A technical study on the determinants of Greece's current account position

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The present study draws on the existing literature on national saving and investment to identify and analyze the main drivers of Greece's current account position in recent decades and, especially, in the years following the euro adoption. Our empirical methodology employs cointegration techniques and a vector correction model (VECM) for studying the determinants of the country's external imbalance.

Our econometric results seem to provide broad-based support to the key findings of a number of earlier empirical studies on the determinants of Greece's current account position. Specifically, the trend deterioration in the country's external imbalance in 1999-2008 can be traced back to a number of developments that took place over that period.

More specifically, our empirical results document a number of key drivers contributing to the significant deterioration in the country's current account position in recent years, with two of the most important ones including: (i) accumulated loss of economic competitiveness against main trade-partner economies; and (ii) pronounced fiscal policy relaxation following the euro adoption.

To assess the capacity of the new programme of fiscal consolidation and structural reforms to stabilize the country's external position, we utilize our estimated econometric models to produce out-of-sample forecasts for the evolution of Greece's current account in 2012-2016. Specifically, we examine a number of alternative scenarios encompassing varying degrees of policy-adjustment and success rates in implementing the agreed reforms.

Assuming a broadly satisfactory pace of programme implementation, we forecast a steady improvement in Greece's current account position in the years to come. This is deemed to be an important prerequisite for stabilizing (and gradually starting to reduce) Greece's external debt, from what currently appear to be unsustainable levels.

Introduction

The present study draws on the existing literature on national saving and investment to identify and analyze the main drivers of Greece's current account position in recent decades and, especially, in the years following the euro adoption. Our empirical methodology employs cointegration techniques and a vector correction model (VECM) for studying the determinants of the country's external imbalance.

Our econometric results seem to provide broad-based support to the key findings of a number of earlier empirical studies on the determinants of Greece's current account position. Specifically, the trend deterioration in the country's external imbalance in 1999-2008 can be traced back to a number of developments that took place over that period. These primarily relate to: **a)** the EU convergence progress and closer integration in world goods and financial markets following the euro adoption; **b)** domestic authorities' response to the key policy challenges arising from participation in the single currency area; and **c)** the structural characteristics and idiosyncrasies of the Greek economy.

More specifically, our empirical results document a number of key drivers contributing to the significant deterioration in the country's current account position in recent years, with some of the most important ones including:

Accumulated loss of economic competitiveness against main trade-partner economies. Among other reasons, this appears to have been the result of faster domestic inflation and unit labor costs (ULCs) growth relative to main trade-partner economies not being fully counterbalanced by respective productivity differentials.

Pronounced fiscal policy relaxation following the *euro adoption. In* line with the "twin deficit" hypothesis, wider fiscal deficits appear to have increased disposable incomes, boosting present consumption and reducing private saving. The aforementioned effects may have been even more pronounced in the initial years following Greece's euro area entry as domestic households probably perceived the initial rise in their disposable income as permanent.

Domestic financial deepening post the euro adoption. The completion of domestic financial sector liberalization in the mid 90s and enhanced financial deepening following the euro adoption appear to have been additional contributors to the deterioration in the country's current account position. This has been the result of the ensuing relaxation of the intertemporal budget constraint facing domestic households and businesses.

In an effort to reverse the aforementioned drivers and facilitate a steady improvement in the country's external position, the new EU-IMF financing programme aims to recoup competitiveness losses accumulated since Greece's euro entry and to enhance fiscal sustainability. A third strategic pillar of the new programme is the conservation of domestic financial stability.

More specifically, the new programme envisions a further significant decline in the general government deficit (and a return to primary surpluses from 2013 onwards) as a result of new austerity measures as well as the beneficial impact of a market-based restructuring of Greek public debt (PSI) and more favorable terms on old and new EA/EFSF loans.

The new EU-IMF programme for Greece also puts special emphasis on structural reforms in the domestic labor and product markets, aiming to boost medium-term growth and help reclaim accumulated competitiveness losses via a further significant decline in domestic ULCs and the   liberalization of key sectors of domestic economic activity.

The applied package of aggressive fiscal consolidation and structural reforms as well as deteriorated investor sentiment towards Greece have already propagated a sharp contraction in the domestic economic activity, with pronounced output losses having been recorded since Q4 2008.

The new EU-IMF baseline scenario forecasts Greek real GDP growth to contract by a further 4.8% this year, following a near 7% decline in 2011. Domestic economic activity is broadly expected to stabilize in 2013, with a return to positive and sustainable growth now expected no earlier than in 2014. By implication, the present recession and more competitiveness gains down the road are expected to further reduce the current account deficit in the quarters and years ahead.

To assess the ability of the new EU-IMF programme to stabilize Greece's current account, we utilize our estimated VECM models to produce out-of-sample forecasts for the evolution of Greece's current account position in 2012-2016 under two policy-adjustment scenarios. Specifically,

- **Scenario A (full adjustment)** broadly incorporates the underlying macro & fiscal forecasts of the new IMF baseline scenario for Greece (IMF County Report No. 12/57, March 2012); and
- **Scenario B (partial adjustment)** incorporates a less favorable projected trajectory relative to that envisaged in *scenario A*. Specifically *Scenario B* assumes realized adjustments in the real effective exchange rate and the fiscal balance that are half the size of the respective adjustment assumed in the first scenario.

In addition to the above, we examine two alternative policy adjustment scenarios. In the first of these we let the evolution of our explanatory variables to be determined by our estimated baseline VECM model in a recursive fashion. In the other one we depict the projected current account path that is computed as the average of the three aforementioned scenarios.

Under all scenarios examined in our study, we forecast a steady improvement in Greece's current account position. Specifically, our out-of-sample forecasts point to an average current account balance (deficit) in 2012-2016 that ranges between -6.64%-of-GDP (dynamic adjustment) and -3.96%-of-GDP (full-adjustment). These imply a respective average improvement of at least 3% ppts-of-GDP and at most 6% ppts-of-GDP, relative to the current account realization in 2011 (-9.9%-of-GDP). Moreover, our point forecasts for 2016 suggest a current account position ranging from a deficit of 3.1%-of-GDP (dynamic adjustment scenario) to a surplus of 2.3%-of-GDP (full

adjustment scenario). Finally, note that the margin of error in these projections is on average 3% over the entire out-of-sample projection horizon.

Overall, our empirical results support the necessity of a vigorous implementation of the reforms programme agreed with official lenders, so as to enhance fiscal sustainability and improve the country's current account position. The latter, in particular, is a prerequisite for stabilizing (and gradually starting to reduce) Greece's external debt, from what currently appear to be unsustainable levels.

The remainder of this paper is structured as follows: **Chapter 1** provides a brief overview of the key concepts and definitions describing a country's balance of payments; **Chapter 2** provides a short literature review on the main determinants of the current account position; **Chapter 3** takes an intertemporal view on current account developments in Greece and the euro area; **Chapter 4** focuses on Greece's current account developments since the euro adoption; **Chapter 5** presents the main results of our empirical study; and **Chapter 6** concludes.

1. Balance of payments - Key concepts and definitions

The current account balance is the difference between domestic saving and investment, aggregated over private and public sectors. A surplus (deficit) in the current account balance implies an excess (shortage) of saving over investment. In a closed economy, saving is, by definition, equal to investment, so that the current account balance is always zero. However, in an open economy domestic investment does not need to be equal to domestic saving. Provided that international capital is mobile, a current account deficit (*i.e., an excess of domestic investment over saving*) can be financed though borrowing from abroad. By a symmetric argument, a current account surplus can be thought as the portion of a country's saving invested abroad.

In the traditional accounting sense, the current account balance at the end of period t, **CA_t**, equals the change in *net foreign assets*, **ΔF_t**, between the end of period t-1 and t. The net foreign asset position is calculated as the difference between a country's total foreign claims and total foreign liabilities. A positive balance (**$F_t > 0$**) means that the country is a net creditor, while a negative one (**$F_t < 0$**) implies a debtor country at time t. Note also that the current account balance is a *flow* concept, while net foreign assets represent a *stock* variable. The above definition of net foreign assets does not take into account changes in asset prices. To account for that effect, the *balance of payments* identity states that the change in the net foreign asset position equals the current account plus an error term, ε_t, which captures valuation effects and net errors and omissions related to *e.g.* unrecorded debt assets held by country residents abroad (see *equation* 1 below).

$$\Delta F_t = CA_t + \varepsilon_t \tag{1}$$

The current account is one of the two main components of the balance of payments, with the other being the *capital account*. The current account represents the aggregation of the balances of: **i)** of *trade* (exports minus imports of goods and services), **ii)** *factor income* (receipts minus payments for employee compensation, interest, dividends, profits and other income) and **iii)** *current transfers*. So that,

$$CA_t = TB_t + SB_t + FI_t + CT_t \tag{1i}$$

Where

TB = trade balance; **SB** = services balance; **FI** = factor incomes balance; **CT** = current transfers balance, and *t* is the time subscript.

In ESA 95 accounting standards (applied to the presentation of Greek balance of payments statistics), the following identity holds for any time period ***t***:

$$CA_t + CT_t + FT_t + EO_t = O$$

Where

CT = capital transfers account (for the case of Greece, it mainly reflects capital transfers from the EU); **FT** = financial account *i.e.,* the overall net balance (inflows minus outflows) of direct investment, portfolio investment, derivatives, other investment and change in reserve asserts (with a minus sign in the latter representing an increase in the country's overall reserve asset position and vice versa); **EO** = errors and omissions.

2. Theoretical overview - Determinants of the current account position

In accordance with the international literature on external imbalances, empirical studies on the determinants of the current account position typically focus on explanatory variables that potentially influence investment and saving decisions. Representative regression typically includes: **a)** *competitiveness* indicators, such as the real exchange rate (REER); **b)** *catching up* indicators, reflecting the state and speed of converge between countries with different income levels *e.g.* relative per capita income levels of the domestic economy and a reference foreign developed economy; **c)** demographic factors, such as population growth and the old-age dependency ratio; **d)** business-cycle indicators, such as the output gap; **e)** degree of financial market deregulation *e.g.* ratios such as private sector credit-to-GDP or M3-to-GDP may provide useful proxies for assessing the impact of banking intermediation on domestic private savings and the current account position; **f)** degree of integration with international goods, services and financial markets; in the case of Greece (and other economies in the euro area periphery), the creation of the Single European Market and, most crucially, the adoption of the common currency may have caused structural breaks in the current account time series as a result of *e.g.* the elimination of exchange rate risk as well as the collapse of domestic interest rates in the early EMU years; **g)** fiscal variables, such as the general government balance; and **h)** other important variables, such as aggregate proxies of investor and consumer uncertainty (e.g. inflation volatility) and special factors having a temporary impact on the current account (e.g. deviation of oil prices and freight rates from their respective long-term averages).

