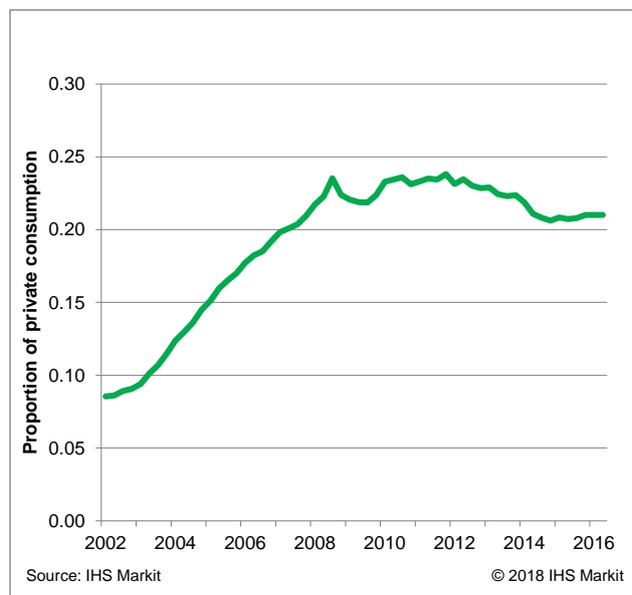
- lending to households for consumer credits, in euros
- lending to households for consumer credits, in non-euro currencies
- lending to households for housing, in euros
- lending to households for housing, in non-euro currencies
- credit card loans to households, in euros (which are a subcomponent of total consumer credits)

For nonfinancial corporations and insurances companies:

- loans to nonfinancial corporations, in euros
- loans to nonfinancial corporations, in non-euro currencies
- loans to insurances, in euros
- loans to insurances, in non-euro currencies

- total loans from domestic banks to the private sector, in euros
- total loans from domestic banks to the private sector, in non-euro currencies.

**Figure 55 Credit to domestic residents, as share of private consumption in Greece, 2002–16**



The split between loans to consumers via credit cards and loans associated with housing is convenient as it makes it possible to use the relevant type of credit as a driver of private consumption and investment. Similarly, for nonfinancial corporations, the breakdown of loans in euros and in other currencies than the euro is important as it makes it possible to take into account the impact of variations in exchange rates on the debt level.

Figure 55 shows the share of nominal private consumption that was financed by credits to consumers.

After having risen up to 24 percent between the early 2000 and 2008, the share of private consumption funded by consumer credit initially stabilized then started to decrease, yet remaining above 20 percent. Note that consumer credit excludes credit for housing.

In the Greek model, the value of loans to consumers is a function of the change in long-term government bond yields and in the money market rate, both with negative signs reflecting the cost of credit for borrowers. Loans to consumers are also a function of disposable income (as higher income levels encourage banks to lend more), of the GDP gap (indicating the position in the business cycle hence expectations of faster or slower growth) and of the level of stress in the global economy.

Total credit to consumers (both in euros and in non-euro currencies) is explained by similar variables, although in this case the risk associated to doing business in Greece also influences total lending to Greek households, with a negative sign. Credits to households in non-euro currencies are calculated by difference.

Household wealth is defined as the sum of financial and non-financial wealth, the latter mainly reflecting trends in house prices and home ownership. Financial wealth is the sum of bank deposits, bond and equity holdings by households, and other household financial assets.

Once deflated by the private consumption deflator, real household wealth influences households' decision to consume or invest.

For credits to nonfinancial corporations (NFC), a similar approach is adopted. For example, total loans to NFCs are explained by the trend in GDP at factor costs, long-term bond yields (the German yield being used here to reflect the overall market situation and not the specific problems which relate to Greece's sovereign debt), financial market stress and the country risk score (which explains a lot of the variance in credit to NFCs in Greece).

### **Income Distribution Module**

The last module in the Greek model makes it possible to derive the impact, on the aggregate propensity to consume, of changes in fiscal policy that alter the income distribution structure. Indeed, changes in household income tax rates or in pension payments will not have the same impact on overall private consumption whether these are implemented across the board (i.e. reduce or increase disposable income by the same percentage for all households) or whether they apply only to certain income categories, since the average propensity to consume varies across income brackets.

