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An Investigation of
National Balance Sheet Data
(1997-2014)

by: Paul-Adrien Hyppolite

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**TOWARDS A THEORY ON THE CAUSES OF THE GREEK
DEPRESSION: AN INVESTIGATION OF NATIONAL BALANCE
SHEET DATA (1997-2014)**

Paul-Adrien Hyppolite¹

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Drawing on a new dataset, I explore the dynamics of national wealth accumulation in Greece since 1997, and suggest a thought-provoking narrative on the causes of the Greek depression. I show that about two-thirds of the increase in external public debt during the pre-crisis period inside the euro area can be attributed to factors other than fiscal indiscipline. A positive wealth effect tied to the housing bubble resulted in a low level of national saving, thereby pushing the government to borrow from abroad to roll over its debt issued domestically and to finance investment in capital goods. Compared to Spain and Ireland, two explanations may account for the rise in external public - instead of corporate - debt during the pre-crisis period: (i) the smaller size of firms that were relatively more credit-constrained and thus had limited access to external financing, and (ii) the larger initial size of the government balance sheet - in terms of both assets and liabilities - that generated a greater incentive to roll over existing domestic debt and invest in physical assets through external borrowings.

Keywords: National wealth; Real estate bubble; Valuation effects; Capital flows; External adjustment; Euro area crisis; Greece.

JEL classification codes: E01; E2; F3; H1.

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I. INTRODUCTION

The euro area crisis, that has been ongoing for six years, has already been the subject of numerous papers by academics who seek to analyze its causal factors and its dynamics. Martin and Philippon (2015) still insist very recently on the persistent disagreement about the best way to interpret the crisis. Essentially, two competing views emerge from the current discussions: the first one argues that the euro area crisis is the result of the accumulation of excessive public debt away from the Stability and Growth Pact's fiscal targets, whereas the second one insists on the accumulation of excessive private external debt used to finance unproductive investments in the construction sector amid regional real estate bubbles in periphery countries. In a nutshell, the euro area crisis is either considered as a sovereign debt or a balance of payments (a.k.a. external debt) crisis. In the first case, Greece is generally considered as being at the very root of the crisis: the partly hidden accumulation of excessive fiscal deficits by unscrupulous governments willing to increase public sector employment and wages made public debt unsustainable and subsequently destabilized a monetary union where the overall level of public debt was too high. In this regard, Aguiar et al. (2014) rationalize the possibility of sovereign debt booms in monetary unions by showing how an increase in inflation credibility following the entry into a monetary union can raise the maximum borrowing limit of a country and reduce its incentives to save. However, such a model can hardly explain why the pre-crisis increase in public debt took place in Greece and not in Spain or Ireland for instance. Then, there is naturally a big temptation to resort exclusively to political motives to explain the greater accumulation of public debt in Greece. In the other case, which is currently supported by most of the influential macroeconomists (see for instance Baldwin and Giavazzi 2015 for a recent review or Giavazzi and Spavento 2010), Greece is *de facto* treated as an outlier in the euro area. Indeed, in the current state of knowledge, the balance of payments approach fits well the situation of the other periphery countries (Ireland, Portugal and Spain), but does not seem to apply to Greece.² The disclosure of the Greek fiscal fraud in 2009 is therefore simply identified as the exogenous trigger of the euro area crisis. Hence, in both cases, a "political view" of the Greek crisis persists and the so-called "fiscal indiscipline" of the government is a black box that is not investigated. I argue that this inability to understand the Greek crisis other than through the sole prism of fiscal indiscipline has prevented to achieve a consensus on the root causes of the euro area crisis so

² Most serious country-level economic studies focus therefore on periphery countries other than Greece, namely Ireland (Lane 2011, Whelan 2014), Portugal (Reis 2013) and Spain (Gopinath et al. 2015).

far. The consequence is that policymakers have focused more on designing mechanisms to *combat* the next crisis (e.g. ESM, OMT, SRB³ etc.) than to actually *prevent* it from happening.

Before we go any further, a brief analysis of basic statistics is needed. Breaking down the evolution of the Greek fiscal deficit over 2001-2007 (see Appendix n°1), we note that its increase was entirely driven by the rise in government expenditure. In particular, the rise in government final consumption expenditure (i.e. mostly spending related to the workforce) can alone explain the budgetary drift over the period. However, what is really specific to Greece compared to the other periphery countries is not the rise in government final consumption expenditure *per se*, but rather the stagnation of government revenue.⁴ Overall, this increase in the fiscal deficit before the crisis can reasonably be attributed to political mismanagement, and notably to the poor quality of the fiscal administration.⁵ But importantly, it did not trigger an explosion of the public debt to national income ratio (the latter only rose from 139 percent in end 2001 to 150 percent in end 2007 i.e. a 8 percent increase), as the impact of fiscal deficits was mitigated by the sustained growth of national income. Rather, the evolution of the *composition* of public debt appears crucial: over the same period, external public debt rose from 55 percent of national income to 98 percent (i.e. a 78 percent increase - see chart 1 below). Thus, what needs to be investigated is this massive rise, which made the government increasingly dependent on foreign capital inflows and the adjustment following the 2009-2010 sudden stop especially costly (see Gourinchas et al. 2016 for a comparison with other relevant historical episodes). So I argue in this paper that the proper metric on which we need to focus in order to understand the pre-crisis build-up of imbalances in the Greek economy is not the evolution of the fiscal deficit, but rather that of external public debt. Focusing only on the deficit would be like focusing on the tip of the iceberg. If the increase in the deficit can be convincingly explained by fiscal indiscipline, other factors must lie behind such an increase in external public debt. This invites us to go beyond the conventional frame for thought on the Greek debt crisis, thereby refusing to treat it as the outcome of purely exogenous political

³ European Stability Mechanism, Outright Monetary Transactions program and Single Resolution Board.

⁴ As evidenced in Appendix n°2, the Greek government final consumption expenditure as a share of national income was in line with other periphery countries and gradually converged towards the euro area level before the crisis. But the breakdown of the fiscal deficit evolution in other periphery countries shows that they had a much more prudent fiscal management: contrary to Greece, government revenue as a share of national income increased very substantially.

⁵ As we shall see later on, the inability to increase government revenue as a percentage of national income over the pre-crisis period is all the more problematic that the value of private assets as a percentage of national income increased substantially over this very period.

motives, but rather attempting to understand the endogenous dynamics and economic mechanisms that generated the external over-indebtedness in the first place.

In order to do so, we must start by taking distance with respect to the burning public debt issue and consider what happened in the economy from a broader angle. Given the lack of official national balance sheet in Greece, the idea is to construct a new macro-historical dataset in order to provide information on the evolution of national income, saving, investment as well as national, domestic, foreign, government and private wealth in the run-up to the euro area accession, during the pre-crisis period inside the monetary union (2001-2007) and finally during the crisis from 2008 onwards.⁶ The objective is to study the evolution of the full balance sheets (total assets and liabilities) of each sector in the economy (government, corporations and households), and notably the sectoral accumulation of capital in the run-up to the crisis. I attempt to answer a number of key questions. While the Greek external public debt has sharply increased over the last decade, what about the government assets? What was the role of valuation effects (i.e. real capital gains or losses) on domestic capital and net foreign assets in explaining the external debt accumulation in the public and private sectors? Then how can we rationalize the increase in external public debt and the related unsustainable dynamics that took place before the crisis? And finally during the crisis, how has the adjustment occurred?

Related literature. My paper is related to several strands of literatures. First, it contributes to the growing literature on the measurement of national wealth and the analysis of its accumulation. Piketty (2011) studies the long-run evolution of private wealth in France by breaking down its accumulation into an “inherited” and a “self-made” components. Using official national balance sheets, Piketty and Zucman (2014) extend the database to seven other countries,⁷ over longer time periods and also include government wealth in the analysis. They break down national wealth accumulation into a saving/investment-induced (volume effect) and a real capital gains/losses-induced (relative price effect) components and find that over the long run, the accumulation of national wealth is well accounted simply by national saving flows. I focus on a country where there is currently no official national balance sheet: Greece.

⁶ Note that all data presented throughout the paper will be end-of-period data. I choose to start the crisis period in 2008, and not 2009, as Greece - in particular banks and then the sovereign following the recapitalization of banks with the 2008 support plan - began to be severely affected by the 2008 global financial crisis.

⁷ In addition to France, the seven other developed countries included in their dataset are the United States, the United Kingdom, Germany, Italy, Japan, Australia and Canada.

Contrary to Charalampidis (2014), I use disaggregated stock and flow data to derive national wealth and notably suggest a new approach to estimate the value of natural capital. To the best of my knowledge, the resulting series on government and private wealth in Greece are the first of their kind. Then, I am able to break down the accumulation of national wealth at a finer level than Piketty and Zucman (2014), namely between net foreign assets and domestic capital, and then within these categories between the government, corporations and households over 1997-2014. I show that valuation effects on domestic and foreign assets can be very substantial over the medium-term, generate a false sense of capital accumulation during a boom phase and ultimately precipitate the country in a crisis that completely wipes out the previously accumulated wealth. So my work is connected to the international finance literature (Milesi-Ferretti 2001; 2007 and Gourinchas and Rey 2007a; 2007b; 2013). In particular, I highlight (i) the link that may exist between valuation effects on the stock of domestic capital (e.g. in the context of a regional real estate bubble) and the increase in external indebtedness, and (ii) the role that the valuation channel on net foreign assets can play in worsening or stabilizing external imbalances (in the Greek case: worsening before the crisis and stabilizing during the crisis).