In what follows, we draw on the existing theoretical literature on external imbalances to provide some insight on the expected direction and potency of the effects of the aforementioned variables on the current account position.

i) Competitiveness indicators

The real effective exchange rate (REER) is a typical *competitiveness* indicator utilized in empirical studies of the current account. The expected sign in the corresponding relationship is negative. That is because, on a ceteris paribus basis, an appreciation of the real exchange rate increases the purchasing power of domestic incomes in terms of imported goods. It also increases the relative value of financial, real estate and other assets held by domestic residents. These effects tend to reduce domestic saving and increase the propensity to consume. A REER appreciation of the domestic currency also tends to reduce the price competitiveness of a country's exports in international markets. The aforementioned factors have probably even been amplified in the euro area following the introduction of the single currency as a result of strengthened competition. Recent empirical evidence suggests that the relationship between changes in the real exchange rate and the current account position may not be monotonic. Theoretical models allowing for such a non-monotonic relationship include, among others, Tornell and Lane (1998) and Mansoorian (1998). More recently, Arghyrou and Chortareas (2008) and Berger and Nitsch (2010) document that the real exchange rate has a significant (negative) effect on the current account position in most euro area economies, thought the effect may be subject to nonlinearities.

ii) Convergence indicators

Convergence influences on a country's current account position can be best conceptualized within the framework of the so-called *inter-temporal approach to the current account*, originally proposed by Sachs (1981) and Buiter (1981) and later extended by Obstfeld and Rogoff (1995). More recently, Blanchard and Giavazzi (2002) applied a more elaborate intertemporal framework to the euro area to show that a country's *optimal* level of external borrowing is higher, the greater is its expected output growth relative to the euro area average, the lower is the wedge between the domestic and the foreign interest rate and the higher the elasticity of substitution between domestic and foreign goods (se also Giavazzi and Spaventa, 2010).

To a certain extent, these findings may provide some rationale to what some analysts and commentators have claimed to be a "benign neglect" attitude by EU authorities towards diverging current account positions across euro area member states, especially in the period before the outbreak of the global financial crisis. The basic idea here is that, in a monetary union characterized by increased market liberalization and financial integration, capital moves "downhill" *i.e.,* from the more advanced, capital-intensive countries to less developed capital-scarce euro area states. This capital movement occurs in a quest of superior investment opportunities in poorer countries that are expected to enjoy stronger productivity and output growth in the future. Thus, the *catching up* process between low and high per-capita-income countries in an environment of increased capital mobility may have a profound effect on these countries' *optimal* external borrowing levels.

Naturally, the above discussion gives rise to the notion that widened imbalances within the euro area may have both "good" and "bad" components (Eichengreen 2010). Countries like Greece and Portugal enjoying faster productivity growth in the early EMU years capitalized on the advent of the euro and deeper financial integration to attract foreign savings in order to finance domestic

investments (Gourinchas 2002). This along with a concomitant increase in domestic consumption (*i.e.,* reduced domestic saving) as a result of positive *permanent* income effects has given rise to widening current account deficits which, to a certain extent, were the natural outcome of the real convergence progress (Ahearne, Schmitz and von Hagen 2009).

On the other hand, capital-abundant core euro area economies experienced the opposite effect. Namely, capital outflows were destined to higher growth areas in the euro area and thus, lower domestic investment, higher saving and persisting current account surpluses. Eichengreen (2010) extends the latter argument even further by claiming that core euro area countries like Germany and the Netherlands with their highly-sophisticated banks were in a position to borrow from and run current account deficits with the rest of the world and on-lend to Greece, Portugal and other euro periphery countries. In that respect, in the early EMU years, the core was effectively acting as a financial intermediary between the periphery and the rest of the world.

Of course, the main rationale for characterizing certain external imbalances as "good" ones is based on the premise that converging economies starting from a low income-per-capital level will be eventually able to repay accumulated foreign liabilities by increased export revenues, once they reach a higher state of development. However, with the benefit of hindsight, one can now convincingly argue that growing bilateral imbalances within the euro area were, to a large extent, overlooked by authorities, at least in the initial EMU years. Unfortunately, this "benign neglect" attitude did not prevent certain "good" imbalances from turning into "bad", driven by domestic distortions such as real estate and financial asset bubbles, fiscal profligacy and unrealistic expectations about future incomes.

A number of recent empirical studies on the determinants of the current account position use relative per capital income levels as an explanatory variable for assessing and quantifying the impact of convergence effects. Based on the earlier discussion, one would expect the coefficient of that variable to be both positive and significant.

iii)   Financial integration

The way in which financial integration affects a country's current account position has been already discussed in the previous section. To recap, when countries become more closely integrated in goods and financial markets, a certain *disconnect* may arise between domestic saving and investment. This is because in a world characterized by capital mobility, capital moves "downhill" *i.e.,* from the more advanced, capital-intensive countries to less developed, capital-scarce states. In turn this suggests that poor countries with superior growth prospects may see an increase in domestic investment, a decrease in domestic saving and, by implication, a higher current account deficit. Practically, the development of the single European market and the introduction of the common currency constitute natural experiments to empirically examine whether to what extent the formation of the euro area helped to eliminate the so-called *Feldstein-Horioka Puzzle* (see Feldstein and Horioka 1980).

iv)   Fiscal policy

The potential effect of changes in fiscal policy stance on private saving and the current account depends on whether domestic households react in a *Keynesian* or a *Ricardian* fashion. In a Ricardian world, higher levels of public deficits and debts are, *ceteris paribus,* associated with higher domestic savings by households. In fact, the so-called Ricardian *equivalence* holds that an increase (decrease) in public debt must be *fully* offset by a rise (decline) in private saving. This offsetting dynamic is set in motion when, for instance, in response to a higher fiscal deficit (or lower fiscal surplus) domestic private agents decrease present consumption and increase *precautionary* saving in anticipation of reduced future disposable income. That is, as a result of higher expected taxation to repay public debt. Consequently, when the Ricardian *equivalence* holds, the impact of a fiscal policy change on the overall national saving (private + public) is zero and so is its impact on the current account position.

A departure from the Ricardian equivalence may imply that an increase in public debt may not be fully offset by an increase in private saving. In particular, the Keynesian model suggests that a higher fiscal deficit (or lower fiscal surplus) as a result of higher government spending or lower taxation increases disposable income and thus, boosts present consumption and reduces private saving. The aforementioned effect is even more pronounced if myopic households perceive the rise in disposable income to be permanent. This behavior of private agents in the Keynesian model gives rise to the so-called *twin-deficits* hypothesis, which states that higher fiscal deficits should be usually accompanied by wider current account deficits and vise versa.

The general government budget balance (as percent of GDP) offers a natural proxy for a country's fiscal policy stance. As such, it has been frequently utilized as an explanatory variable in a number of recent empirical studies on the current account position.

v)   Financial liberalization

A potentially important driver of the current account position that frequently appears in the empirical literature is financial liberalization as proxied by *e.g.* the ratio of private sector credit-to-GDP. Conceivably, financial liberalization and financial deepening are often associated with lower private saving, thanks to the relaxation of the intertemporal budget constraint facing households. Moreover, to the extent that these factors also facilitate significant price increases in domestic asset markets (e.g. housing), increased financial liberalization and bank intermediation may lead to lower private saving and higher consumption as a result of permanent income effects (Brissimis, et al 2010).

vi)   Real interest rate

The real interest rate - *as proxied by e.g. the average deposit rate minus CPI* - can potentially influence private saving through two opposite channels; namely, a *substitution* effect and an *income* effect. A rise in the real interest rate can conceivably increase private savings as households postpone consumption and save more today in order to facilitate higher consumption in the future (substitution effect). A higher real interest rate also increases the opportunity cost of investments. On the contrary, if the income effect prevails over the substitution effect, then a rise in the real interest rate on deposits may induce higher consumption (and less saving) today.

vii)   Demographic factors

Theoretical models and recent empirical studies document that population growth and the population age structure may have a significant effect on the behavior of private saving. The latter may be negatively affected by a high dependency rate or old population ratio. The basic intuition here follows from the life-cycle theory of consumption which implies that higher income and savings in mid-age working life offset dissaving in young and old ages. Arguably, that is because dependent and elderly people consume more than they produce and depend on the provision of goods by productive members of the economy (Higgins 1998; Lane and Milesi-Ferretti 2002). The above arguments imply that a high *contemporaneous* share of dependents relative to workers tends to have a negative effect on the current account balance. On the contrary, some empirical studies have documented a positive relationship between the current account balance and the *future* dependency ratio. That is on the basis that the latter variable constitutes a proxy of the amount of aggregate saving that domestic households need to undertake today in order to sustain living standards in the future. (see *e.g.* Barnes, Lawson and Radziwill 2010).

The potential influence of the demographic structure of an economy on domestic investment may be less straightforward. If capital and labour are complements in production, as it especially holds for business investment, a reduction in the growth of working-age population may have a negative effect on domestic investment (and vice versa). The opposite may also be true for the young and old population (Hoffmann 2002). However, in the case of public investment, a high dependency and old population ratio may raise the need for increased investment in social infrastructure.

viii)   Macroeconomic uncertainty

Macroeconomic uncertainty (as proxied by *e.g.* inflation volatility) may have a significant effect on domestic saving behavior. The prevailing view in the literature is that in periods of increased macroeconomic uncertainty, domestic private-sector agents reduce present consumption and increase precautionary saving so as to smooth their consumption streams in the face of volatile future income flows. Yet, some existing empirical evidence suggest that the effect of high inflation volatility may in fact work in the opposite direction *i.e.,* reduce saving and increase current consumption at the expense of future consumption (see *e.g.* Brissimis et al 2010).

ix)   Cyclical variables

Higher domestic GDP growth is often associated with lower current account balances, though this result has not proven to be very robust across countries. The basic idea here is that higher contemporaneous GDP growth rates may induce higher consumption (and lower saving) today, especially if households expect higher future income levels. Higher growth rates resulting from productivity gains may also lead to higher domestic investment (Barnes, Lawson and Radziwill 2010).

x)   Trade openness

Trade openness - proxied by the ratio of the total value of external trade (exports plus imports) to GDP - is used in many empirical studies as an indicator of the existence of barriers to trade and the degree to which a country is an attractive destination for foreign capital inflows. The existing empirical literature broadly supports a positive link between trade openness and the current account balance.

xi)   World oil prices

Higher world oil prices exacerbate widening pressures on the current account deficit of oil-importing countries and vice versa. Greece in particular is one of the most energy-dependent economies in the euro area and thus, one would normally expect widening pressures in its current account deficit in periods of price appreciation trends in world oil markets. Transportation revenue, primarily from shipping, also constitutes an important component of the Greek services balance. As such, periods of large deviations in world oil prices and freight rates from their historical averages must have had a significant effect on the country's current account position.

xii)   Initial net foreign asset position

Empirical studies document a positive link between the initial net foreign asset position and the current account in the subsequent periods. This positive relation usually arises as a result of the ensuing flow of future income streams *e.g.* interest revenue or expenditure, dividend receipts or payments. For instance, in a highly indebted country, a high external debt burden today points to a future steam of sizeable interest payments that may continue to exert widening pressure on the current account deficit in the subsequent years. The *persistence* of imbalances that led to the earlier accumulation of external debts may constitute another factor strengthening the positive link between the initial net foreign asset position and the current account.