In Greece, where a large proportion of households earn an income which is below the tax free bracket, a large part of the population will not benefit from any change in household income tax rate, but would be impacted by a change of the tax free income level. Similarly, pensions are not evenly distributed across the population, hence changes in the amount paid or caps on high pensions will not impact all households homogeneously.

To take this into account, a specific module has been developed, the purpose of which being to quantify the impact on the average propensity to consume of different changes in tax structure.

The data in this module comes from Euromod. This source provides information on the distribution of income by quintile in several European countries including Greece, and on the distribution of income taxes, transfers and consumption across the same income deciles.

Using these tables, IHS Markit has developed a module in Excel which makes it possible to analyse the impact of changes in tax payments, in pension payments or in income by decile on private consumption by decile, and hence to calculate an average propensity to consume that differs across scenario. This module is used in the fiscal multiplier exercises presented in the main report.

## Data Sources

### *Global Link Model*

All the data comes from official national or international sources. National sources are always given priority, however, international sources have been used where national sources were deemed less reliable, or to extrapolate the series backwards to have longer history for estimation purposes.

Beyond the national statistical institutes and the central banks of each country, the GLM uses data from the UN (for the GDP and components of a number of emerging countries, as well as the population data and the detailed trade flows by commodity), from Eurostat and the ECB for European economies and Turkey (where needed), from the OECD (for sectoral GDPs and some employment and hours data), from the IMF (to complement the national balance of payments data), ILO, World Bank, etc.

All detailed commodity price data also come from recognized national and international sources. The forecasts are provided by IHS Energy, IHS Pricing and Purchasing for non-agricultural commodities and IHS' Agriculture group for agricultural commodity prices.

The model frequency is quarterly: where quarterly data was not available, interpolations were made by IHS using appropriate proxies to create a relevant profile for the annual history.

### *Custom Modules*

The data used in the custom modules added to the Greek macro model for the purposes of this study come from the following sources:

- EUROMOD statistics on Distribution and Decomposition of Disposable Income, accessed at: <http://www.euromod.ac.uk/using-euromod/statistics> using EUROMOD version no. G3.0+
- Statistical Office of the European Communities. (1990). Labour input in industry: sts\_inlb\_q, updated on May 16, 2016. Luxembourg: Eurostat.
- Statistical Office of the European Communities. (1990). Gross value added and income A\*10 industry breakdowns: namq\_10\_a10, updated on May 17, 2016. Luxembourg: Eurostat.
- Statistical Office of the European Communities. (1990). Emigration/Immigration by five year age group, sex and citizenship: migr\_emi1ctz/ migr\_imm1ctz, updated on Mar 21, 2016. Luxembourg: Eurostat.
- Statistical Office of the European Communities. (1990). Employment rates by sex, age and educational attainment: ifsa\_ergaed, updated on April 26, 2016. Luxembourg: Eurostat.

- Statistical Office of the European Communities. (1990). General government expenditure by function (COFOG): gov\_10a\_exp, updated on May 16, 2016. Luxembourg: Eurostat.
- Statistical Office of the European Communities. (1990). Financial balance sheets: nasa\_10\_f\_bs, updated on April 28, 2016. Luxembourg: Eurostat.
- Statistical Office of the European Communities. (1990). Population on 1 January by five years age group and sex: demo\_pjangroup, updated on April 22, 2016. Luxembourg: Eurostat.
- Statistical Office of the European Communities. (1990). Nights spent at tourist accommodation establishments – monthly data: tour\_occ\_nim, updated on May 11, 2016. Luxembourg: Eurostat.
- Statistical Office of the European Communities. (1990). input-output table – current prices (NACE Rev 2): naio\_cp17\_r2, updated on August 27, 2014. Luxembourg: Eurostat.
- Ministry of Finance. (2014). General Government Monthly Bulletin: February 2016: Time Series General/Central Government (xls). Greece.
- Public Debt Management Agency. (2016). Public Debt Strategy: Composition of Debt, updated December 31, 2015. Greece.
- The Observatory of Economic Complexity by Alexander Simoes. (2010). Greece Export and Import Visualizations. 2003–2014. MIT: Massachusetts, USA.

## Appendix E: Model Validation

All equations in the model for Greece were estimated using ordinary least squares (OLS), with an error correction model (ECM) specification wherever relevant. The equations were estimated one by one to optimize the degrees of freedom and define the best specification for each variable. Various tests were conducted at the single equation, then country model level, and finally for the entire GLM which includes the model for Greece. These include in- and out of sample forecasts, stability and normality tests on the residuals of the equations, and sensitivity analysis at country then overall GLM level.