Second, the paper is related to the aforementioned literature on the euro area crisis. Drawing on the analysis of national wealth accumulation, it provides a new narrative on the root causes of the Greek depression that departs from the conventional view solely focusing on “fiscal indiscipline” to fit into a comprehensive view of the euro area crisis. The idea is not to deny the existence of the Greek budgetary drift but to consider it against the background of a broader and endogenous dynamics. Just like in Spain or Ireland, I argue that the growth of external debt can be related to the real estate bubble that started in the mid-1990s. Indeed, the low level of national saving resulting from the bubble through a positive wealth effect on households led the country to borrow from the rest of the world to roll over its debt held by domestic residents but most importantly to finance investment in an overheated construction and housing sector. I offer two explanations to account for the rise in external public vs. corporate debt in Greece vs. Spain and Ireland over the pre-crisis period: (i) the smaller size of Greek firms⁸ that were relatively more credit-constrained and thus had very limited access to external financing, and (ii) the larger initial size of the Greek government balance sheet (in terms of both assets and liabilities) that created a greater incentive for the government to

⁸ The European Commission 2015 SBA (Small Business Act for Europe) fact sheet for Greece reveals that micro firms represent 98 percent of all firms in Greece. Moreover, the share of micro firms is significantly higher in Greece than in the EU-28 (98 vs. 93 percent of existing firms). Many firms are family-run and the number of self-employed workers reaches record levels for the region - see Appendix n°3.

invest in physical assets⁹ and mechanically led to the roll-over by foreign investors of a significant part of the existing public debt. On the contrary, the smaller size of the government balance sheet and the better access of domestic firms to foreign savings in Spain and Ireland (either directly or through domestic banks) prevented the imbalances to emerge in the public sector. Hence, specific structural characteristics such as the size of the government and firms can explain why the accumulation of excessive external debts materialized mostly in the public sector in Greece, as opposed to the private sector in Ireland and Spain.¹⁰ But overall, the wealth accumulation dynamics of Greece, Spain and Ireland were all unsustainable because foreign savings was used to finance unproductive investments in overvalued assets. In the end, the Greek case appears to be simply a different manifestation of the same phenomenon, namely an external debt crisis at the periphery level.

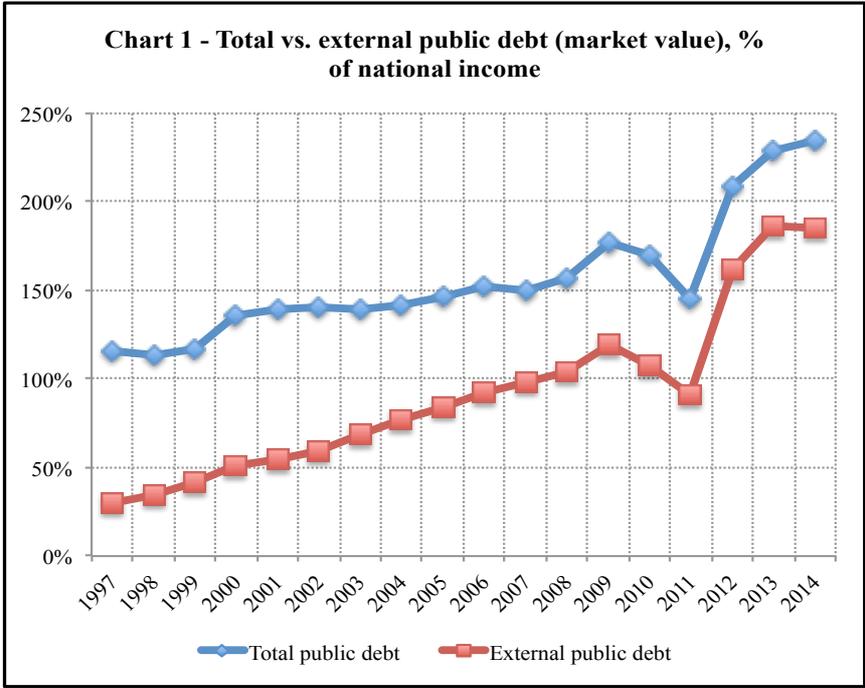
Third, more generally, the paper casts a light on the structural determinants of external debt crises and on the role of domestic asset bubbles in output contraction. In that respect, it can be related to several recent papers. Reinhart and Trebesch (2015) analyze two centuries of evidence to highlight the persistent dependence of the Greek government on external financing and the subsequent costs of external debt crises. The mechanism described in my paper focusing on real estate bubbles and structural features such as the size of the government and firms can help explain the recurrence of these crises. Mian et al. (2016) question the relation between household debt and the macroeconomy on a large set of data over many countries and historical episodes. They find that an increase in the household debt to GDP ratio over a three-year period in a given country predicts subsequently lower output growth. This finding suggests that fluctuations are not necessarily driven by productivity or permanent income shocks as suggested by standard open economy macroeconomic models. My analysis of the Greek depression helps thinking about the interaction between bubbles on domestic assets and credit supply shocks, while suggesting a mechanism through which such shocks can affect external indebtedness, end up in a crisis and thus in a contraction of output.

In section II, I start by discussing the notion of national wealth and its main components before explaining in section III how I construct new national balance sheet series in Greece since 1997. In section IV, I comment on the interesting patterns exhibited by the resulting

⁹ Indeed, I show that the Greek government borrowed significant amounts from the rest of the world to finance investments in physical assets and that the participation to the net capital formation of the government relative to firms was much higher in Greece than in the rest of the periphery before the crisis.

¹⁰ The case of Portugal is deliberately left aside because we do not have so far enough detailed data to see if the reasoning applies.

series. I study in sections V to VIII the dynamics of national wealth accumulation (sections V to VII) and the external adjustment (section VIII) that occurred before and during the crisis. First, I break down national wealth accumulation into a volume (saving/investment-induced) and a relative price (real capital gains/losses-induced) effect at a very broad level, and then move to finer levels of detail by breaking down national wealth into its domestic and foreign components, and subsequently domestic capital and net foreign assets between the government, corporations and households. In section IX, I elaborate on the aforementioned narrative of the Greek crisis, which allows me to suggest a comprehensive view of the euro area crisis as well as policy proposals to improve the resilience and future prospects of the monetary union. I conclude by putting forward some future research perspectives. The reader uninterested in methodological considerations may want to skip the first two sections and directly proceed to section IV.



II. NATIONAL BALANCE SHEETS: THE CONCEPTUAL FRAMEWORK

National wealth. First of all, agreeing on a definition of national wealth and its components is far from straightforward. In the interests of coherence and clarity, I choose to follow the

most recent international guidelines (SNA 2008 and its European equivalent ESA 2010)¹¹ and thus to only consider “economic assets” for the measurement of wealth, i.e. assets over which ownership rights can be enforced and which provide economic benefits to their owners. Importantly, this approach notably excludes human capital as well as future government expenditures and transfers (e.g. pay-as-you-go social security pension, health benefits, education expenses etc.), but it includes non-produced assets such as natural resources (e.g. land and proved natural reserves) and intangible capital (e.g. intellectual property products such as R&D) on condition that they provide economic benefits.¹² Besides, residents in a given country can be divided into three main sectors: corporations,¹³ households¹⁴ and the government.¹⁵ Each sector has by definition a *net* wealth equal to the sum of its non-financial and financial assets minus its liabilities.¹⁶ Thus, national wealth is defined as the sum of the wealth of the three main sectors in the economy. At the total economy level, the sum of domestic financial assets is necessarily equal to the sum of domestic financial liabilities,¹⁷ so that national wealth is also the sum across the three main sectors of their respective non-financial asset and net foreign asset portfolios.¹⁸

¹¹ The United Nations System of National Accounts (SNA) is an international standard system of national accounts whose aim is to provide an integrated, complete system accounts enabling international comparisons of all significant economic activities. The first international standards were published in 1953. New handbooks have been released for the 1968, 1993 and 2008 revisions. The first guidelines for the computation of wealth were detailed in the 1993 version. The European System of Accounts (ESA) is the system of national accounts used by members of the European Union. The ESA 95 and ESA 2010 are fully consistent respectively with the 1993 and 2008 SNA in definitions, accounting rules and classifications.

¹² This is one of the key differences between national wealth measures obtained by using official country-wide balance sheets and measures obtained simply by cumulating past investment flows and adjusting for changes in relative prices (measures of the capital stock that can be found in the growth accounting literature).

¹³ Corporations include the national central bank (considered as a financial corporation) and government-controlled companies. Importantly, all government units that are engaged in market production and keep a complete set of separate accounts are not in the government but rather in the corporate sector.

¹⁴ Households include non-profit institutions serving households (NPISHs) i.e. all individuals and unincorporated enterprises owned by households except those that have sufficiently detailed accounts and behave in the same way as corporations. In the case of Greece, it is worth noting that the properties of the Church are included in the households sector.

¹⁵ The government sector incorporates central, state and local governments as well as social security administrations.

¹⁶ Throughout the paper, the term “wealth”, when used alone, will always refer to the notion of “*net* wealth” i.e. total assets minus liabilities. Also, the terms “wealth” and “capital” will have exactly the same meaning.

¹⁷ The domestic financial assets/liabilities refer to the financial contracts between residents. By construction, the sum of all financial claims of residents on other residents is equal for each period to the sum of all financial liabilities of residents due to other residents.

¹⁸ The net foreign asset portfolio or position (“NFAP”) is the difference between a country’s gross external assets and liabilities. Gross external assets include all financial claims of domestic residents on the rest of the world, while gross external liabilities include all financial liabilities of domestic residents due to the rest of the world. Although the net foreign asset position of a country only includes financial assets and liabilities, it also incorporates in theory the market value of the non-financial assets such as real estate owned by the rest of the world in the country and *vice versa*. Indeed, when a foreigner owns a real property in the country, statisticians record that a domestic quasi-corporation owns the property and that the quasi-corporation is fully owned (equity) by a foreign investor. Because quasi-corporations are unincorporated corporations, these data should be included

$$\text{National wealth} = \text{NFAP (corporations, households, government)} + \text{Non-fin. assets (corporations, households, government)} \quad (1)$$

This gives immediately a definition of national wealth as the sum of foreign and domestic wealth.

$$\text{Foreign wealth} = \text{NFAP (corporations, households, government)}$$

and:

$$\text{Domestic wealth} = \text{Non-fin. assets (corporations, households, government)}$$

Government and private wealth. Starting from this, one can now divide national wealth into a private and public component. Indeed, when the equity of corporations is measured at book value, a simple balance sheet identity at the corporations' aggregate level shows that the sum of the net foreign assets and non-financial assets of corporations is equal to the sum of the net domestic financial assets of households and the government.¹⁹

$$\text{NFAP (corporations)} + \text{Non-fin. assets (corporations)} = \text{Domestic fin. liabilities (corporations)} - \text{Domestic fin. assets (corporations)} \quad (*)$$

and:

$$\text{Domestic fin. assets (households, government)} - \text{Domestic fin. liabilities (households, government)} = \text{Domestic fin. liabilities (corporations)} - \text{Domestic fin. assets (corporations)}$$

Thus, coming back to our initial definition of national wealth (1), we can break down the latter into a private and public component.

in the households sector. Note also that the fifth edition of the IMF Balance of Payments Manual (BPM5) recommends that quasi-corporations be included in the direct investment data.