Table A
Current account determinants and sign of theoretic relationship
Positive sign (+) indicates positive relationship / negative sign (-) indicates negative relationship

| Explanatory variable	Sign of theoretical relationship
Real Effective Exchange Rate	**-**
GDP per capita	**+**
GDP growth	**-**
Fiscal balance *Ricardian / Keynesian agents (twin deficits)*	**- / +**
Financial integration due to EMU membership *Low income/High income country*	**- / +**
Financial deepening (credit to GDP)	**-**
Real interest rate	**- / +**
Age dependency ratio	**-**
Population growth	**-**
Macroeconomic uncertainty	**+ / -**
Trade openness	**+**
Oil price (oil importing country)	**-**
Freight price (country with large shipping sector)	**+**

Source: Eurobank EFG Research

3.   Drivers of current account developments in Greece and the euro area

Historically, Greece and other economies in the euro area have been running significant current account imbalances (Graphs 1.1, 1.2). However, the scale and persistence of such imbalances in the period following the introduction of the euro in 1999 appears to have been greater than in earlier decades (Barnes, Lawson and Radziwill 2010). In particular, for the period leading to the global financial crisis in 2008, the increase in dispersion in current account positions among OECD countries was greatest for the European Union, especially

euro area countries (Blanchard and Giavazzi, 2002). The turn of the year 2008 found most countries in the so-called *euro area periphery* running large current account deficits (Greece: -17.9%; Portugal: -12.6%; Spain: -9.6% ; Italy: -2.9%; all as percentage of GDP – AMECO database), with core member states in the richer north featuring significant external surpluses (Germany: +6.2%; the Netherlands: +4.7% ; Finland: +3.2%). Despite these large current account imbalances across member states, the overall current account position of the euro area in 2008 was close to balance (-0.7% of GDP).

Graph 1.1
Greece's current account balance (ppts-of-GDP)
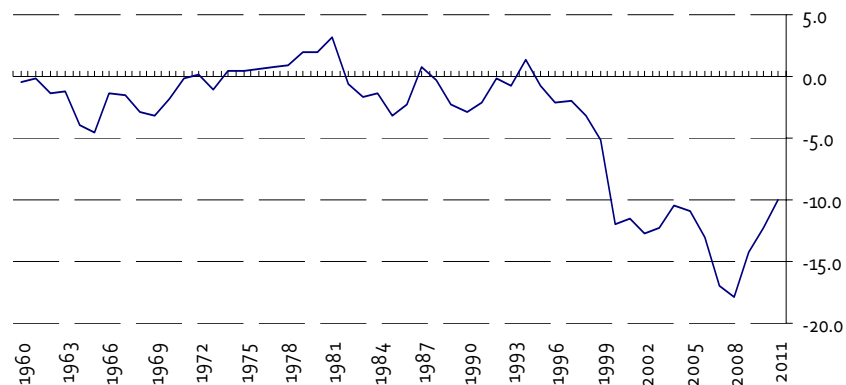
Source: AMECO

The scale of current account imbalances (and the ensuing net foreign asset and liability positions) across euro area countries in the period following the introduction of the single currency has raised concerns as to whether such large and unprecedented positions could be justified on the basis of underlying macro fundamentals (Arghyrou and Chortareas 2006). As we have already alluded to in the previous chapter of this paper, current account imbalances constitute an important mechanism for open economies to smooth consumption (Barnes, Lawson and Radziwill 2010). That is at least the prevailing view in the new open economy macroeconomics literature and, especially, of the intertemporal approach to the current account positions (Buiter 2001, Sachs 2001, Obstfeld and Rogoff 1995).

The implications of the latter view for the euro area is that diverging current account positions across member states potentially constitute the natural outcome of strengthened domestic financial deepening, the removal of exchange rate risk and the integration of goods, services and financial markets as a result of the single European market and the creation of the EMU. While the intertemporal budget constraint implies that countries cannot continue to increase their net indebtedness for ever, foreign borrowing to finance productive investment and to smooth consumption may be sustainable for some time. Furthermore, for mature economies with aging populations, accumulation of foreign assets maybe an effective way to fund future consumption (Barnes, Lawson and Radziwill 2010).

For Greece in particular, earlier studies have empirically documented a number of underlying factors driving the widening in the country's current account deficit, particularly in the period 1999-2008 (see *e.g.* Bitzis, Paleologos, Papazoglou 2008). To recap, some of the most important drivers of the deterioration in the current account position (and the ensuing accumulation of net foreign liabilities) include:

- **A gradual loss of competitiveness as a result of higher domestic inflation and relative unit labor costs vis-à-vis main trade-partners.** The real effective exchange rate (REER) constitutes a natural aggregate proxy of competitiveness and, as depicted in Graph 2.6, Greece's competitiveness deteriorated significantly since the country adopted the euro. Note that participation in the common currency area eliminates the possibility of reclaiming competitiveness losses via a depreciation of the nominal exchange rate. Effectively then, the only available root through which competitiveness can be restored is via an "internal devaluation" program to compress the general level of domestic wages and prices. In fact, internal devaluation constituted one of the three main strategic pillars of both the 1st and the 2nd EU-IMF bailout programmes for Greece (initiated May 2010 and March 2012, respectively), with the other two being fiscal stabilization and the safeguarding of domestic financial system stability.

- **Higher GDP growth, mainly driven by domestic demand, in the initial years following the adoption of the common currency.** Greece's real GDP growth averaged 3.8% in the period 2001-2008 vs. 2.4% in 1991-2000 and 0.7% in 1980-1990. This was the result of, among others, the domestic financial liberalization that took place by the mid-90's and the collapse in interest rates

that followed the adoption of the single currency. Special factors, including increased fixed investment ahead of the 2004 Olympic Games, raised the import content of domestic demand, aggravating the ensuing deterioration of the country's current account position. The cyclical position of the Greek economy relative to other euro area economies over that period helped to reinforce the aforementioned trends. In the period 2001-2008, the average annual output gap of Greece was ca +0.9% compared with a corresponding average of -0.01% in Germany (AMECO data base).

- **The sharp rise in public deficits and debts after Greece joined the single currency area**. Using a classic Keynesian argument (twin deficit hypothesis), the sharp decline in public savings in the years following the euro adoption may have aggravated the deterioration in the country's external imbalance. This hypothesis is empirically tested in the present paper.

- **Factors exogenous to developments in the Greek economy,** *e.g.* **developments in world oil and freight prices, may have also affected considerably the country's current account position in recent years.** Greece is a net oil importer and its economy is energy intensive. Moreover, transportation revenue from shipping has traditionally been a major source of financing for the services balance, given the country's strong share in the global commercial fleet. It is therefore only natural to expect that the sharp rise in the levels and volatility of international oil prices since 2005-2006 has aggravated pressures on the current account deficit. Moreover, the strong increase in shipping revenues mid-last decade must have exerted a positive influence on the current account balance.

Graph 1.2
Current account balances in euro area countries (ppts-of-GDP)

Source: AMECO
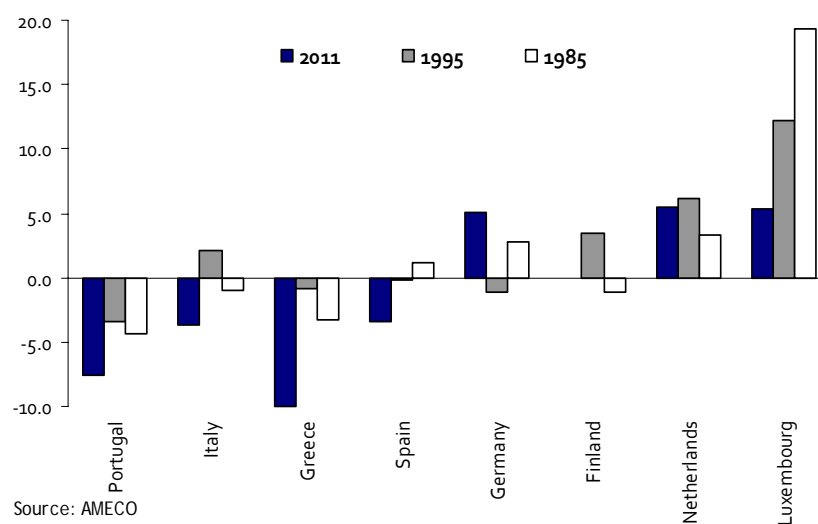
## 4. Focus – Current account developments in Greece since euro adoption

Greece's current account position underwent a sizeable deterioration in the initial years following the country's euro area entry in 2001. According to Bank of Greece's balance of payments (BoP) statistics, the current account gap widened from levels around €10.6bn (7.8%-of-GDP) in 2000 to a record €34.8bn (14.9%-of-GDP) in 2008, before embarking on a declining path, reaching ca 21.1bn or 9.8%-of-projected GDP at the end of 2011. From its peak in 2008, the current account deficit has retreated by around 40%.

4.1 Trade balance

A brief look at the evolution of the main components of the current account position since 2000 reveals some interesting trends. From a starting position of €21.9bn (16.1%-of-GDP) in 2000, the trade deficit hit a record of €44.1bn (18.9%-of-GDP) in 2008, before declining significantly in the following years to reach ca €27.2bn or 12.6%-of- projected GDP at the end of 2011. From its peak in 2008, the trade deficit has contracted by around 38%, with the improvement having been even more pronounced in the trade balance excluding oil and ships (down by ca 53% in the period end-2008 to end-2011). According to the latest available BoG data, the cumulative deficit of the trade balance excluding oil and ships in January-December 2011 amounted to 5.9%-of-projected GDP (Graph 2.2).

Graph 2.1
Greece's current account deficit (ppts-of-GDP)
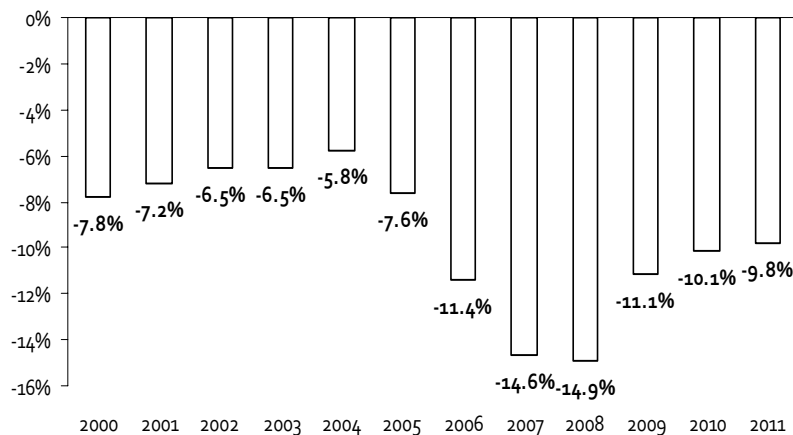
The net balance (purchases minus sales) of ships has started from a broadly flat (balanced) position in 2000, it reached a decade-high shortfall of ca 2.5%-of-GDP in 2007 and stood at a deficit of ca 1.5%-of-projected GDP at the end of 2011 . To the extent that the purchase of ships can translate into increased transportation revenue in the future, the aforementioned development should be viewed as a net positive with respect to future BoP developments.

**Graph 2.2**
Greece's trade balances (ppts-of-GDP)
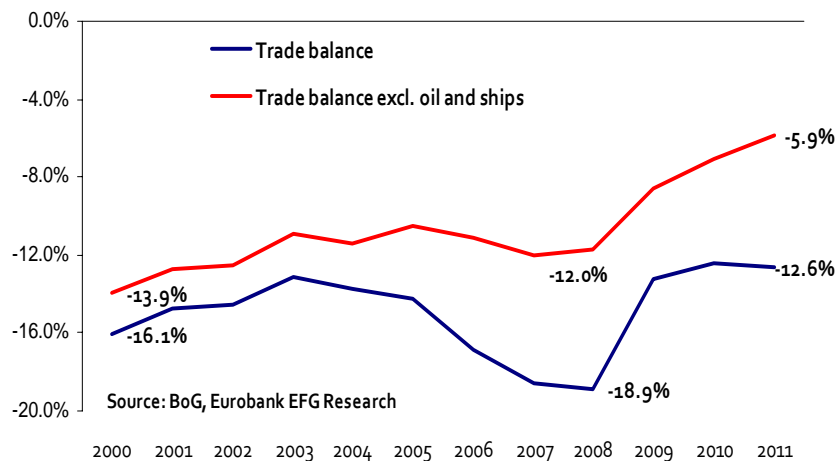
As regards merchandise exports, BoG's latest balance of payments statistics show a sharp acceleration in the total value (€-terms) of exports of goods excluding oil and ships in the 12-months to December 2011 (+17.3% YoY), following respective declines of 1.3% and 17.8% in the years 2010 and 2009 (Graph 2.3). As a percentage of GDP, Greece's goods exports excluding oil and ships amounted to 6.2% in January-December 2011, the highest ratio in almost a decade (vs. ca 6.8%-of-GDP in 2001). A sharp rebound of goods exports in recent quarters is also documented in the corresponding customs-based statistics (source: EL.STAT.), which arguably provide a more accurate picture of Greece's merchandise trade flows excluding fuels.