Given the forecast horizons to be accommodated by the model, with a focus on the short term to measure adjustment costs, and on the long term to define the equilibrium solution once the economy has adjusted to structural reform – it was indeed important to verify the forecasting capabilities of the model over different horizons.

The model was tested by running a series of standard scenarios and sensitivity analyses, such as looking at the impact of changes in energy prices or in the Euro–dollar rate. Fiscal policy simulations were also conducted, to compare the GDP multipliers resulting from various fiscal policy changes, with those obtained by the ECB in a similar exercise, using the models of the European System of Central Banks.

In these fiscal scenario simulations, the fiscal policy changes that were tested consisted in a € 1bn cut in: current government expenditure; transfers; indirect tax revenue (combination of VAT and excise); household income tax receipts; and, corporate tax revenue. In this exercise, the “automatic fiscal stabilisers” that are embedded in the Greek model, which imply that a degradation of public finances will be mitigated by cuts in public spending and increases in tax rates, were neutralised. Indeed, the objective was to analyse the multiplier effect of different fiscal instruments when no compensatory measure is implemented.

The results of this exercise showed an overall consistency between the IHS Markit and ECB results. The differences were mainly explained by the different time period covered, and by the fact that the ECB focuses on fiscal tightening whereas we looked at the multiplier effects of cuts in expenditures but also of reductions (as opposed to increases) in taxes. The IHS Markit multiplier exercise also takes into account the worsened credit conditions in Greece in 2016 following the run on deposits in early 2015, and assumes no redistribution of the budget savings resulting from the fiscal tightening, whereas the ECB simulations cover an earlier period and assume a redistribution of the gains when the fiscal tightening is “permanent.”

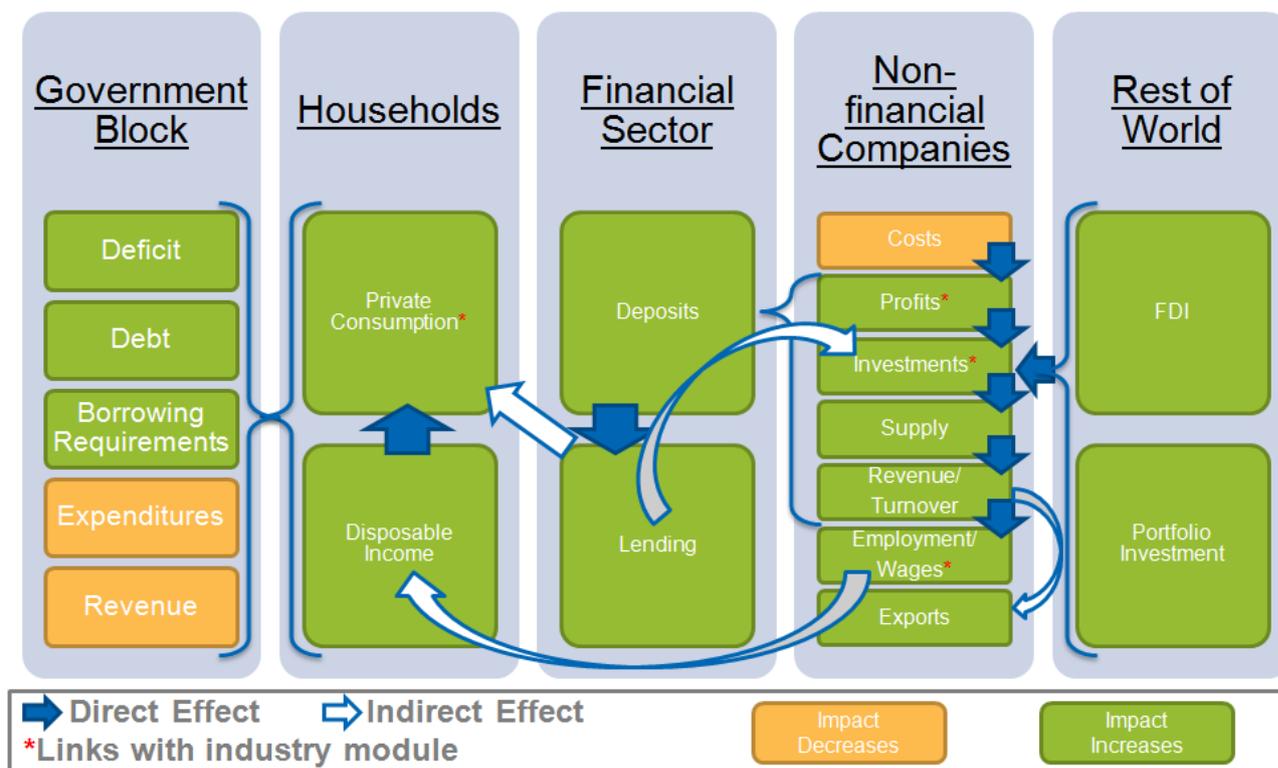
### Modelling the Impact of a Cut in Tax Rates