¹⁹ Net domestic financial assets of households and the government are the difference between financial assets held by households and the government on other sectors of the economy and liabilities due by households and the government to other residents.

$$\begin{aligned} \text{National wealth} = & [\text{NFAP (households)} + \text{Non-fin. assets (households)} + \text{Domestic fin. assets} \\ & \text{(households)} - \text{Domestic fin. liabilities (households)}] + [\text{NFAP (government)} + \text{Non-fin.} \\ & \text{assets (government)} + \text{Domestic fin. assets (government)} - \text{Domestic fin. liabilities} \\ & \text{(government)}] \quad (2) \end{aligned}$$

With:

$$\text{Private wealth} = \text{NFAP (households)} + \text{Non-fin. assets (households)} + \text{Domestic fin. assets (households)} - \text{Domestic fin. liabilities (households)}$$

and:

$$\text{Government wealth} = \text{NFAP (government)} + \text{Non-fin. assets (government)} + \text{Domestic fin. assets (government)} - \text{Domestic fin. liabilities (government)}$$

Although it is useful to understand through the balance sheet identity of corporations how we can move from the first breakdown of national wealth as the sum of foreign and domestic wealth, to the second one as the sum of private and government wealth, the latter follows immediately when one recalls the basic definition of national wealth as the sum of the wealth of our three main sectors. Indeed, when the equity is measured at book value, the wealth of corporations is zero by definition, so that national wealth becomes the sum of the wealth of households (private wealth as defined above) and of the government (government wealth as defined above). Conversely, when the equity of domestic corporations is valued at market prices, corporate wealth can be non-zero: either positive if the book value of equity is higher than the market value, or negative in the opposite case.

Official national balance sheets. In accordance with the aforementioned international guidelines, the national statistical institutes of some developed economies have begun to publish retrospective national balance sheets, which report, whenever possible, the market value of all non-financial and financial assets and liabilities held by each sector in the economy.²⁰ These data enable researchers to construct historical series of national wealth, with the aim of studying the dynamics of capital accumulation. Piketty and Zucman (2014)

²⁰ I will discuss the issues related to the valuation of assets in the next section.

define two notions of national wealth, namely the “book-value national wealth” as the sum of net foreign assets and non-financial assets across all sectors in the economy (cf. (1) above), and the “market-value national wealth” as the sum of the wealth of households and the government (cf. (2) above). As is suggested by their respective names, the intuition is that the market-value national wealth captures the value of domestic corporations’ equity at market prices, while the book-value national wealth estimates it at book value (i.e. as the difference between the value of corporate assets and liabilities excluding equity). The difference between the two values of national wealth is the “residual corporate wealth”. Depending on the perspective one adopts, a non-zero residual can be attributed to temporary fluctuations in the market price of equity above or below the book value (a.k.a. the fundamental value) and/or to measurement errors in the book valuation. A potential issue in the measurement of the “book-value national wealth” arising from the direct use of official national balance sheets is that part of the shares issued by domestic corporations - namely the part owned by foreign investors - is still valued at market prices in the country’s official net foreign asset position.²¹ We can attempt to make adjustments in the official data to correct this imperfection: I refer to Appendix n°5 for more details regarding the construction of the “*adjusted* book-value national wealth.”²²

Book vs. market valuation of national wealth. Now, an important issue becomes: should we rather use the notion of book-value or market-value national wealth for the breakdown and analysis of wealth accumulation? One can argue that book valuation can help avoid many measurement errors since estimating the market value of equity in privately held companies is tricky and in essence approximate.²³ This argument could be especially relevant in countries like Greece where unquoted shares of private companies account for the largest fraction of total equity.²⁴ However, for several other reasons, it can be interesting to use measures of market-value national wealth. This can help to avoid a different kind of measurement errors

²¹ Thus, strictly speaking, the resulting book-value national wealth does not perfectly capture equity at book value. This is more or less relevant depending on the share of domestic corporations’ equity owned by non-residents (see Appendix n°4 for specific data on Greece).

²² One must nonetheless keep in mind that we talk about minor adjustments because the value of domestic corporations’ equity owned by the rest of the world typically represents a very small share of national wealth. Simply summing the market value of non-financial assets and net foreign assets across all domestic sectors thus yields a good approximation of the actual book-value national wealth.

²³ Unquoted shares of private companies are typically valued by statisticians on the basis of observed market prices for comparable publicly traded companies (“comparable” means for instance same market/industry, similar earnings and dividend history). If deemed necessary, statisticians can make a downward adjustment to account for inferior liquidity. All this is by nature a sensitive and approximate exercise.

²⁴ According to the official financial accounts, the estimated market value of shares issued by private companies was more than twice as high as the market value of listed shares at the end of 2014 in Greece.

inherent to book valuation and related to the difficulty to properly estimate the value of corporations' non-financial assets (equipment, factories etc.). Lastly, working with a market valuation of equity seems more appropriate to study the role of real capital gains or losses in wealth accumulation. Piketty and Zucman (2014) argue in favor of the market-value definition, while acknowledging that there is no simple answer to this debate. From my perspective, I tend to prefer the book-value definition because, as shown previously, moving from the first breakdown of national wealth between foreign and domestic wealth to the second one between private and government wealth is more straightforward with book valuation.²⁵ In any case, as we shall see later on, using either market- or book-value wealth series in Greece over our period of interest makes little difference, so that my general findings will be robust to any definition.

III. THE DATA: CONSTRUCTION OF GREEK SERIES

Empirical challenges in Greece. Greece has no official national stock accounts yet, so that I cannot rely at first sight on official data to compute the wealth series. Charalampidis (2014) makes a first attempt to estimate the Greek national wealth over 1974-2013 using a two-good wealth accumulation model.²⁶ Even if such kind of simulation is useful to assess its long-run evolution, it has a number of drawbacks, which make it not perfectly suitable to study the short- to medium-term fluctuations we are interested in. It notably requires remaining at a high level of generality, cumulating national saving flows from a given starting point (which is by nature tricky to estimate) and using a unique aggregate asset price index to obtain market-value data. As such, it does not allow us to get fine breakdowns of national wealth, in particular between government and private wealth, and intrinsically carries the risk that capital gains or losses are over- or underestimated over short-term periods. For the purpose of the current study, I intend to suggest another estimation method. I argue that, to some extent, it is possible to use in a comprehensive manner different available data sources to estimate national wealth and its components with the same methodology as the one adopted in the

²⁵ Recall that this is because the net wealth of corporations is always zero. A non-zero net wealth of corporations in the market value case raises the issue of its possible reallocation to the government and households sectors.

²⁶ Therefore, he allows for relative price effects between capital and consumption goods (i.e. real capital gains or losses on capital goods) to simulate the evolution of the national wealth-income ratio. He finds results that are coherent with the regularities observed by Piketty and Zucman (2014) on other developed economies. He notably observes a long-run increase in national wealth-income ratios, from about 250 percent in the 1970s to 500 percent at the height of the Greek crisis.

most recent international guidelines. I start by briefly explaining what are the different types of assets included in official national balance sheets and how they are commonly valued, before presenting my own approach for the computation of Greek series.

Valuation of assets. In theory, all financial assets and liabilities as well as non-financial assets owned by residents and the rest of the world in a given country and providing economic benefits must be included in the national balance sheet. Non-financial assets are typically divided into “produced” and “non-produced” assets. Produced assets consist of produced tangible²⁷ and intangible²⁸ assets, whereas non-produced assets also include non-produced tangible²⁹ and other types of intangible assets.³⁰ Then, the key idea of international guidelines for the computation of wealth is to resort to as many market-value estimates as possible. Thus, statisticians use, whenever available, census-like sources where economic units report the prevailing market value of their holdings like equity, debt, dwellings etc.³¹ Otherwise, they can rely on recently observed transactions, notably on the real estate market, to obtain the missing market values of particular assets. Only when the prevailing or observed market price of a given asset or its equivalent is not available, they estimate, as a second best, its value by referring to its historical cost, cumulating past investment flows and adjusting the series for the depreciation of capital and the variation of relative prices. Statisticians still have to rely on this second-best approach - called the “perpetual inventory method” - for a significant portion of assets, in particular for corporations where, by nature, many non-financial assets such as capital equipment can hardly be valued at market prices. Finally, there are some cases where neither the first (census-like) nor the second (perpetual inventory) methods are suitable. Such is the case, for instance, of natural reserves (oil, gas, water etc.) that are never sold because they are the property of the government. Then, as a last resort,

²⁷ Produced tangible assets include tangible fixed assets, inventories and valuables. Tangible fixed assets, which make the bulk of produced assets in general, mainly include dwellings, non-residential buildings and other structures, machinery, equipment and weapon system and cultivated biological resources. In particular, historical monuments like the Parthenon in Greece are included in the “non-residential buildings and other structures” category.

²⁸ Produced intangible assets consist of intellectual property products (e.g. R&D, computer software and database, mineral exploration and evaluation, entertainment, literary or artistic originals). Intellectual property products are also considered as (intangible) fixed assets.

²⁹ Non-produced tangible assets are natural resources. They include the value of land, mineral and energy reserves as well as non-cultivated biological resources and water resources. “Pure” environmental assets like the seas and the air are not included in the natural resources of a country because they are not “economic assets” in the sense that they have no identifiable owner.