Merchandise imports excluding oil and ships have declined sharply over the past three years, both in ppts-of-GDP terms and on a year-on-year basis (Graph 2.4). As percent of GDP the respective ratio stood at ca 12.1% at the end of 2011, compared to 17.7% at the end of 2008.

Graph 2.3
Greece's merchandise exports excluding oil and ships
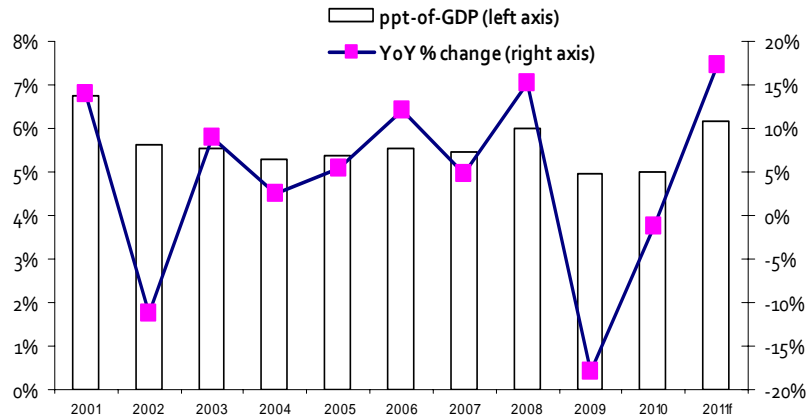
Source: BoP, Eurobank EFG Research

Taking into account the aforementioned developments, one can safely conclude that the significant improvement in the trade balance over the past three years can be mainly attributed to a concomitant decline of merchandise imports as a result of the deepening of the global financial crisis after the Lehman Brothers debacle and the fiscal austerity program implemented domestically following the eruption of the Greek sovereign debt crisis in late 2009. That is, especially given that the total value of merchandise imports continues to exceed the total value of merchandise exports by a significant margin. (In the 12-months to December 2011, the total value of goods imports was around 2.4 times the total value of merchandise exports).

Graph 2.4
Greece's merchandise imports excluding oil and ships
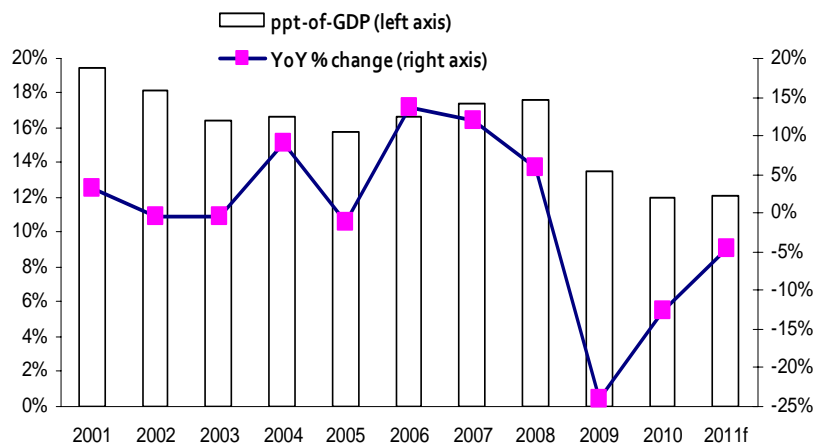
Source: BoG, Eurobank EFG Research

Another important factor contributing to the observed improvement in the overall trade balance is the recent rebound in Greece's merchandise exports as a result of: a) the strong recovery of main trade-partner economies (e.g. core euro area member states) since the second half of 2009; the ongoing decline in Greece's ULCs growth due to the economic recession, the applied fiscal austerity program and, more recently, the implementation of structural reforms aiming to induce additional flexibility in the domestic labor market (Graphs 2.5 & 2.6).

Graph 2.5
UCL growth (Greece vs. Eurozone)
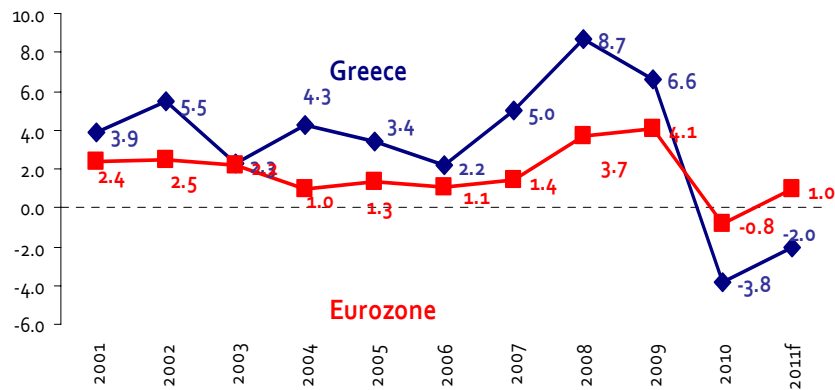
Source: BoG, Eurobank EFG Research

According to Bank of Greece data (January-August 2011), the strong rebound of goods exports since the beginning of last year was broad based, with the sectors of metallurgy, chemicals, business equipment and agriculture having the most significant contribution to the observed rise in the total bill of non oil exports[2]. As also reported by the Bank of Greece, the *export performance* of the domestic manufacturing sector - defined as the share of domestic production that is exported – rose significantly in H1-2011, reaching levels not seen since 2005. On the other hand, *import penetration* in manufacturing – defined as the ratio of the value of related imports to the total value of manufacturing goods consumed domestically – increased further in the first half of 2011. This appears to suggest that the substitution of imported manufacturing goods with goods produced domestically has not yet reached satisfactory levels (Graph 2.7).
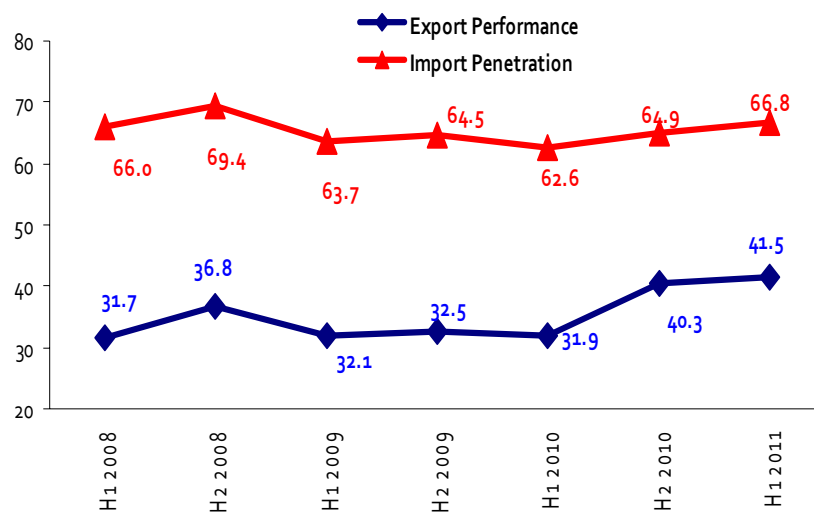
Graph 2.6
Greece's REER cumulative growth
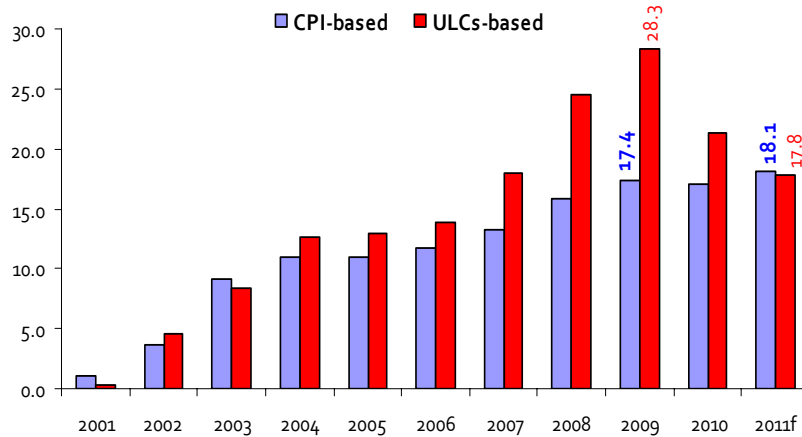
Source: BoG, Eurobank EFG Research

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[2] Bank of Greece "Interim Monetary Policy Report 2011".

Graph 2.7
Export performance and import penetration in manufacturing

Source: BoG, Eurobank EFG Research

4.2 Services balance

The overall services balance increased by 10.5%YoY in January-December 2011, reaching 6.8%-of-projected GDP. Greece's services balance has traditionally been on a surplus position, providing an important source of balance-of-payments financing. This has primarily been on the back of the strong performance of the tourism and shipping sectors, two of the most important industries of the Greek economy (Graph 2.8). In particular, 2011 was a good year for the Greek tourism sector, with travel revenue rising by 9.5%YoY, following respective declines of 7.6%YoY and 10.6%YoY in the years 2010 and 2009. On the other hand, gross revenue from transportation (mainly shipping) dropped by 8.6%YoY last year, mainly as a result of a sharp decline in international freight rates. Transportation revenue rose by 13.8%YoY in 2010, after contracting by 29.4%YoY in the prior year.