Figure 56 illustrates the interactions between the blocks of the Greek model and how changes in tax rates filter through the macroeconomic and public finances’ modules. A lowering of income tax rates raises disposable income in the core macro model, which affects private

consumption and imports, given that a high proportion of private consumption is imported. The increase in private consumption triggers additional demand addressed to all the sectors supplying consumption, which in turn drives intermediate demand. As macroeconomic and sectoral activity increases, this triggers new investments by companies, creating a positive virtuous circle. Indeed, higher activity eventually leads to higher employment, possibly to higher wage growth (depending on the state of the labour market), hence higher income which continues to fuel the virtuous circle. The higher consumption and income levels, and the higher level of activity, in turn lead to a rise in deposits and slightly ease the liquidity constraint.

On the negative side, the lower taxes worsen the public sector deficit and potentially “squeeze” out liquidity and saving. In the long term, the increased public sector deficit, hence higher public sector borrowing requirements, can result in higher long-term government bond yields, affecting market interest rates and potentially discouraging certain investors due to the higher cost of domestic credit.

**Figure 56 Impact of a cut in tax rates**



Depending on the magnitude of the effects (which depends on the size of the GDP gap and the labour market situation, among other), the net impact on real GDP will vary.

Table 18 shows the impact of a €1 billion cut in different type of revenue or expenditure components on real GDP, fiscal balance and debt respectively.

**Table 18 Impact of a €1 billion cut in revenue/expenditure components, 2017–25  
(difference from baseline, billions of euros)**

	2017	2018	2020	2025
<b>Real GDP</b>				
Government spending	-0.47	-0.34	-0.41	-0.21
Transfers to households (pensions)	-0.22	-0.27	-0.23	0.05
Consumption tax	0.59	0.6	0.4	0.08
Corporate tax	0.7	0.82	0.84	0.45
<b>Government fiscal balance</b>				
Government spending	0.92	0.47	0.69	0.5
Transfers to households (pensions)	0.63	0.42	0.2	0.02
Consumption tax	-0.99	-0.87	-0.96	-1.33
Corporate tax	-0.7	-0.72	-0.84	-1.26
<b>Government primary fiscal balance</b>				
Government spending	0.91	0.46	0.67	0.43
Transfers to households (pensions)	0.62	0.41	0.18	-0.01
Consumption tax	-0.99	-0.86	-0.93	-1.22
Corporate tax	-0.7	-0.71	-0.81	-1.16
<b>Government debt</b>				
Government spending	-0.57	-1.51	-3.1	-7.09
Transfers to households (pensions)	-0.62	-1.39	-2.33	-3.24
Consumption tax	0.75	1.85	4.12	11.91
Corporate tax	0.43	1.29	3.23	10.22

### Comparison with Results of Other Models

In March 2014, the European Central Bank (ECB) published a comparative analysis of fiscal multipliers across the eurozone economies, based on the fifteen structural models of the European System of Central Banks. The analysis compares the short- and long-term effects of different fiscal shocks in each of the 15 countries, among which were a permanent cut in government current expenditure, a rise in income tax rate, a rise in the consumption tax and a rise in the capital tax, each amounting to 1 percent of GDP. Although the analysis is not directly transposable to the present study, due to the different nature of the tax changes and to the assumptions made with respect to the use of the revenue generated by this policy tightening, useful insights can nevertheless be drawn.

The first finding from the ECB study is that a permanent shift in tax structure (or a permanent reduction in government current expenditure) does not have the same impact as a temporary one. Moreover, the long-term effects of a given fiscal shock are very different from the short-term effects, and can even have the opposite sign as behavioural changes occur and fiscal balances durably change.