³⁰ Note that the official distinction between produced and non-produced intangible assets is quite blurred. For instance, according to international guidelines, non-produced intangible assets include “marketing assets”, although the latter could be considered as “produced” assets.

³¹ Such sources include reports of balance sheet and off-balance sheet positions by non-financial and financial corporations, as well as housing surveys.

such assets are typically valued by estimating the net present value of future revenues over a long-term horizon. These estimates are obviously very sensitive to the chosen long-term discount rate (see for a recent work on the subject Giglio et al. 2015). With this in mind, table 1 documents how my series are constructed compared to the corresponding international guidelines. My valuation standards are broadly consistent with the official ones, even if I have no choice (as we shall see later on: given the scarcity of available data) but to give to the perpetual inventory method a greater role in the estimation of the value of produced assets.

Table 1 - National balance sheet, valuation of assets and liabilities		
Types of assets/liabilities	Valuation method in ESA 2010 / SNA 2008	Valuation method in Hyppolite (2016)
Financial assets/liabilities	Mix of prevailing market prices & nominal value	
Currency and deposits	Nominal value	idem
Other accounts receivable/payable (e.g. trade credits)	Nominal value	
Loans	Market value (i.e. nominal value minus loss provisions)	
Debt securities	Prevailing market prices or market price estimates	
Equity	Prevailing market prices or market price estimates	
Produced assets	Mix of observed market prices and PIM	PIM only
Fixed assets	Observed market prices whenever available (e.g. for dwellings) or PIM (e.g. for other buildings and corporate tangible assets)	PIM
Inventories	Perpetual inventory method	idem
Valuables	Perpetual inventory method	not included (typically small)
Non-produced assets	Mix of observed market prices and net present value of future returns otherwise	idem
Land	Observed market prices (whenever available)	(based on extrapolation of official data for a regional peer country, namely the Czech Republic)
Natural reserves (energy, water, non-cultivated biological resources)	Net present value of future returns	
Intangible non-produced assets	Observed market prices (whenever available) or PIM	
<i>Source: ESA 2010</i>		
Notes: (1) prevailing or observed market prices are obtained from census-like sources where economic units have to report on the current market-value of their assets and liabilities (e.g. reports on balance sheet - as well as off-balance sheet - positions of financial and non-financial corporations); (2) perpetual inventory method (PIM) consists of cumulating past investment flows with adjustments to account for capital depreciation and changes in asset prices; (3) fixed assets include tangible and intangible fixed assets: tangible fixed assets are the most important category of produced assets and notably include dwellings, other buildings and structures (note that most of historic monuments are in theory included in this category), machinery and equipment, cultivated biological resources and weapon systems.		

Financial assets and liabilities. Detailed data following the ESA 2010 methodology for financial assets and liabilities are regularly compiled and published on an annual and quarterly basis since 1997 by the national central bank of Greece, the Bank of Greece (BoG). In this paper, I precisely start by studying the evolution of wealth in 1997 because sufficiently detailed data on financial assets and liabilities before the end of 1997 are not available.³² All

³² Note that, throughout this study, data in drachmas prior to the adoption of the common currency by Greece in January 2001 are systematically converted using the Greek irrevocable euro conversion rate (340.75 drachmas for one euro). This is the convention adopted by the main international statistical bodies (e.g. the OECD). Another option could consist of expressing national currency data for years prior to the euro adoption in ECU, the precursor currency to the euro. I favor the first approach for the sake of comparability between different data

financial assets and liabilities including equity are thus valued at market prices whenever possible. When market prices cannot be readily observed, for instance in the case of shares of unlisted companies, statisticians compute market-value approximations. When there are no market prices (e.g. for deposits), the reported values are the nominal values. With respect to loans, a “market-value equivalent” is displayed by subtracting to the nominal value the loan-loss provisions. Hence, the data I use for financial assets and liabilities in Greece are by definition fully in accordance with the ones that could have been integrated in the official national balance sheet of the country.

Produced assets. However, there is currently no official historical series of the market value of non-financial assets. The newly created national statistical service³³ has just started computing these series for households, corporations and the government and officially transmitting the series to Eurostat according to the ESA 2010 framework.³⁴ At present, detailed data by sectors are only available for the year 2012 and only relate to produced assets.³⁵ In view of this, I estimate the historical series for produced assets in market value between 1997 and 2014 by starting from the 2012 available data point and cumulating or subtracting corresponding net investment flows³⁶ and using a reference price indicator to adjust for each period the end-of-period market value of the stock. Formally, suppose K_t is the market value of the stock of produced assets at the end of period t , I_{t+1} the net-of-depreciation investment flow that occurs during period $t+1$ and r_{t+1} the variation of the reference price index between t and $t+1$ (year-on-year, end-of-period), we have the following identity:

$$K_{t+1} = (1 + r_{t+1})(K_t + I_{t+1})$$

sources. In practice, one or the other method does not make much difference because I do not go far back in time prior to the euro adoption.

³³ The national statistical institute of Greece, ELSTAT, is an autonomous legal entity under public law and independent from the government only since July 2010. Prior to July 2010, it was a non-autonomous service of the Greek state known as the National Statistical Service of Greece.

³⁴ Note that the same data are also used by the OECD in their annual national accounts (section “balance sheets for non-financial assets”).

³⁵ By email, ELSTAT specified me that data on produced assets by sectors for the years before 2012 are not available because the analysis was optional before 2012. Data for the year 2013 will be available after the transmission to Eurostat on 31 December 2015 and data for the year 2014 will be available after the transmission to Eurostat on 31 December 2016, according to the Transmission Program of Regulation 549/2013 ESA 2010. Besides, ELSTAT stressed that data on non-produced assets are not available because the calculation of such series is not compulsory according to the Transmission Program of Regulation 549/2013 ESA 2010.

³⁶ Net capital formation i.e. gross capital formation minus consumption of fixed capital.

or equivalently if we go backward:

$$K_t = \frac{K_{t+1}}{1 + r_{t+1}} - I_{t+1}$$

The sectoral data on gross capital formation and consumption of fixed capital available in the AMECO database³⁷ allow to compute a breakdown by sectors of the net capital formation (see Appendix n°6), so that I am able to estimate the value of produced assets at historical cost held by each sector over the 1997-2014 period. Then, as reference price indicator to get series in market value, I use the index of prices of dwellings in urban areas created and updated by the Bank of Greece.³⁸ By doing so, I assume that, first, the *average* market price of produced assets follows the market price of dwellings in urban areas and, second, the respective portfolios of produced assets of the three main sectors follow the same market price dynamics. In practice, there are important differences in the asset composition of these portfolios (see Appendix n°8), which makes the second assumption especially strong. For instance, the government primarily owns assets categorized as “other structures” which include notably roads, railways, bridges, tunnels etc., while households’ holdings mostly include dwellings. Regarding corporations, the bulk of the portfolio is made of machinery and equipment, followed by non-residential buildings and inventories. Ideally, this heterogeneity would require working with more price indexes.³⁹

Non-produced assets (total economy level). In order to complete the national balance sheet, we need estimates at the total economy level and by sectors of the value of non-produced assets, i.e. essentially of natural capital (land plus natural reserves).⁴⁰ Data for non-produced

³⁷ AMECO is the annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs (DG ECFIN). Using AMECO is perfectly coherent here (with respect to the other data sources from the Bank of Greece or ELSTAT that I use) because the main data source of AMECO is Eurostat, complemented when necessary by national sources coming from local statistical institutes. All reported series follow the ESA 2010 methodology.

³⁸ The index is based on data collected by the Bank of Greece from the various credit institutions operating in the Greek real estate market. Note that this is the most comprehensive real estate price indicator available in Greece. There exist more specific indicators such as the index of prices of dwellings in Athens, Thessaloniki, in other cities and in urban areas other than Athens. All are reported in Appendix n°7 for the interested reader.

³⁹ This is nonetheless not possible with the current data. For instance, data on commercial (instead of residential) property prices are not available on a sufficiently long period of time. But note that when the data begin to be available (starting from 2006), they follow exactly the same trend as residential property prices, so that they might have also followed the same trend before 2006.

⁴⁰ The value of non-produced intangible assets is extremely small compared to the value of natural capital in most cases (cf. OECD database, balance sheet of non-financial assets). I choose to simply ignore them in what follows.

assets are completely inexistent in Greece. To overcome this major issue, I choose to extrapolate - with several adjustments - data on the value of corresponding assets in a regional peer country, the Czech Republic.⁴¹ My estimation method relies on a single critical assumption, namely that the marginal value of natural capital is the same in both countries. This can be justified, first, by considerations regarding the valuation method of natural reserves in official national balance sheets and, second, by several observations regarding the characteristics of both countries that may influence the marginal price of land. As stated previously, the very nature of natural reserves generally prevents statisticians from using market valuation, thereby forcing them to estimate their value by computing the net present value of future revenues over a long-term horizon. Hence, the value of the pool of natural reserves in a country is not subject to market fluctuations, but rather depends on the quality of resources, on the exhaustion of proved reserves, on the discovery of new reserves and finally on the discount rate used to compute the net present value. Because both countries belong to the same geographic area (East-Central Europe), it is very unlikely that we have significant differences in the quality of natural reserves that may result in differing marginal prices of one unit of water, oil, gas or any mineral deposit from one country to the other.⁴² Besides, similar characteristics regarding land structure, GDP per capita and density of population⁴³ tend to suggest that the marginal value of land is also comparable in both countries. Moreover, beyond the marginal value, the quantity of natural reserves and the land use structure (urban vs. rural) are unlikely to have significantly changed or diverged in any way over such a relatively short period of time because both countries have already reached an advanced and similar level of development.⁴⁴ So after adjusting for the relative size of natural reserves and land between the two countries as detailed in the World Factbook database (see table 2 below), I obtain the value of natural capital in Greece at the total economy level. The land category raises an additional issue. Since it includes the ground underlying dwellings and

⁴¹ The Czech Republic is the only country in the region with a similar per capita GDP that displays appropriate official data (i.e. over a sufficiently long period and following the ESA 2010 methodology).