Graph 2.8
Greece's services balance and main components (ppts-of-GDP)
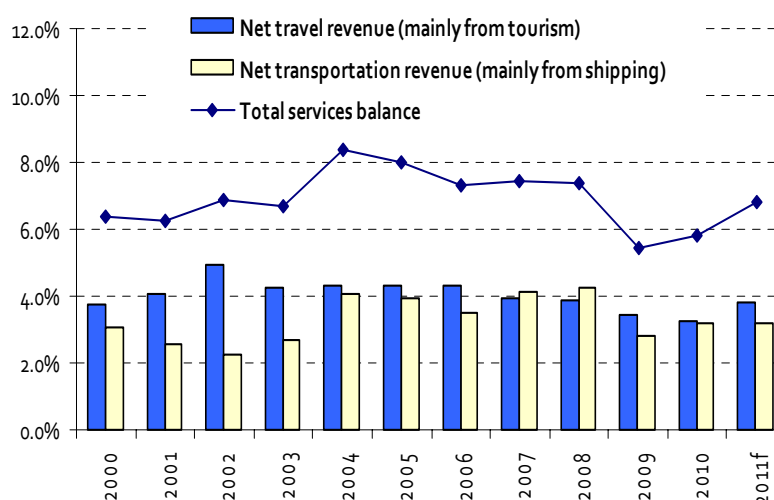
Source: BoG, Eurobank EFG Research

4.3 Incomes balance

The incomes balance has traditionally been in deficit, mainly reflecting net payments for interest, dividends and profits on foreign investments in Greece (Graph 2.9). The incomes deficit followed a broadly increasing trend since Greece's EMU entry, rising from levels around 0.7%-of-GDP in 2001 to a multi-year high of 4.6%-of-GDP in 2008. At the end of 2011, the corresponding shortfall stood at 4.2%-of-projected GDP. Looking forward, we expect Greece's incomes balance to derive significant support in the years ahead from lower interest payments on new (and old) EU loans provided to the country under the 1st EU-IMF bailout package (signed in May 2010) as well as a new official financing programme that was formally endorsed at the February 21, 2012 Eurogroup. Significant benefits, in the form of lower coupon payments on privately-held Greek government bonds, will also derive from a market-based restructuring of privately-held Greek sovereign debt (PSI) that is expected to be completed by mid-April 2012. (A thorough analysis on the potential government savings in the period 2012-2020 due to lower interest and amortization payments can be found in Eurobank EFG Research, March 2, 2012 *"New bailout program for Greece: Conditionality, implications for sovereign solvency and valuation of the Greek PSI deal"*)

4.4 Current and capital transfers

In recent years, the balances of current and capital transfers have been in surplus, mainly reflecting higher net EU payments to the general government (Graphs 2.9 & 2.10). A faster absorption of EU structural funds is likely to lead to higher capital inflows in 2012-2013. Note that the total amount of committed, yet still undistributed, funds for Greece under the country's National Strategic Reference Framework (NSRF) 2007-2013 is currently estimated at ca €12bn. The use of such funds for implementing infrastructural projects in key sectors of the domestic economy requires certain co-financing from the public investment budget (PIB). However, a preliminary agreement was recently reached with EU authorities aiming to both speed up absorption of structural funds and significantly compress the PIB's required co-financing share.

Graph 2.9
Incomes and current transfers balances (ppts-of-GDP)
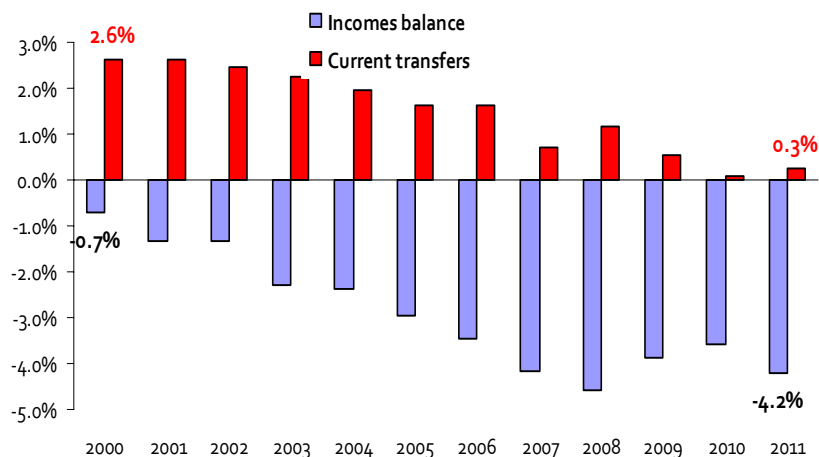
Source: BoG, Eurobank EFG Research

Graph 2.10
Current account and capital transfers balance (ppts-of-GDP)
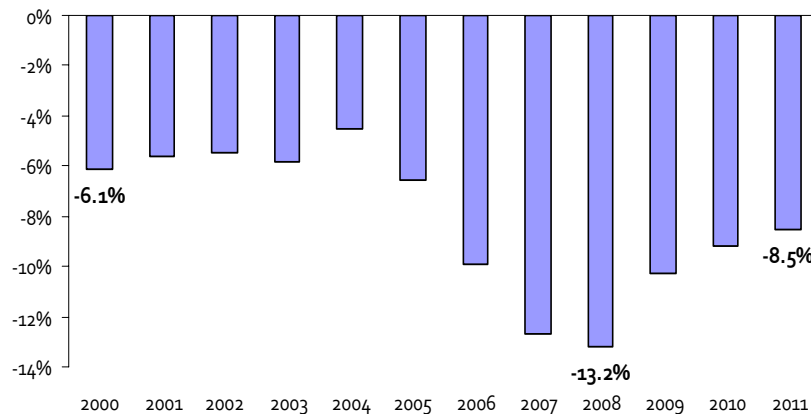
Source: BoG, Eurobank EFG Research

4.5 Financial account

Despite the continuation of significant portfolio outflows, the overall balance of the financial account remained in surplus in 2011, mainly thanks to substantial EU-IMF funding to Greece under the 1st bailout program (Greek Loan Facility) that was singed in May 2010 (Graph 2.11).

Graph 2.11
Financial account and components (EUR mn)

Source: BoG, Eurobank EFG Research

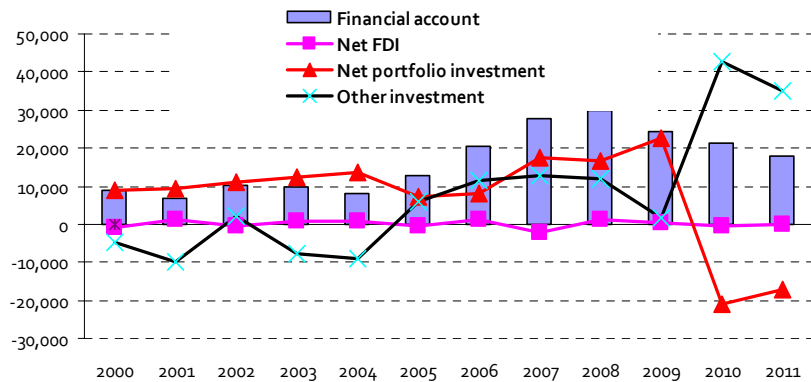A significant amount of available funding to Greece under the new EU-IMF bailout programme Is likely to continue providing considerable support to the country's financial account this year and the next. (Under the new program, total official financing to Greece for the period 2012-2015 amounts to €172.6bn). Further down the road, a significant pick up in foreign direct investment (from their broadly depressed levels in the prior decade) as well as a stabilization/reversal in bank deposits and net portfolio outflows is required to stabilize the financial account and provide adequate financing to the country's the balance-of-payments.

4.6 Greece's current account looked from a saving-investment balance perspective

Graph 2.12 below provides a more inter-temporal view of Greece's current account position. The graph depicts the current account balance (green bars) expressed as the difference between national saving and investment (blue and red lines, respectively). In the period before Greece's euro area entry (2001), the country's current account position recorded mostly small-to-medium sized deficits (between 2% to 5%-of-GDP). Over that period, national saving and investment evolved broadly in sync, with the latter mostly exceeding the former. This reflected, among other factors, increased inflows of EU cohesion funds and, more generally, the fact that in a world of

increasing financial integration capital moves from the more advanced, capital-intensive countries to less developed, capital-scarce states.

However, in the period following the domestic financial liberalization in the mid 90s and, especially, after the adoption of the euro, a significant deterioration in Greece's current account position occurred, with the corresponding shortfall reaching unprecedented levels (~14.9%-of-GDP in 2008, according to BoG data). As depicted in graph 2.12, the widening of the current account deficit in the period 2001-2008 was mostly the result of declining national (private and public) savings, especially during the second half of that period (2004-08). On its part, total investment (as percent of GDP) hit a multi-year high near 25% in 2003 (the year before the 2004 Olympic Games) to only decline steadily thereafter, with the descent taking accelerating proportions after the eruption of the global financial crisis in 2007/08.

Graph 2.12
Greece's current account as a savings-investment imbalance (ppts-of-GDP)

Source: AMECO, BoG, Eurobank EFG Research
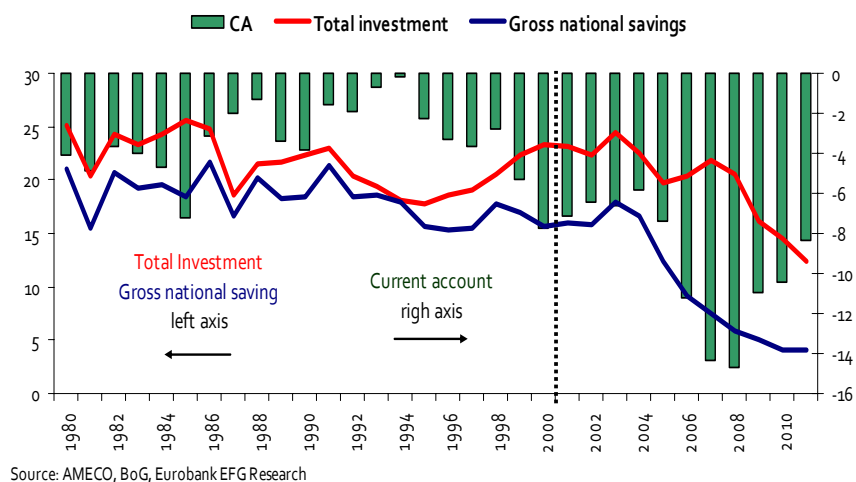
A breakdown of the national saving and investment series in their respective public- and private-sector components in the period following the outbreak of the global financial crisis reveals some interesting trends (Table 2.13).

Starting with the private saving-investment (S-I) balance, what is probably the most striking development is the collapse in private investment following the eruption of the global financial crisis and, more recently, the outbreak of the Greek sovereign debt crisis (late 2009). In an effort to rescue Greece from an outright default -given the explosion of Greek sovereign bond yield spreads to prohibitively high levels during the first months of 2010 - its euro area partners and the IMF agreed on a sizeable lending package (~€109bn), aiming to cover a significant part of the country's borrowing requirement until end -2012/mid-2013.

This lending program was signed by the Greek government in May 2010 and it was accompanied by a comprehensive package of structural reforms and fiscal consolidation measures. The main strategic objectives of this package included: (i) stabilization of the country's fiscal position and solvency outlook; (ii) reclamation of competitiveness losses via an "internal devaluation" program of reforms in domestic labor and product markets; and (iii) safeguarding of the stability of the domestic financial sector. As a consequence of the "internal devaluation" process engineered by the 1st EU-IMF programme as well as collapsing investor confidence towards Greece, domestic demand entered a protracted recession, with (public and private) consumption and investment falling significantly over the period under consideration (2008-2011).

National saving also contracted significantly over that period, though a sharp drawdown in public saving (i.e., widened fiscal deficit) in FY-2009 was, to a large extent, offset by a sharp increase in private saving. The aggressive fiscal consolidation program that was implemented since the early months of 2010 and, in particular, after the signing of the 1st EU-IMF programme in May 2010 resulted in a significant decline in public-sector dissaving (i.e., fiscal deficits). However, this improvement was more than outweighed by a concomitant decline in private saving in the period 2010-2011 as, due to the economic recession, domestic private agents tapped their existing poll of saving to finance current consumption (inter temporal smoothing).

Table 2.13

Greece: Saving-Investment Balance, 2008-11

(in percent of GDP)

	2008	2009	2010	2011 est.
Private S-I balance	**-10.4**	**2.3**	**-0.9**	**-1.9**
Investment	20.7	15.4	13.9	12.6
Saving	10.4	17.7	13.0	10.8
Public S-I balance	**-4.6**	**-13.5**	**-9.2**	**-7.9**
Investment	2.9	2.9	2.3	2.1
Saving	-1.6	-10.5	-6.9	-5.8
Current account balance	**-14.9**	**-11.1**	**-10.1**	**-9.8**
Gross investment	23.7	18.3	16.2	14.7
Gross domestic saving	8.7	7.2	6.1	4.9

Source: IMF staff calculations (March 2012)

4.6 Concluding remark to this section

After recording a post EMU-entry high of 14.9%-of-GDP in 2008, Greece's current account deficit improved considerably to reach an estimated 9.8%-of-GDP at the end of last year. This improvement reflects mainly a shrinking shortfall in the trade balance of goods excluding oil and ships as well as a higher services surplus due to stronger revenue from tourism.