On the comparative impact of using different policy instruments, the ECB analysis shows that, in the eurozone, expenditure based fiscal adjustments have larger negative short-run effects than income tax based adjustments. In other words, a cut in current government expenditure is more damaging to growth than a rise in taxes by the same amount. However, when the shock is maintained and not temporary, tax based fiscal adjustments eventually lower the long-run output potential of the economy, while expenditure-based fiscal adjustments can result in positive long-run output effects. In other words, a reduction in government consumption will have a more negative impact on real GDP than a rise in taxes by the same amount in years 1 and 2. However, if the cut is permanent, then after two years the “crowding in” made possible by the cut in public spending creates financing capacities for households and companies and can foster a rise in consumption and investment that partly outweighs the negative effect of higher taxation. So the total impact of the cut in current government expenditure in the long run is less negative than in the short run, and can even be positive if the public sector was using up all the saving in the economy.

A number of factors explain the different responses to the fiscal changes across countries:

- The short-run costs of fiscal tightening are greater when the economy is financially distressed (i.e., there is a higher share of liquidity constrained households; this clearly is the case of Greece).
- The net impact on the economy also depends on the magnitude of “crowding out” resulting from government spending. If the crowding out effect is large, meaning that the national saving is mostly used to finance the public sector deficit, then the reduction in the share of the government is more likely to free resources that can be invested in consumption and investment. This would apply to Greece, where all the national saving is presently used up to repay the debt, and where the most revenue possible is channelled to the government sector in order to keep the deficit under control.
- The impact of increases in capital tax are more devastating in countries which run large excess capacities – again the case of Greece. Indeed, to avoid paying the higher tax, capital depletion accelerates.
- The size of the country matters. Small countries implementing such shocks in isolation will not be able to influence the overall monetary policy stance in the EU, hence there is less likely to be a relaxation of monetary policy when they tighten fiscal policy, hence no monetary boost to partly compensate the fiscal squeeze.

### On the duration of the shock:

- Temporary reductions in government consumption are typically associated with larger short-run (negative) GDP effects than temporary increases in the households' labour income tax rate, the capital income tax or the consumption tax rate. To mitigate the negative effects of fiscal tightening on real GDP, budget tightening should thus take the form of tax increases rather than reductions in spending. This finding explains at least in part the general policy stance adopted in the eurozone since the beginning of the crisis. It, however, is not confirmed by the IHS results on latest Greek data, where we find that a reduction in government consumption has a high albeit lower negative impact on GDP than a rise in corporate tax or in a consumption tax by the same amount. The impact of the tax on capital depletion (for companies) or relocation, and on private consumption (due to the uneven income distribution structure and propensity to consume across income brackets in Greece) is indeed eventually more negative than a reduction in current government consumption.
- When fiscal shocks are implemented permanently in the models of the European System of Central Banks, short-run (negative) government consumption and sales tax multipliers are smaller in absolute value than in case of a temporary implementation. In other words, the negative impact of a permanent cut in government consumption appears to be less severe than that of a temporary cut. The same holds for tax increases—a result that probably explains the policy stance adopted in the eurozone.
- Long-run multipliers (impact on real GDP) are more negative when the saving that is generated through the fiscal tightening is “reinvested” in the economy in the form of a lump sum tax cut. But if the “saving” is used to reduce household' labour income tax in the medium to long term, the long-run multiplier of a cut in government consumption or an increase in capital tax becomes typically positive. Indeed, using the net saving to lower future tax rates on household or on corporate income provides an incentive for households to work more, and for companies to invest more, which raises potential output hence eventually generates a boost to the economy. Indeed, since households anticipate these long-run GDP effects at the outset, short-run multipliers are more favourable when the budgetary room that materializes after the fiscal tightening is used to lower distortionary taxes.

In summary, the ECB study shows that the short-term negative effects of fiscal tightening are typically more negative than the long-term negative effects with lump sum tax cut, which are themselves more negative than the long-term effect when the fiscal margin for manoeuvre generated by the tightening is used to reduce income tax. The effect of the latter can even be positive. Indeed, in this case households anticipate the forthcoming income tax reduction and increase labour supply (since they will retain a higher share of income in the long term), which boosts potential output.