⁴² Conversely, the quality of natural reserves may differ significantly between very distant geographical areas. For instance, the quality (and thus price) of crude oil depends on sulfur content and thus on the soil's characteristics that can vary substantially from one geographic area to the other (e.g. Greece vs. Nigeria).

⁴³ According to the World Factbook Database (source: CIA), land use in Greece is 63.4 percent agricultural, 30.5 percent forest and 6.1 percent "other", while in the Czech Republic land use is 54.8 percent agricultural, 34.4 percent forest and 10.8 percent "other". According to the IMF World Economic Outlook database, GDP per capita was respectively of \$21,653 and of \$19,563 in Greece and the Czech Republic in 2014 (in current prices). According to the World Bank database, population density was of 85 people per sq. km in Greece, while the corresponding figure was 136 in the Czech Republic.

⁴⁴ Hence, factors that can have differentiated effects between two countries on the total value of the pool of natural reserves such as the discovery of new reserves, the exhaustion of past reserves, and the rhythm of urbanization are basically irrelevant here.

non-residential buildings, it is therefore potentially subject to country-specific market price fluctuations, just as the value of dwellings and non-residential buildings. Thus, I use our previous property price index to adjust the series on land and ultimately get a market value series.⁴⁵

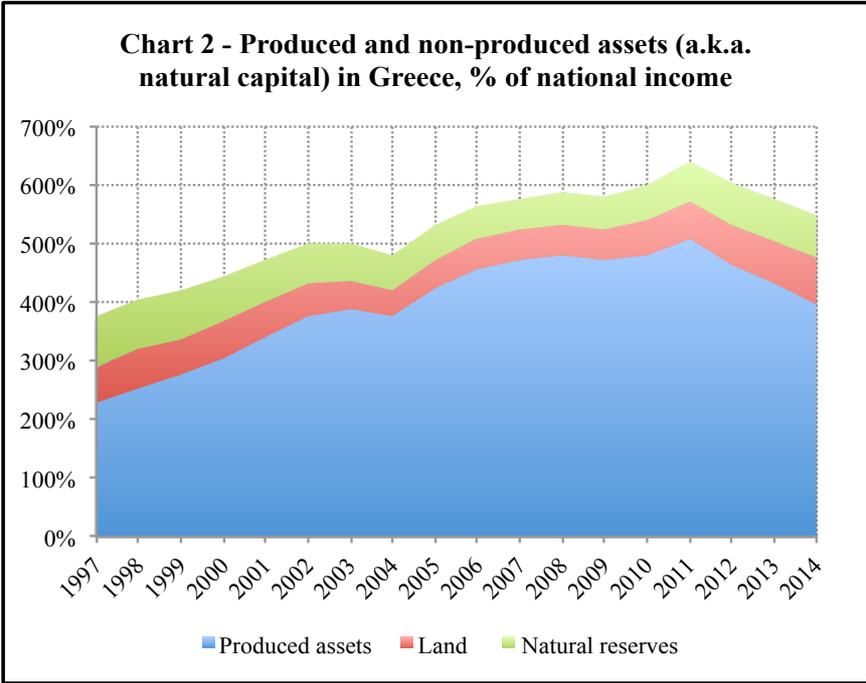
Sectoral breakdown of non-produced assets. Now, the last issue boils down to getting a sectoral breakdown of the resulting series. I proceed in two stages. First of all, I consider that land is distributed between our three sectors of interest in the same way as produced assets, i.e. the distribution of land by sectors mirrors the distribution of produced assets. This simply means that whoever owns a building also owns the underlying land. The notion of land property is not always clear-cut in Greece given the lack of proper cadaster: cross-ownership or no-ownership cases over pieces of land appear very frequent. But the potential impact on our sectoral breakdown must nonetheless be relativized given that these ownership issues mainly concern pieces of land in the countryside whose value is extremely low compared to the land on which there are constructions. Finally, to assign natural reserves between the government and corporations, I look at the regularities observed in other countries for which official data are available.⁴⁶ After examination of the cross-country data, I find that in the relatively less advanced economies, the government holds a disproportionate fraction of non-produced assets relative to produced assets (see Appendix n°9). One could argue that this is because natural reserves are mostly concentrated in the hands of the government in less advanced or less market-oriented economies. Although this is confirmed in the data, the advanced privatization process of natural reserves does not necessarily seem to be a distinctive feature of the most developed economies.⁴⁷ What actually makes the key difference between these two groups of countries (most advanced vs. the rest) in terms of ownership of non-produced assets is the relative value of land. It is indeed everywhere less concentrated within government hands than natural reserves and it has a much lower value in countries with lower GDP per capita. To be conservative, I contemplate Greece as an

⁴⁵ The value of unconstructed ground (or unused land) is a priori extremely low compared to the constructed ground in any country, so that it appears legitimate to say that the average price of land follows the average price of real estate. Note that land refers only to the ground over which ownership rights can be enforced. It excludes subsoil assets, non-cultivated biological resources and water resources below the ground for instance (the latter are valued separately).

⁴⁶ To date, the OECD annual national accounts (balance sheets for non-financial assets) is the most comprehensive dataset on the subject. It displays data (in compliance with ESA 2010) on non-produced assets with sectoral breakdown for seven countries, namely Australia, Canada, the Czech Republic, France, Japan, Korea and Mexico. The Czech Republic and Mexico are the relatively less advanced economies in the sample.

⁴⁷ For instance, while the government owns respectively 0 and 14 percent of natural reserves in Japan and Korea over our period of interest, the latter owns almost 100 percent of natural reserves in Australia and France.

intermediate case and allocate 70 percent of natural reserves to the government and the remaining 30 percent to corporations. It is likely that the concentration of natural reserves in the hands of the government is closer to 100 percent, as is the case in France or in the Czech Republic, so that I minimize the value of government wealth over the whole period. But it is essentially a matter of level and not trend, as the value of natural reserves is broadly constant over the relatively short period of time we are interested in (see table 1). In short, the wealth accumulation analysis that starts from section V is robust to the “70/30” assumption.



Breakdown of domestic capital by asset classes. Estimating the value of non-produced assets, and in particular its breakdown across sectors is undoubtedly one of the most delicate parts of this study. At this stage, it is worth noting that the value of non-produced assets is much lower than the value of produced assets over the whole period we are interested in (see chart 1 above), so that any possible measurement or allocation error of natural capital should not affect too much the estimates of national, foreign, domestic, private and government wealth-income ratios. I provide in Appendix n°8 a complete breakdown of domestic capital (i.e. non-financial assets: produced and non-produced) by sectors and asset classes for the year 2012.⁴⁸ Such a level of detail cannot be achieved for other years because the investment

⁴⁸ By way of indication, the 2012 government’s portfolio of non-financial assets - worth €225bn in market prices - notably included 43 percent of natural resources, 34 percent of other structures (roads, highways, railways, tunnels etc.), 11 percent of equipment and weapon systems (transport equipment, warships, submarines, military

flow data on which I rely on to construct the historical series are aggregated and not detailed by asset classes.

Table 2 - Natural resources: Greece vs. the Czech Republic			
	Czech Republic	Greece	Relative size (adjustment factor)
Land (km ²)	77,247	130,647	1.7
Mineral and energy reserves	–	–	0.5
<i>(of which) natural gas (billion cu m) - proved reserves</i>	4.3	1.0	0.2
<i>(of which) crude oil (million bbl) - proved reserves</i>	15.0	10.0	0.7
Water resources (cu km)	13.2	74.3	5.6

Source: World Factbook Database, author's computations

Notes: (1) I only include in the category "mineral and energy reserves" the proved reserves of natural gas and crude oil; then the adjustment factor for "mineral and energy reserves" is simply obtained by taking the mean of the respective relative size of proved natural gas and crude oil reserves; (2) according to the World Factbook Database, land use in Greece is 63.4% agricultural, 30.5% forest and 6.1% "other", while the corresponding figures for the Czech Republic are 54.8% agricultural, 34.4% forest and 10.8% "other": land structure is therefore very similar.

IV. EVOLUTION OF NATIONAL WEALTH AND ITS COMPONENTS IN GREECE

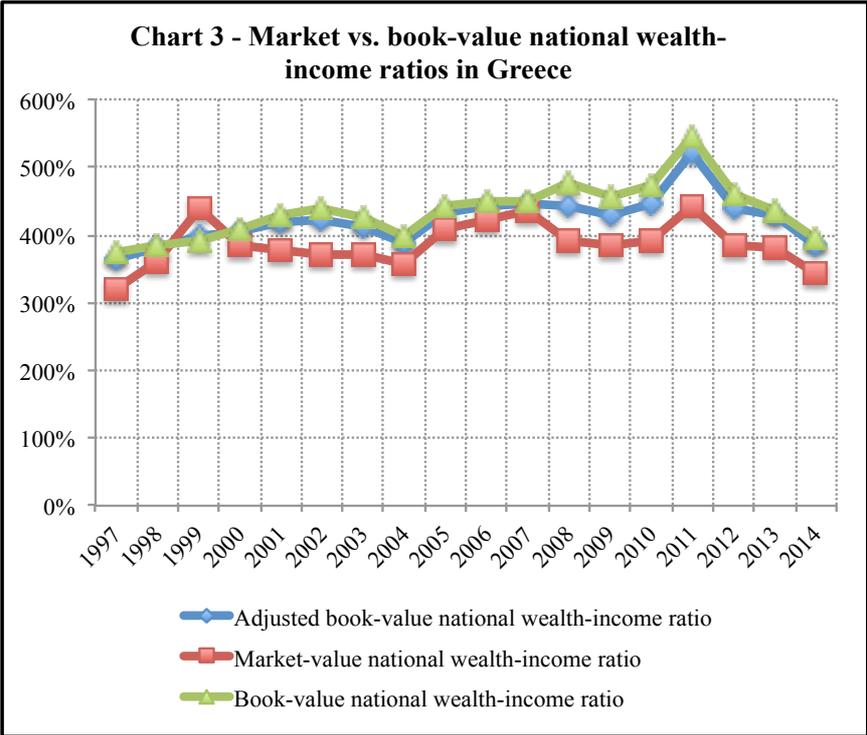
National wealth series. Turning now to the resulting national wealth series, I highlight a slight increase in the national wealth-income ratio over our period of interest, regardless of the definition of national wealth (market- or book-value) adopted (see chart 3). Specifically, the book-value national wealth-income ratio increased from 373 percent in 1997 to 394 percent in 2014 (6 percent increase), while the market-value national wealth-income ratio increased from 320 percent to 344 percent (7.5 percent increase).⁴⁹ In addition, two periods are clearly distinguishable in the series: between 1997 and 2011, the book- and market-value national wealth-income ratio increased respectively from 373 percent and 320 percent to 547 percent and 442 percent (47 percent and 38 percent increase)⁵⁰, before decreasing to 394 percent and 344 percent at the end of 2014 (28 percent and 22 percent decrease). The crisis has therefore led to a marked decline in the Greek national wealth-income ratio: in spite of the well-known contraction of national income from 2009 onwards, national wealth has declined

aircraft etc.) and 9 percent of non-residential buildings (offices and historical monuments), the remaining 3 percent consisting of dwellings (representational housing for civil servants and social housing) and R&D.