The current account shortfall is likely to shrink further this year and the next, reflecting lower demand for imports as a result of the ongoing domestic recession and higher exports growth due to improved competitiveness.

A significant amount of available funding to Greece under the new EU-IMF bailout program should continue to provide adequate balance-of-payments financing in the period 2012-2015. Further down the road, a strong pick up in foreign direct investment as well as a stabilization/reversal in bank deposits and net portfolio outflows is required to provide sustained support to Greece's financial account.

5. Empirical study – Determinants of Greece's current account position

5.1 Data and notation

Our empirical study utilizes annual data on Greece's current account, expressed as percent of GDP, as well as a range of potential explanatory variables. The primary source of our data is the European Commission's AMECO database and the estimation time horizon, when available, is 1960-2011. In certain time series, the data for 2011 have been modified to reflect the authors' estimated/forecasted values for the corresponding year. Table 3.1 below provides a summary of our data and the notation utilized in our study.

Table 3.1
Data and notation

Variable description	Country	Source	Units	Notation	Data availability - Initial year of respective time series
Current account - "Balance on current transactions with the rest of the world" (National accounts)	Greece	AMECO	% GDP	*ca*	1960
Real GDP per capita (2005 market prices)	Greece	AMECO	EUR thousands (variable expressed as natural logarithm of respective value)	*ypcgr*	1960
Real GDP per capita of Greece relative to real GDP per capita of reference country	Greece vs. Netherlands	AMECO	%	*rygrnl*	1960
Net lending (+) or net borrowing (-): general government - ESA 1995 (Including one-off proceeds related to the allocation of mobile phone licences)	Greece	AMECO	%GDP	*ggvnt*	1980
Real effective exchange rates, based on unit labour costs (total economy) :- Performance relative to the rest of 23 industrial countries (EU-15, TR, CH, NR, US, JP, AU, MX, NZ) : double export weights (XUNRQ)	Greece	AMECO	Index (FY2000=100) (variable expressed as natural logarithm of respective value)	*rer23*	1970
Real effective exchange rates, based on unit labour costs (total economy) :- Performance relative to the rest of the former EU-15: double export weights (XUNRQ)	Greece	AMECO	Index (FY2000=100) (variable expressed as natural logarithm of respective value)	*rer15*	1960
Old-age dependency ratio (% of working population)	Greece	AMECO	%	*oadr*	1961
Young-age dependency ratio (% of working population)	Greece	AMECO	%	*yadr*	1961
Total credit to domestic non-MFIs by domestic MFIs (outstanding balances e.o.p)	Greece	BoG	% GDP	*credit*	1980
Terms of Trade (goods & services)	Greece	AMECO	Index (FY2000=100) (variable expressed as natural logarithm of respective value)	*tot*	1960
Trade openess	Greece	AMECO	%	*open*	1960
crude oil price		Bloomberg	$/br (variable expressed as natural logarithm of respective value)	*oil*	1960
Private Investment (% of GDP) - Gross fixed capital formation to GDP ratio private sector	Greece	Ameco	% GDP	*pinv*	1960

5.2 – Unit root tests

We find all variables in our study to be unit root (i.e., I(1)) processes. For expositional purposes we report below the test results for our current account-to-GDP ("*CA*") variable.

Table 3.2i
Unit root test results for our current account-to-GDP, "*CA*", variable (in levels)

Null Hypothesis: CA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.074892	0.7189
Test critical values:	1% level	-3.565430	
	5% level	-2.919952	
	10% level	-2.597905	

*MacKinnon (1996) one-sided p-values.

The estimated value of our *Augmented Dickey-Fuller* (ADF) test statistic presented in the table above is -1.074892 and the corresponding one-sided p-value is 0.7189. Moreover, the associated 1% 5% and 10% critical values are all lower than ADF t-statistic, suggesting that the test can not reject the null hypothesis of a unit root at conventional test sizes. In our unit root test we utilized the Schwarz Information Criterion (SIC) for selecting the maximum number of lag terms in the ADF test equation.

Table 3.2ii below shows the results of performing the ADF test in the first differenced series of the variable *CA*. For this series, the ADF test rejects the null hypothesis of a unit root (against the alternative hypothesis of stationarity) at the 10%, 5% and 1% confidence level.

Table 3.2ii
Unit root test results for the first differenced series of our "*CA*" variable

Null Hypothesis: D(CA) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.902039	0.0000
Test critical values:	1% level	-3.568308	
	5% level	-2.921175	
	10% level	-2.598551	

*MacKinnon (1996) one-sided p-values.

As an alternative, we performed the Phillips and Perron (PP) 1988 unit root tests for the level and first differenced series of our current account-to-GDP ("*CA*") variable. Here again the null of a unit root for the series in levels was not rejected at conventional test sizes. On the other hand, the Phillips and Perron (PP) test firmly rejected the unit root hypothesis against the stationarity alternative for the first differenced series. Note that the PP method estimates the AR(1) version of the DF test equation and modifies the t-ratio of the estimated coefficient so that the serial correlation does not affect the asymptotic distribution of the test statistic. (All results of our unit root tests are available upon request).

5.3 - Cointegration

It is a well-known result in econometric analysis that when two or more *trending* or *non stationary* time series are regressed on each other the *spurious regression* problem arises. In case of trending time series, the spurious found relationship may be due to a common trend governing both series rather than to pure economic reasons. In case of nonstationarity (say of I(1) type) the series - even without drifts - may exhibit local trends that tend to move along for relatively long periods.

The problem of spurious regressions stimulated the development of the theory on non-stationary time series analysis. Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary time series may be stationary. If such a stationary linear combination exists, then the series are said to be *cointegrated*. Moreover, the linear combination – called the *cointregrating equation* – may be interpreted as a long-run equilibrium relationship among the variables.

Since all variables utilized in our study have been found to be integrated of order one (i.e., I(1) processes) we proceeded next to test for cointegration among the variables using the relevant methodology developed by Johansen (1991, 1995). The presence of cointegration in our variables forms the basis a number of alternative Vector Error Correction Model (VECM) specifications examined in our study. In this paper, we test for cointegration between our left-hand side variable, **ca**, and alternative sets of (potential) explanatory variables.

As in Brissimis et al, 2010 (ECB Working Paper Series, No 1243), the starting point of our empirical study is the national accounts identity, according to which, the current account, *ca,* is equal to the difference between national saving (S) and investment (I).

$$CA = S - I = (S_P - I_P) + (S_G - I_G) \tag{1}$$

Where,

S_P and I_P, denote private saving and investment;

S_G and I_G, denote public saving and investment; and

All variables above are expressed as a percentage of GDP.

Expressing then S_P as a function of private saving determinants, equation (1) becomes:

CA = f (REER, private credit -to-GDP, $S_G − I_G$, I_P, rear GDP per capita, output gap, old-age dependency ratio, terms of trade, trade openness, inflation vol, real interest rate on deposits, crude oil, …..)

$− I_P + (S_G − I_G)$ (1.1)

Or, using the notation depicted in Table 3.1, equation (1.1) becomes:

CA = f(rer, credit, $S_G–I_G$, I_P, ypcgr, ygapgr, oadr, tot, open, infvol, rir, oil,…) − I_P + ($S_G − I_G$)   (1.2)

A linear representation of the above equation can then be written as follows:

$CA_t = b_0 + b_1*rer_t + b_2*credit_t + b_3*ypcgr_t + … + b_{n-1}*I_{Pt} + b_n*ggvnt_t + \varepsilon_t$ (1.3)

Where

t denotes the time transcript and ε_t the error term;

In the equation above, the variable *ggvnt* (general government deficit as percent of GDP) is used as a proxy for the variable $S_G − I_G$ in equation (1.2).

Brissimis et al, 2010, express the coefficients of I_P and $S_G − I_G$ as $b_{n-1}−1$ and $1+b_n$, respectively.

This allows a formal test of two additional hypothesis in their study; namely the Ricardian Equivalence hypothesis (if $1+b_n = 0$) and the Feldstein – Horioka hypothesis (if $b_{n-1}−1 = 0$).

The signs and significance of the rest of the estimated coefficients are also examined to see whether there are in broad agreement with the theory of the determinants of current account position (see also Chapter 2-Table A of this paper).

In our study, we examine a number of alternative specifications for explaining the evolution of Greece's current account position. For illustration purposes, **Table 3.3** (see **Annex** section at the end of this document) presents the cointegration test results for the following variables:

- **ca,** current account balance (as percent of GDP);

- **rer₁₅,** natural logarithm of the ULC-based real effective exchange rate of Greece vs. the EU-15 trading partners;

- **ggvnt,** general government balance (as percent of GDP); and

- **pinv,** private investment (as percent of GDP).

As implied by **Table 3.3** (Annex section), both the Trace and Maximum Eigenvalue tests point to the existence of one cointegration relationship among the above variables.

5.4- VECM specifications

Based on the results of our cointegration tests we next proceed to estimate a number of alternative Vector Error Correction Model (VEMC) specifications. **Table 3.4** below provides a summary of VECM models *(coefficients and significance of long-term equilibrium relationships and other statistics).*

The first (upper) part of Table 3.4 shows the estimated coefficients (and associated t-statistic values in parentheses) of the VECM error correction term, which can be interpreted as the long-term equilibrium relationship linking the current account variable, *ca*, with the list of explanatory variables utilized in the corresponding specification; namely rer_{15}, *ggvnt* and *pinv.* Table 3.4i at the Annex section provides the full EViews output from estimating Model 1.

For demonstration purposes we present below the estimated equilibrium relationship for **Model 1.**

ca = 2.53 + 0.95***ggvnt** – 0.52*rer_{15} -0.78***pinv** + ε_t

All coefficients in the equation above are significant and they also have the (theoretically) correct sign (see also Chapter 2 - Table A of this document).

Specifically, the coefficient of the real effective exchange rate, rer_{15}, is negative and strongly significant. Chapter 2 of this paper provides the theoretical rational for the sign of this important *price-competitiveness* indicator in typical empirical studies of the determinants of the current account position. To recap, the expected sign of the aforementioned relationship is negative. That is because, on a ceteris paribus basis, an appreciation of the real exchange rate increases the purchasing power of domestic incomes in terms of imported goods. It also increases the relative value of financial, real estate and other assets held by domestic residents. These effects tend to reduce domestic saving and increase the propensity to consume. A real effective appreciation of the domestic currency also tends to reduce the price competitiveness of a country's exports in international markets. The aforementioned factors have probably even been amplified in the euro area following the introduction of the single currency as a result of strengthened competition. Finally, note that the coefficients of the real effective exchange rate variables (rer_{15} and rer_{23}) in all alternative VECM model specifications utilized in our study are all negative and strongly significant.

The coefficient of our private investment variable, *pinv*, is also negative and significant**.** Indeed, this was to be expected from the national accounting identity expressing the current account as the difference between national saving and investment. See *e.g.* equation (1) in section 5.3 of this paper.