This finding is less likely to apply to Greece, where the labour market is already characterized by huge unemployment. It is thus unlikely that a lowering of income tax rates in Greece would cause a rise in labour force participation rates and raise potential output in any reasonable lapse of time.

Because the ECB study looks at the impact of a tightening of fiscal policy, as opposed to compensating a cut in government expenditure with a cut in taxes, as we did, the results of the study only provide information on the magnitude of an a priori neutral tax shift if we assume that the impact is linear (i.e., that the negative growth impact of a rise in income tax is exactly the same, in absolute terms, as the positive effect of a reduction in the income tax by the same amount). This is, of course, not necessarily the case, especially when the categories of households concerned by the rise (respectively cut) in tax are not the same.

Table 20 presents the key real GDP multipliers for Greece from the ECB report. The report did not provide results on the impact on public finances or debt.

### Table 19 Impact on real GDP of a permanent tightening of fiscal policy in Greece

*Assumption: Revenue saving is reinvested in the form of a reduction in lump-sum taxes*

Assumption/measure	Year 1	Year 2	Long-run impact
<b>Revenue saving is reinvested in form of reduction in lump-sum taxes</b>			
Cut in government expenditure	-0.87	-0.74	-1.05
Labour income tax increase	-0.57	-0.82	-1.41
Capital income tax increase	-1.18	-2.46	-3.77
Consumption tax increase	-0.39	-0.58	-0.96
<b>Revenue saving is reinvested in form of reduction in household income tax</b>			
Cut in government expenditure	-0.83	-0.81	0.53
Labour income tax increase			
Capital income tax increase	-1.17	-2.51	-2.69
Consumption tax increase	-0.35	-0.56	0.55

Source: ECB Working Paper Series N°1648 / March 2014

**Table 20 Comparison of fiscal multipliers of IHS Markit's Greek model and European System of Central Banks' results**

Measure	Year 1	Year 2	Long-run impact
<b>Cut in government expenditure</b>	-0.82	-0.59	-0.72
<b>ECB study</b>	-0.87	-0.74	-1.05
<b>Reduction in transfers/pensions</b>	-0.38	-0.47	-0.4
<b>ECB income tax increase</b>	-0.57	-0.82	-1.41
<b>Corporate tax increase</b>	-1.23	-1.44	-1.48
<b>ECB capital income tax increase</b>	-1.18	-2.46	-3.77
<b>Consumption tax increase</b>	-1.04	-1.05	-0.71
<b>ECB consumption tax increase</b>	-0.39	-0.58	-0.96

Note: IHS Markit calculations based on Carroll, Slacalek, and Tokuoka (2014).

**Appendix F: Macroeconomic and Fiscal Effects of Alternative Policy Change Scenarios****Table 21 Estimated multipliers of various policy actions (impact by 2022)**

<b>Policy</b>	<b>Real GDP</b>	<b>Real Private Consumption</b>	<b>Real Fixed Investment</b>	<b>Real Imports</b>	<b>Real Exports</b>	<b>Employment</b>	<b>Government Debt</b>	<b>Government Revenue</b>	<b>Government Expenditure</b>
<b>Tax cuts</b>									
20% VAT rate	1.011	1.021	1.014	1.020	1.000	1.006	1.035	0.971	1.002
20% corporate income tax rate	1.002	1.003	1.010	1.004	1.000	1.001	1.005	0.995	1.000
20% personal income tax rate	1.005	1.010	1.010	1.010	1.000	1.002	1.024	0.980	1.001
20% personal income tax rate after accounting for distributional effects	0.999	0.998	0.999	0.998	1.000	0.999	1.000	1.000	1.000
<b>Pension reform</b>									
Employer contributions (25% to employment price elasticity)	1.062	1.109	1.056	1.123	1.002	1.074	1.095	0.933	1.005
Employee contributions (80% to disposable income)	1.029	1.057	1.045	1.061	1.000	1.020	1.114	0.916	1.006
Fixed payment of €700 a month to all pensioners	0.970	0.941	0.938	0.939	1.001	0.986	0.860	0.992	0.862
Return to labour force	0.999	0.984	1.049	0.994	1.000	0.998	1.004	0.997	1.000
Distributional Effects	1.000	1.001	1.000	1.001	1.000	1.000	1.000	1.000	1.000

*Note:* Detailed descriptions of the policies simulated can be found in chapter 5 of the main report.

*Source:* IHS Markit.

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