⁴⁹ For the sake of completeness, I also report in chart 3 the adjusted book-value national wealth-income ratio (see Appendix n°5 for details regarding the computation).

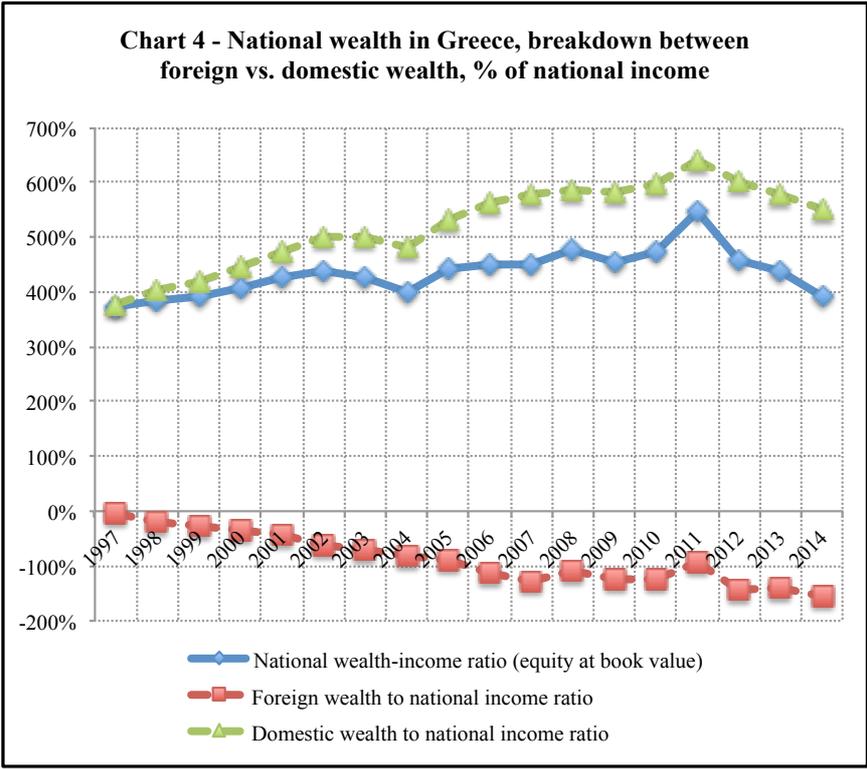
⁵⁰ The increase is almost continuous in the book-value case, whereas in the market-value case, large market fluctuations of stock prices such as the dot-com bubble and the subsequent crash, as well as the 2008 global crash, generate more variations.

even more sharply. As evidenced also by the U.S. case (see World Wealth and Income Database by Alvaredo, Atkinson, Piketty and Saez), profound and prolonged financial crises seem to destroy relatively more wealth than income.



Foreign and domestic wealth. More specifically, the breakdown of the Greek national wealth into its foreign and domestic components shows that the accumulation of domestic capital has been the key driver of national wealth during the whole period (chart 4). Between 1997 and 2011, the rise in the national wealth-income ratio was indeed driven by the rise in the domestic-wealth income ratio, while, starting from 2012, the decline in the national wealth-income ratio has been mostly driven by the decline in the value of the domestic capital stock. However, one of the key developments of the 1997-2014 period is the parallel accumulation by Greece of a very sizable negative net foreign asset position, from -4 percent of national income in 1997 to -156 percent at the end of 2014. Hence, compared to the rise in the value of the domestic capital stock, the rise in the national wealth-income ratio was limited over 1997-2011 by the almost continuous build-up of large external imbalances from -4 percent of national income in 1997 to -92 percent at the end of 2011. And then, from 2012 onwards, the decrease in the national wealth-income ratio has been reinforced by the further decline in net foreign assets from -92 percent of national income to -156 percent at the end of

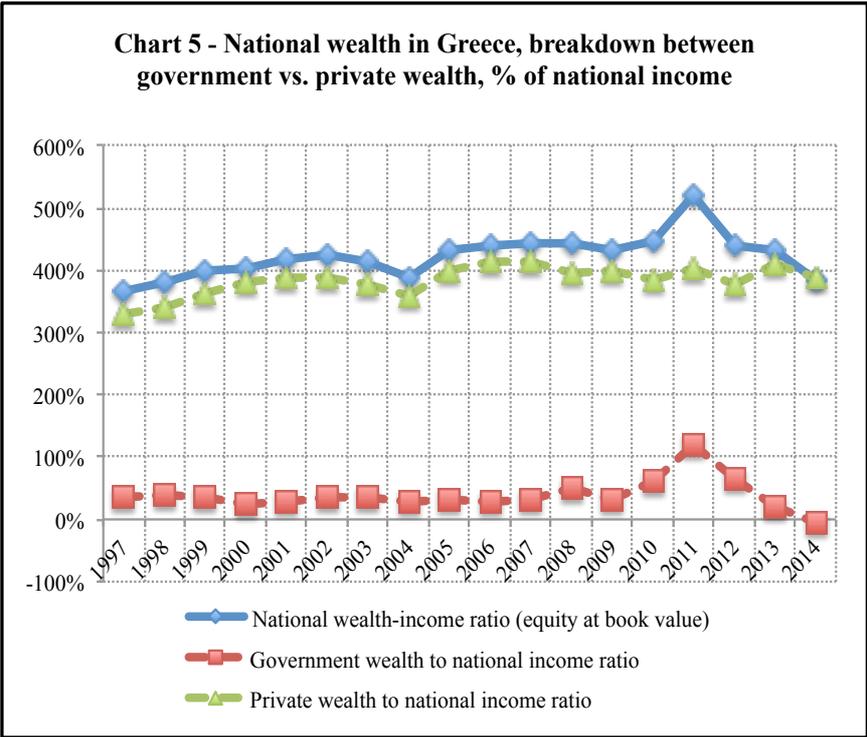
2014. By comparison to other high-income countries, the magnitude and deepening of the Greek external imbalance is unique over the period (see Appendix n°10).⁵¹



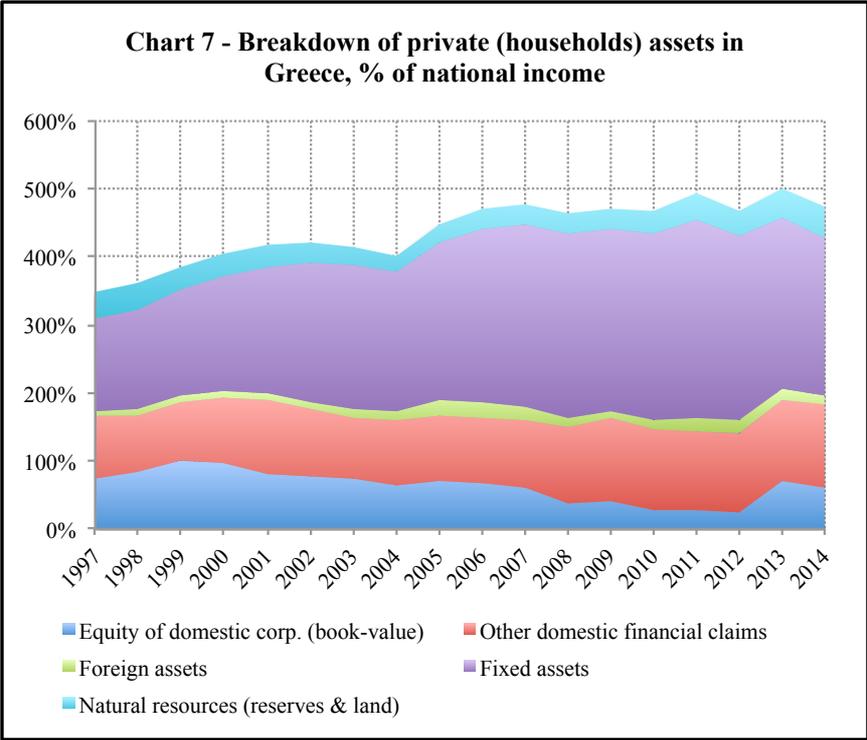
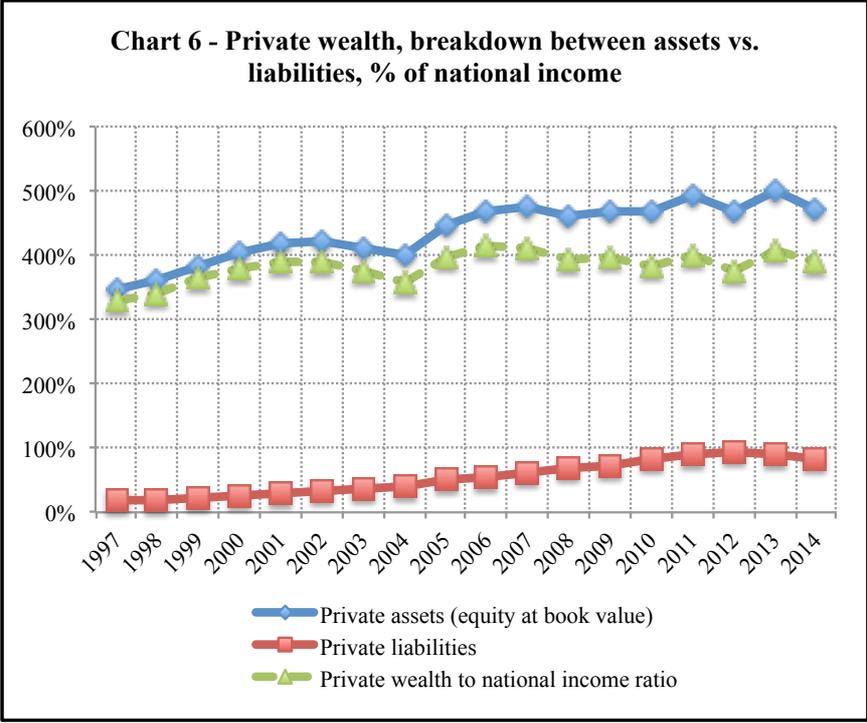
Government and private wealth. Furthermore, the evolution of private and government wealth also presents interesting patterns. The Greek private wealth-income ratio gradually increased over 1997-2006 from 329 percent to 414 percent (26 percent increase) but has broadly stagnated ever since. Importantly, the government wealth has remained positive during the whole period in spite of the notorious increase in public debt. The government wealth-income ratio rose from 35 percent in 1997 to a record level of 119 percent in 2011, before abruptly declining during the crisis and reaching -5 percent of national income at the end of 2014. Due to this inverted V-shaped pattern, the rise in the national wealth-income ratio over 1997-2014 can be fully attributed to the rise in the private wealth-income ratio. However, during the crisis, the fluctuations of the national wealth-income ratio have been almost entirely driven by the evolution of government wealth. A breakdown of market-value (instead of book-value) national wealth between its private and government components can