The coefficient of the general government fiscal balance, *ggvnt*, in the estimated long-term equilibrium relationship of Model 1 is both positive and significant. This positive relationship provides support to the so-called *twin deficit hypothesis* and appears to be in broad agreement with the evolution of Greece's current account and fiscal positions, especially in the years following the country's euro area entry. These also point to a type of behavior by domestic agents that is broadly in line with the main predictions of the Keynesian model, which claims that a higher fiscal deficit (or lower fiscal surplus) tends to increase disposable income and thus, to boost present consumption, reduce private saving and lead to a wider current account deficit. The aforementioned effects are even more pronounced if "myopic" households perceive the rise in disposable income to be permanent. Note that in some of our VECM specifications (Models 6-10), the estimated coefficients of the **ggvnt** variable are negative, implying a partial *Richardian* type of behavior by domestic households. In most of these models, however, the estimated coefficient of the general government balance was found to be insignificant.

In Model 1, as well as in all other estimated specifications, we utilize two dummy variables, **eurodummy(d99)** and **crisisdummy(d2009)**. The former takes the value of 1 in the years 1999 onwards and zero (0) otherwise. The latter, takes the value of 1 in the years 2008 onwards and the value of 0 in all other years.

Our **eurodummy(d99)** dummy aims to empirically document whether and to what extent domestic financial deepening and increased financial integration with world goods and capital markets as a result of euro area entry have led to a trend deterioration of Greece's current account position in the initial years following the adoption of the single currency. As explained in Chapter 2 of this document, when countries become more closely integrated in goods and financial markets, a certain *disconnect* may arise between domestic saving and investment. That is because in a world characterized by capital mobility, capital moves "downhill" *i.e.,* from the more advanced, capital-intensive countries to less developed, capital-scarce states. In turn, this suggests that poor countries with superior growth prospects may see an increase in domestic investment, a decrease in domestic saving and, by implication, a higher current account

deficit. In all of the VECM specifications utilized in our study, the estimated *eurodummy(d99)* variable has the *theoretically-correct* sign (negative) and is also significant.

Table 3.4
Determinants of Greece's current account balance (alternative VECM specifications)

Variable name	Model 1 Baseline	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
ypcgr					-0.01 (4.56)					0.09 (0.62)
rygrnl		-0.46 (5.88)	0.03 (0.31)							
ggvnt	0.96 (4.67)	1.26 (7.59)	1.31 (6.27)	0.52 (2.67)		-0.24 (1.58)	-0.38 (2.29)	-0.40 (2.42)	-0.10 (0.69)	-0.28 (1.69)
rer23				-0.43 (7.08)						
rer15	-0.52 (8.08)	-0.42 (6.21)	-0.48 (7.30)		-0.21 (5.47)					
oadr										
yard										
credit						-0.13 (4.82)	-0.19 (5.56)	-0.19 (5.50)	-0.12 (4.90)	-0.18 (2.23)
tot		0.26 (1.85)					0.07 (0.63)	0.09 (0.84)		
open			-0.22 (1.61)						-0.15 (1.81)	
pinv	-0.78 (3.96)			-0.36 (1.90)	-0.13 (1.07)	-0.16 (1.01)	-0.09 (0.47)			
eurodummy (d99)	-0.03 (3.34)	-0.07 (3.42)	-0.03 (2.25)	-0.03 (4.01)	-0.03 (5.00)	-0.04 (4.11)	-0.03 (3.02)	-0.03 (3.30)	-0.04 (4.16)	-0.03 (3.63)
crisisdummy(d2008)	0.04 (2.93)	0.06 (3.35)	0.06 (3.42)	0.04 (2.91)	0.03 (3.07)	0.04 (3.58)	0.06 (5.67)	0.06 (6.11)	0.04 (4.42)	0.04 (3.26)
Number of lags in VECM	2	2	1	2	2	1	1	1	1	1
Adjustment coefficient	-0.44 (2.62)	-0.55 (2.96)	-0.11 (0.78)	-0.54 (3.52)	-0.55 (4.74)	-0.79 (5.16)	-0.87 (5.96)	-0.83 (6.20)	-0.90 (5.25)	-0.81 (5.67)
Adj. R-squared	46%	64%	37%	55%	58%	60%	66%	67%	62%	63%
Test on long-run restrictions	0.64	0.82	n.a.	0.62	0.58	0.85	0.96	n.a.	0.97	0.69
Trace test	1	2	1	1	1	1	0	1	1	1
Max test	1	2	1	1	1	1	1	1	1	1
No residual autocorrelation	0.44	0.19	0.63	0.34	0.58	0.07	0.03	0.26	0.02	0.10
No residual heteroscedasticity	0.54	0.39	0.81	0.38	0.33	0.88	0.64	0.67	0.33	0.11
Residual normality	0.48	0.94	0.24	0.36	0.06	0.16	0.01	0.01	0.84	0.67
Stability of cointegration	0.99	0.74	0.86	0.95	0.30	0.16	0.92	0.96	0.32	0.64
Joint causality of explanatory variables on curent account	0.02	0.00	0.1	0.01	0.00	0.07	0.00	0.00	0.12	0.02

Source: Eurobank EFG Research and authors' estimation.

Notes:

1. *t* -statistics in parentheses below point estimates; significance increased when restrictions are valid (unrestricted estimates shown).

2. Test on long-run restrictions indicates the p-value on the null hypothesis of linear combinations of coefficients (where applicable); a value greater than 5% implies that the hypothesis cannot be rejected.

3. Trace test and Max test indicate the number of cointegrating relationships present, based on the trace test and maximum eigenvalue test respectively.

4. Residual autocorrelation, residual heteroscedasticity and residual normality indicate the p-value of the respective null hypotheses; a value greater than 5% implies that the hypothesis cannot be rejected.

5. Stability of cointegration indicates whether the cointegrating relationship is valid through the whole sample; a value greater than 5% indicates rejection of stability.

6. Joint causality indicates whether the dynamic terms of the explanatory variables affect the evolution of the current account; a value greater than 5% indicates non-causality.

Separately, our **crisisdummy(d2008)** aims to capture the impact of the 2008/09 global financial crisis and, primarily, the effects of the ensuing Greek sovereign debt crisis on the country's current account position. As we explained already (see *e.g.* Chapter 4 of this document), a notable improvement in Greece's current account deficit is evident since 2009, mainly as a result of a sharp contraction of imports due to the domestic economic recession and the gradual reversal of the significant real effective rate overvaluation accumulated since the country's euro area entry in 2001. Again, all estimated coefficients of our *crisisdummy(d2008)* variable have the theoretically-correct sign (positive) and they are also statistically significant.

As to the estimated fit of our regressions (adjusted R squares), they are generally pretty satisfactory, ranging between 55% and 65% in most of our estimated VECM specifications.

Regarding the rest of explanatory variables in our study, their estimated coefficients are broadly significant and they have the signs generally predicted by the theory. Specifically,

The estimated coefficients of our **credit** variable are all negative and strongly significant. As we indicated in Chapter 2 of this document, our private credit-to-GDP variable is used in our empirical study as a proxy for financial deepening and financial liberalization. In theory, higher levels of financial deepening are often associated with lower private saving, thanks to the relaxation of the intertemporal budget constraint facing households. Moreover, to the extent that this effect has also facilitated significant price increases in domestic asset markets (e.g. housing), increased domestic financial liberalization and bank intermediation may have led to lower private saving and higher consumption as a result of permanent income effects (see also Brissimis, et al 2010).

The estimated coefficients of our **tot** variable are positive, yet insignificant (models 2, 7 & 8). In the international economics literature, "Terms of Trade" is defined as the ratio of price exports to price imports. It effectively measures what quantity of imports can be purchased through the sale of a fixed quantity of exports. A terms-of-trade improvement is usually considered to be good for a country in the sense that it can buy more imports for any given level of exports.

The estimated coefficients of our **open** variable are negative and mostly significant. The negative sign of the estimated coefficient of our trade openness variable appears to be in disagreement with what the theory predicts (see e.g. Chapter 2 - Table A). We interpret this finding as follows: Greece's imports of goods and services have traditionally been much higher than its exports of goods and services in value terms. (In 2011, the total value of imports was 2.4 times higher than the corresponding value of exports). Given then that our trade openness indicator is calculated as the ratio of the total value of imports and exports to nominal GDP, for *most* of the sample a rise in our **open** variable primarily indicates an increase in the total value of imports (relative to the total value of exports), which, in turn, points to a wider current account deficit.

Finally, the estimated coefficients of our, **ypcgr** (logarithm of Greek output per capital GDP) and **rygrnl** (real GDP per capita of Greece relative to real GDP per capita of a reference country) variables are found to be negative and significant in VEC models 2 & 5, while they are positive and insignificant in models 3 & 10.

As to the "*speed of adjustment*" in Model 1, note that the estimated speed of adjustment coefficient (-0.44) implies that around 44% of the current account disequilibrium is anticipated to be corrected, on average, within one period (i.e., one year).

As a final note to this section, **Graph 3.1** below shows the actual current account series and the corresponding fitted values implied by Model 2 of Table 3.4.

Graph 3.1
Actual current account series & fitted value (ppts-of-GDP)
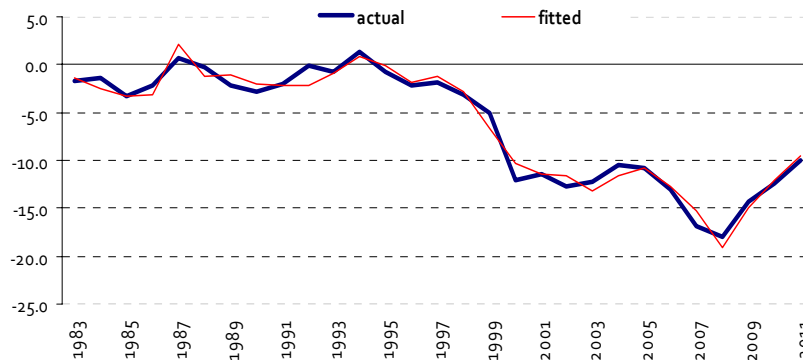
Source: Eurobank EFG Research

5.5 - Policy Implications and concluding remarks

Our econometric results (section 5.4) seem to provide broad-based support to the key findings of a number of earlier empirical studies on the determinants of Greece's current account position. Specifically, the trend deterioration in the country's external imbalance in 1999-2008 can be traced back to a number of developments that took place over that period. These primarily relate to: **a)** the EU convergence progress and closer integration in world goods and financial markets following the euro adoption; **b)** domestic authorities' response to the key policy challenges arising from participation in the single currency area; and **c)** the structural characteristics and idiosyncrasies of the Greek economy.

More specifically, our empirical results document a number of key drivers contributing to the significant deterioration in the country's current account position in recent years, with some of the most important ones including:

1. **Accumulated loss of economic competitiveness against main trade-partner economies.** Among other reasons, this appears to have been the result of faster domestic inflation and unit labor costs (ULCs) growth not being fully counterbalanced by respective productivity differentials.
2. **Pronounced fiscal policy relaxation following the euro adoption.** In line with the "twin deficit" hypothesis, wider fiscal deficits appear to have increased disposable incomes, boosting present consumption and reducing private saving. The aforementioned effects may have been even more pronounced in the initial years following Greece's euro area entry as domestic households probably perceived the initial rise in their disposable income as permanent.
3. **Domestic financial deepening post the euro adoption.** The completion of domestic financial sector liberalization in the mid 90s and enhanced financial deepening following the euro adoption appear to have been additional contributors to the ensuing deterioration in the country's current account position. Note that according to AMECO data, domestic MFI credit to domestic households and non-MFI businesses has more than doubled since Greece's EMU entry, reaching around 114%-of-GDP at the end of 2011, from 51.5%-of-GDP in 2001. As we already claimed in Chapter 2, financial liberalization and financial deepening are often associated with lower private saving, thanks to the relaxation of the intertemporal budget constraint facing domestic households and businesses. Moreover, to the extent that these factors may have also facilitated significant price increases in domestic asset markets (e.g. housing), increased financial liberalization and bank intermediation have probably led to lower private saving and higher consumption as a result of permanent income effects.

Regarding the first two of the aforementioned factors (i.e., economic competitiveness and fiscal sustainability), it suffices here to say that their permanent improvement constitutes two of the three main strategic pillars of the new EU-IMF bailout programme for Greece that was endorsed by the February 21, 2012 Eurogroup (the third one being the conservation of domestic financial stability).

More specifically, the new programme envisions a further significant decline in the general government deficit (and a return to primary surpluses from 2013 onwards) as a result of new austerity measures (mainly from the expenditure side) as well as the beneficial effects of the private-sector debt exchange (PSI) and more favorable terms on old and new EA/EFSF loans under the 1st and 2nd official funding programmes. *For a more thorough analysis on the implications of the new EU-IMF bailout programme for Greece's sovereign liquidity and solvency please see Eurobank EFG Research, Greece Macro Monitor, March 9, 2012*

The new EU-IMF programme for Greece also puts special emphasis on structural reforms in the domestic labor and product markets, aiming to boost medium-term growth and help reclaim accumulated competitiveness losses via a further significant decline in domestic ULCs and the liberalization of key sectors of domestic economic activity.

The applied package of aggressive fiscal consolidation and structural reforms under the 1st EU-IMF bailout programme as well as deteriorated consumer and investor sentiment propagated a sharp contraction in the domestic economic activity, with real output having already declined by as much as 15 percentage points since Q4 2008. The new official funding programme is also expected to have an initial recessionary impact on the domestic economy. The new EU-IMF baseline scenario forecasts Greek real GDP growth to contract by a further 4.8% this year, following a near 7% decline in 2011. Domestic economic activity is broadly expected to stabilize in 2013, with a return to positive and sustainable growth now expected no earlier than in 2014. By implication, the current recession (and more competitiveness gains down the road) is expected to further reduce the current account deficit in the quarters and years ahead.

To assess the ability of the new EU-IMF programme to stabilize Greece's current account, we utilize our estimated VECM models to produce out-of-sample forecasts for the evolution of Greece's current account position in 2012-2016 under the following two scenarios:

- **Scenario A (full adjustment)** broadly incorporates the underlying macro & fiscal forecasts of the new IMF baseline scenario for Greece (IMF County Report No. 12/57, March 2012); and
- **Scenario B (partial adjustment)** incorporates a less favorable projected trajectory relative to that envisaged in **scenario A**. Specifically **Scenario B** assumes realized adjustments in our real effective exchange rate (r*er15*) and fiscal balance (*ggvnt*) variables that are half the size the respective adjustment assumed in the first scenario.

Graph 3.2 below depicts the forecasted path of Greece's current account position in **Scenario A** (full adjustment) & **Scenario B** (partial adjustment) based on the assumed evolution of government deficit, real exchange rate and private investment under these scenarios. The derivation of these forecasts has been generated by our estimated **Model 1** (Table 3.4).

Graph 3.2 also shows the forecasted current account values (ppts-of-GDP terms) under two additional scenarios. In the first of these, which we call "Dynamic", we let the evolution of the aforementioned explanatory variables be determined by **Model 1** in a recursive fashion (that is important in the treatment of the dynamic components). In the other one, we depict the projected current account path that is computed as the average of the three aforementioned scenarios.

Under all scenarios examined in our study, we forecast an improvement in Greece's current account position. Specifically, our out-of-sample forecasts imply an average current account balance (deficit) in 2012-2016 that ranges between -6.64%-of-GDP and -3.96%-of-GDP *i.e.,* an average improvement of at least 3% ppts-of-GDP and at most 6% ppts-of-GDP, relative to the -9.9%-of-GDP current account realization in 2011. The margin of error in these projections is on average 3% over the entire out-of-sample projection horizon. This, in turn, points to an average range of current account projections ranging between -1%-of-GDP and -7%-of-GDP under our "full adjustment" scenario and between -9.7%-of-GDP and -3.7%-of-GDP under our "dynamic adjustment" scenario (see also Graph 3.2 and Table 3.5) .

Graph 3.2
Projected current account path (%-of-GDP) under different adjustment scenarios
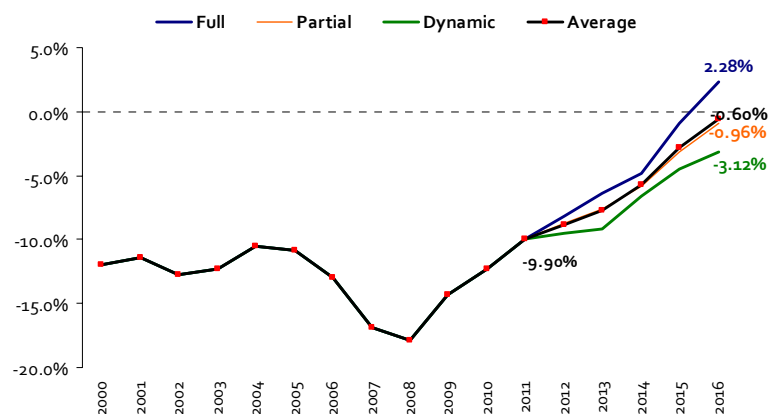
Source: Eurobank EFG Research; AMECO

Table 3.5
Projected current account path (%-of-GDP) under different adjustment scenarios

YEAR	Scenario A (full adjustment)	Standard error (SE)	Scenario B (partial adjustment)	Standard error (SE)	Dynamic	Standard error (SE)	Average	Standard error (SE)
2012	-8.15%	1.63%	-8.75%	1.63%	-9.51%	1.62%	-8.80%	1.63%
2013	-6.40%	2.07%	-7.60%	2.07%	-9.12%	2.55%	-7.71%	2.23%
2014	-4.82%	2.31%	-5.82%	2.31%	-6.60%	3.12%	-5.75%	2.58%
2015	-0.97%	2.36%	-3.10%	2.36%	-4.43%	3.57%	-2.83%	2.76%
2016	2.28%	2.36%	-0.96%	2.36%	-3.12%	3.83%	-0.60%	2.85%
Average	-3.96%	2.15%	-5.47%	2.15%	-6.64%	2.94%	-5.36%	2.41%

Source: Eurobank EFG Reasearch

ANNEX

Table 3.3 – Cointegration tests

Sample (adjusted): 1983 2011
Included observations: 29 after adjustments
Trend assumption: Linear deterministic trend
Series: CA PINV RER15 GGVNT
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.686818	57.83397	47.85613	0.0044
At most 1	0.446899	24.16578	29.79707	0.1935
At most 2	0.214227	6.991538	15.49471	0.5786
At most 3	5.11E-07	1.48E-05	3.841466	0.9991

 Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.686818	33.66818	27.58434	0.0073
At most 1	0.446899	17.17425	21.13162	0.1639
At most 2	0.214227	6.991523	14.26460	0.4902
At most 3	5.11E-07	1.48E-05	3.841466	0.9991

 Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Source: EVIEWS, Eurobank EFG Research

Table 3.4i – Vector Error Correction Model 1 estimation output

Vector Error Correction Estimates
Date: 09/21/05   Time: 23:39
Sample (adjusted): 1983 2011
Included observations: 29 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
CA(-1)	1.000000
GGVNT(-1)	-0.958584 (0.20572) [-4.65964]
RER15(-1)	0.517716 (0.06411) [8.07548]
PINV(-1)	0.781030 (0.19753) [3.95407]
C	-2.531879

Error Correction:	D(CA)	D(GGVNT)	D(RER15)	D(PINV)
CointEq1	-0.435405 (0.16649) [-2.61518]	0.262757 (0.23660) [1.11054]	-1.361442 (0.45486) [-2.99313]	-0.044082 (0.16939) [-0.26024]
D(CA(-1))	0.218190 (0.19929) [1.09483]	0.297561 (0.28322) [1.05065]	1.348296 (0.54447) [2.47636]	-0.075541 (0.20276) [-0.37256]
D(CA(-2))	0.234311 (0.18779) [1.24776]	0.295193 (0.26686) [1.10615]	0.090711 (0.51303) [0.17681]	0.098283 (0.19105) [0.51443]
D(GGVNT(-1))	-0.461980 (0.17194) [-2.68680]	-0.180807 (0.24435) [-0.73994]	-0.016498 (0.46975) [-0.03512]	0.055638 (0.17494) [0.31805]
D(GGVNT(-2))	-0.331554 (0.17083) [-1.94083]	-0.119544 (0.24277) [-0.49241]	0.594595 (0.46671) [1.27400]	-0.099243 (0.17380) [-0.57100]
D(RER15(-1))	-0.071753 (0.07008) [-1.02386]	-0.089984 (0.09959) [-0.90352]	0.550998 (0.19146) [2.87787]	0.058781 (0.07130) [0.82442]
D(RER15(-2))	0.211974 (0.09089) [2.33209]	0.044192 (0.12917) [0.34212]	0.433711 (0.24833) [1.74655]	-0.055967 (0.09248) [-0.60520]
D(PINV(-1))	0.113581 (0.24972)	0.393691 (0.35488)	-0.283182 (0.68223)	-0.121950 (0.25406)

	[0.45484]	[1.10937]	[-0.41508]	[-0.48000]
D(PINV(-2))	0.101188	0.004392	0.792074	-0.180442
	(0.24782)	(0.35218)	(0.67704)	(0.25213)
	[0.40832]	[0.01247]	[1.16991]	[-0.71567]
C	0.005231	0.000402	0.021780	-0.003281
	(0.00492)	(0.00700)	(0.01345)	(0.00501)
	[1.06248]	[0.05746]	[1.61928]	[-0.65494]
D99	-0.031834	0.008291	-0.044488	0.005014
	(0.00954)	(0.01356)	(0.02606)	(0.00970)
	[-3.33742]	[0.61166]	[-1.70717]	[0.51671]
D2008	0.043535	-0.013640	0.026881	-0.027224
	(0.01484)	(0.02109)	(0.04054)	(0.01510)
	[2.93361]	[-0.64678]	[0.66302]	[-1.80309]
R-squared	0.672915	0.398203	0.589880	0.354562
Adj. R-squared	0.461272	0.008805	0.324508	-0.063075
Sum sq. resids	0.004379	0.008844	0.032686	0.004533
S.E. equation	0.016050	0.022809	0.043849	0.016329
F-statistic	3.179480	1.022612	2.222841	0.848972
Log likelihood	86.42427	76.23246	57.27811	85.92391
Akaike AIC	-5.132708	-4.429825	-3.122628	-5.098201
Schwarz SC	-4.566930	-3.864047	-2.556850	-4.532423
Mean dependent	-0.003207	-0.001207	0.004245	-0.002886
S.D. dependent	0.021867	0.022910	0.053352	0.015838

Determinant resid covariance (dof adj.)	3.24E-14
Determinant resid covariance	3.83E-15
Log likelihood	316.7419
Akaike information criterion	-18.25806
Schwarz criterion	-15.80636

Source: EVIEWS, Eurobank EFG Research

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