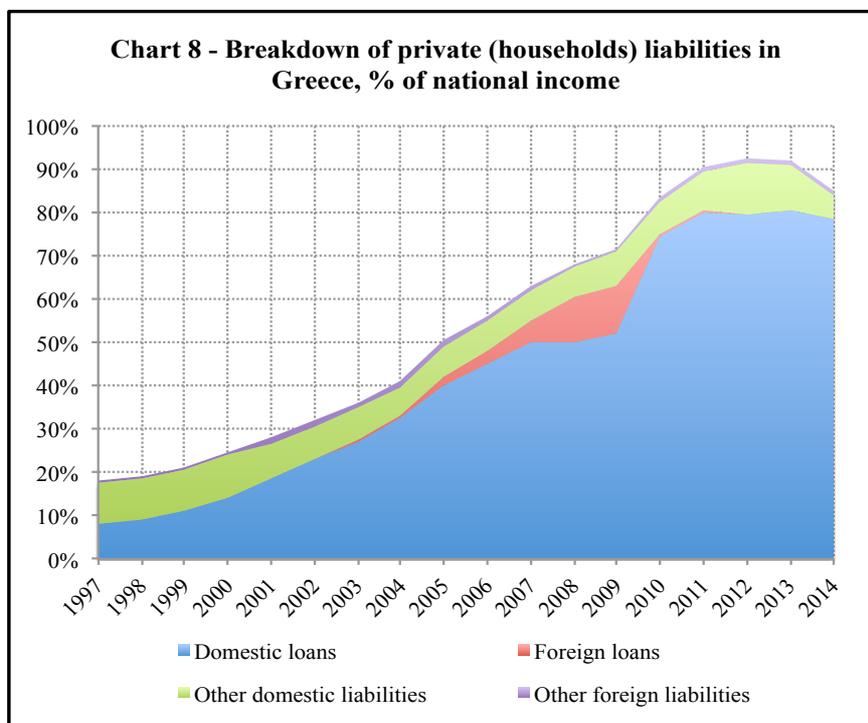
⁵¹ For instance, the well-known and debated external imbalance of the U.S. was only of -28 percent of national income back in 2013, while it reached -139 percent of national income in Greece at the same moment. It is important to bear in mind these orders of magnitude when thinking about Greece in order to realize how important the developments on the net foreign asset position are over the last two decades.

be found in Appendix n°11. We observe the same trend for government wealth but more fluctuations in private wealth due to stock market movements.



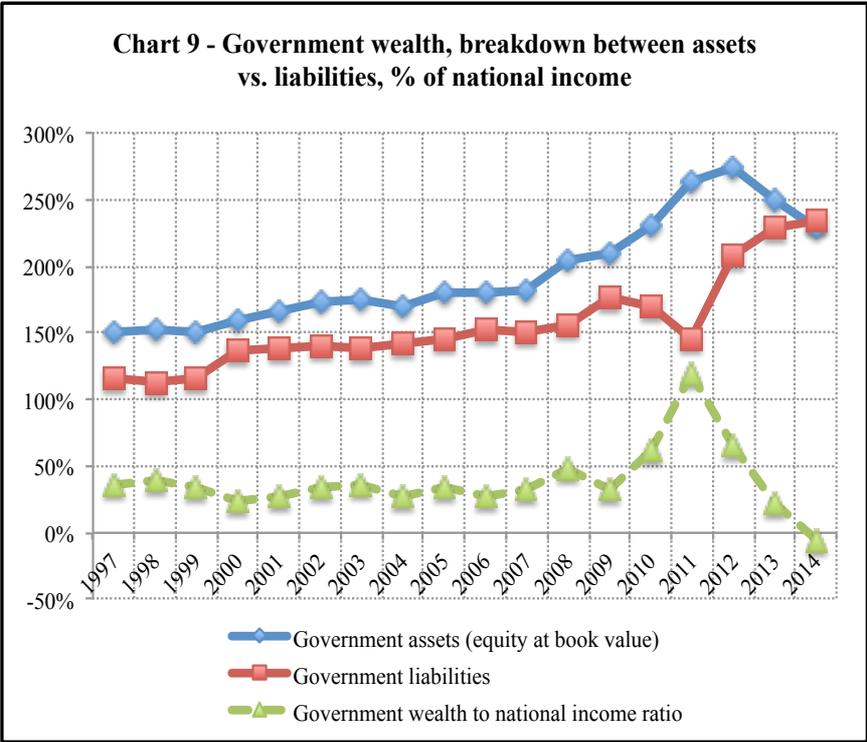
Private assets and liabilities. Now, a closer look at the composition of private wealth broken down between assets and liabilities reveals interesting findings. The private wealth-income ratio has increased over 1997-2006 because the value of private assets rose more rapidly than the value of private liabilities. Since the beginning of the crisis, the ratios of private assets and liabilities over national income have broadly stagnated, around 480 percent of national income for private assets and 90 percent of national income for private liabilities. When looking more specifically at the breakdown of assets and liabilities of households by asset classes, we observe that the increase in the value of private assets before the crisis was supported by the increase in the value of fixed assets (notably dwellings in the case of households, see Appendix n°8), while the increase in private liabilities essentially came from loans granted by domestic banks. Amid a real estate bubble (see Appendix n°7), households borrowed from banks to invest in housing.



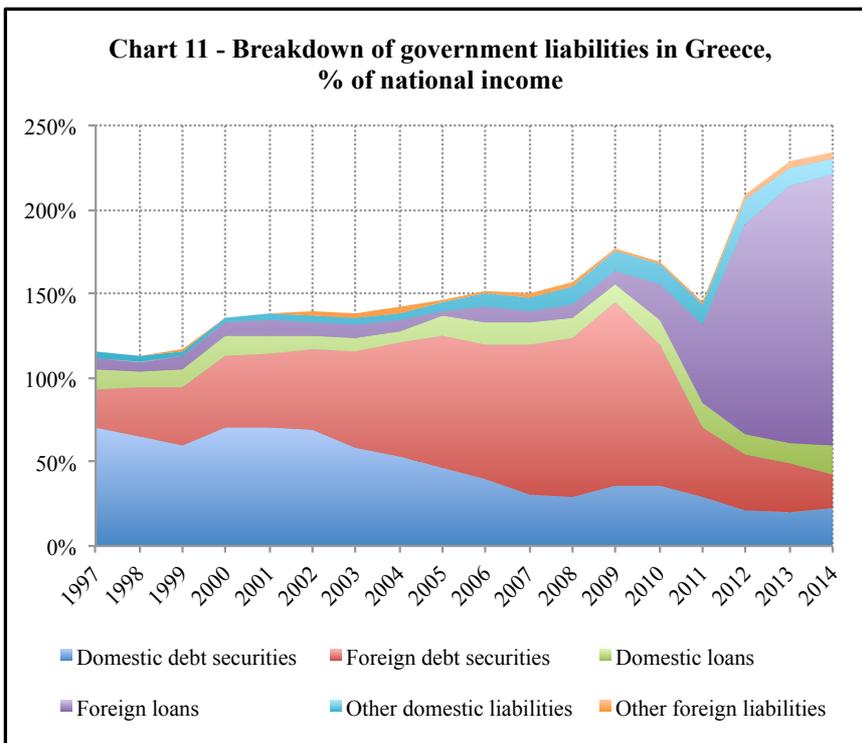
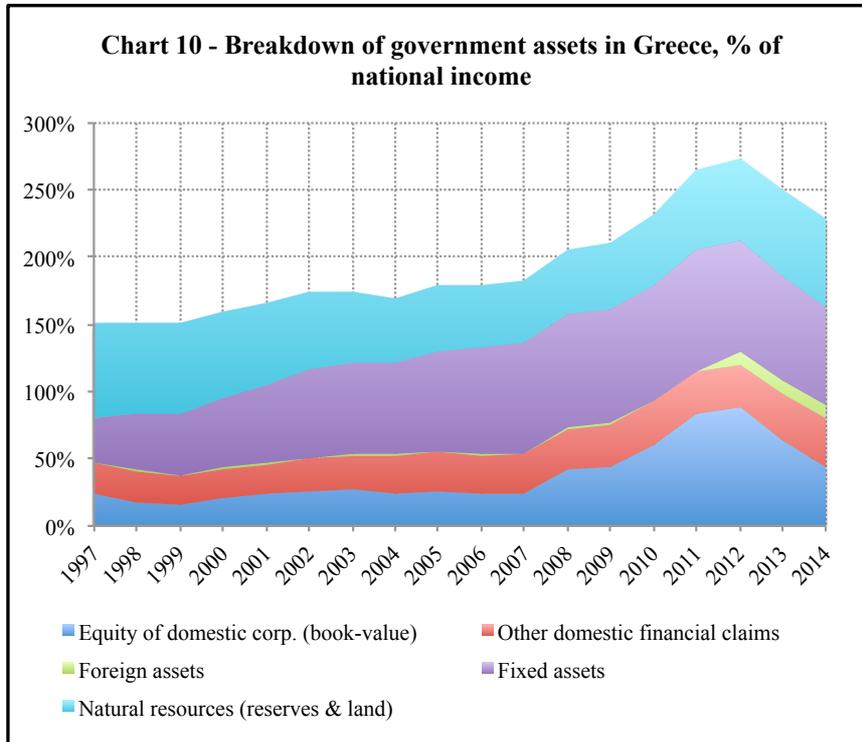


Government assets and liabilities. Focusing on the composition of government wealth, we notice that the increase in public debt was accompanied by an equivalent increase in public assets until 2009. Then, the marked increase in the government wealth-income ratio in 2010 and 2011 can be attributed to the steady increase in the value of government assets and to the decline in the value of public debt. Finally, the subsequent strong decline in the government wealth-income ratio in 2012-2014 has been triggered by the increase in public debt following the official bailouts and by the decline in the value of government assets starting from 2013. The breakdown of government assets and liabilities by asset classes displayed in chart 10 and 11 allows better understanding these trends. Chart 10 shows that, before the crisis, it is essentially the value of fixed assets (mostly other structures, non-residential buildings and weapon systems for the government cf. Appendix n°8) that increased very significantly from 34 percent of national income in 1997 to 82 percent in the end of 2007 (141 percent increase). Conversely, the value of domestic financial claims, including equity claims on domestic corporations, and natural resources remained broadly stable or slightly decreased. But at the beginning of the crisis between 2008 and 2012, the value of equity holdings in domestic corporations markedly increased, thereby suggesting that the previously highlighted increase in the value of government assets at the beginning of the crisis was actually due to the public

bailout of domestic banks or other corporations.⁵² Regarding liabilities, most of the public debt was made of debt securities up until 2011. The share of debt securities held by the rest of the world gradually increased up until the crisis at the expense of securities held by residents. For instance, domestic and foreign entities respectively owned 70 and 24 percent of national income in the form of government debt securities in 1997, while the corresponding 2009 figures were of 36 and 109 percent. Starting from 2010 and until the early 2012 sovereign debt restructuring (Private Sector Involvement), the market value of public debt sharply decreased amid a massive sell-off of debt securities by foreign investors. With the implementation of the country’s successive bailouts, public debt ultimately started increasing again starting from 2012. We observe in chart 11 a clear substitution of debt securities owned by the rest of the world by official foreign loans. The value of public debt has not stopped growing since 2012.

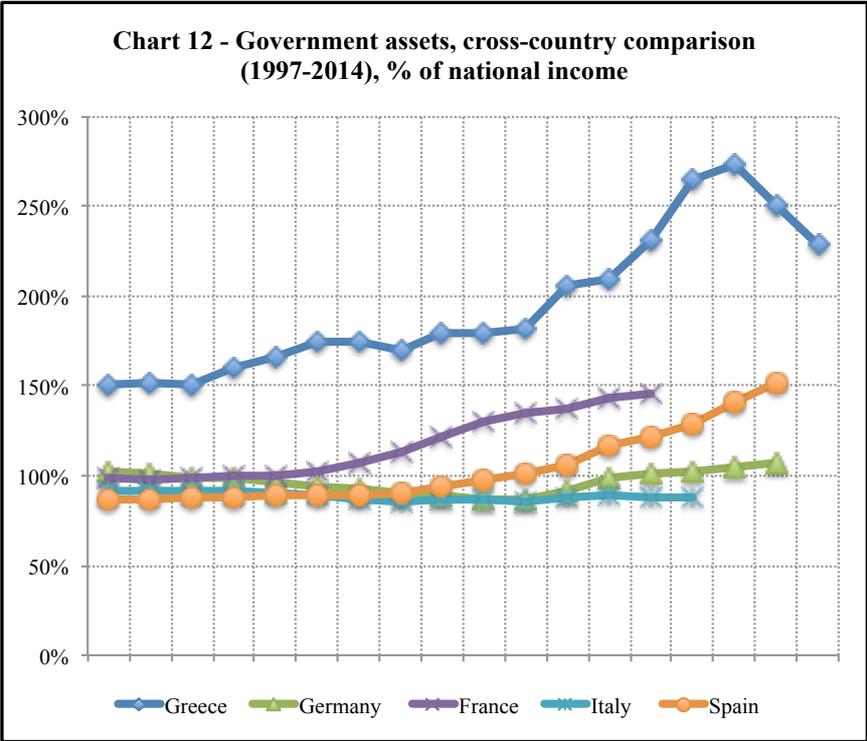


⁵² The Hellenic Republic bank support plan was implemented at the end of 2008. In 2009, the top four Greek banks alone issued €2.6bn of redeemable preference shares that were purchased by the government in exchange of an equal amount of government bonds (see Appendix n°12). It is also possible that the government implicitly bailed out other corporations (i.e. non-financial ones) by buying shares at the time. Note that the increase in the value of equity holdings as a percentage of national income is more visible when equity is valued at book rather than market value (cf. Appendix n°11 for the market value case) because the market value rapidly declined during the crisis following the stock market crash.

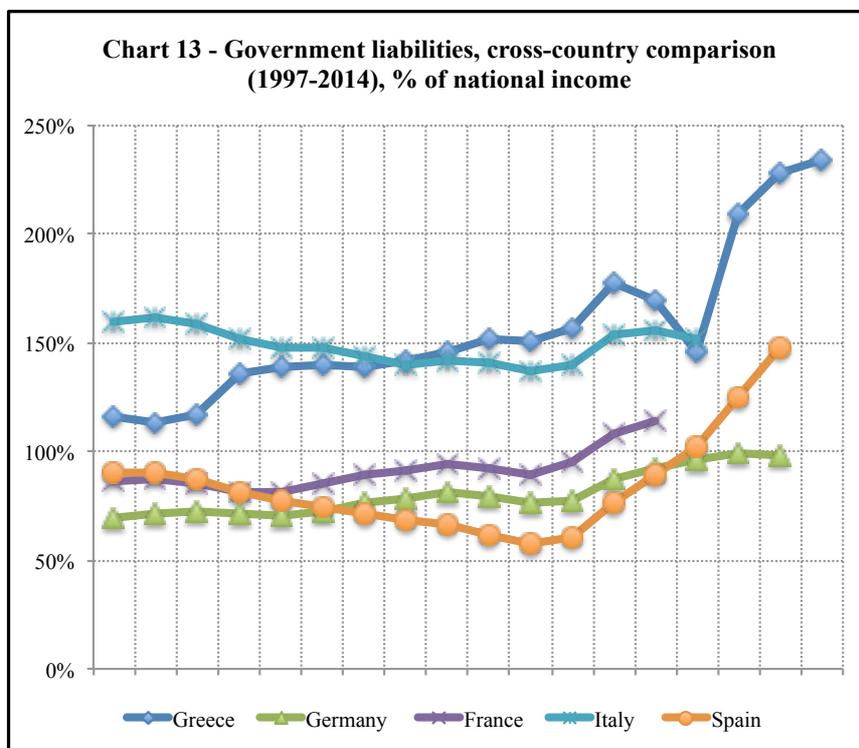


Cross-country perspective. Putting the Greek government wealth in a cross-country perspective throughout the period reveals that the latter has consistently been one of the highest among the main euro area countries in spite of the larger public debt increase that took

place in the country (see chart 12 and 13).⁵³ The ratio of government assets to national income was significantly higher in Greece than in any major member state of the euro area at the beginning of the period and was on an upward trend until 2012, so that the gap with respect to other countries widened significantly. The high concentration of assets in government hands - or put differently the large size of the public sector in terms of ownership of assets - is a very unique characteristic of Greece among the main countries of the euro area that has not been documented so far.



⁵³ For countries other than Greece, data on government assets and liabilities come from the World Wealth and Income Database (WID) of Alvaredo, Atkinson, Piketty and Saez.



Key takeaways. I have highlighted a marked increase in the national-wealth income ratio between 1997 and 2011 followed by a sharp decline thereafter. This inverted U-shaped pattern was supported first by the increase in the value of private fixed assets before the crisis and of equity holdings by the government at the beginning of the crisis, and then by a decline in the value of government equity holdings as well as of public and private fixed assets. During these two periods, the accumulation of a sizable net foreign asset position first limited the increase in national wealth, and then amplified its drop. Finally, in spite of the notorious increase in public debt, the government wealth has remained positive throughout the whole period except in 2014 due to the accumulation of many public assets. Also, variations in government wealth have driven large fluctuations in the national wealth-income ratio during the crisis period.

V. DYNAMICS OF NATIONAL WEALTH ACCUMULATION

Setting. At this stage, we need to investigate the patterns exhibited by the previous series in order to better understand the dynamics of national wealth accumulation before and during the crisis. Ultimately, the aim is to rationalize the unsustainable macroeconomic dynamics that led to the crisis and then to analyze how the external adjustment has occurred during the

crisis. I consider four time periods: the whole period (1997-2014), as well as three sub-periods, namely the pre-euro area period (1997-2000), the euro area pre-crisis period (2001-2007), and finally the crisis period (2008-2014). Following Piketty and Zucman (2014), I use a standard accounting identity to break down national wealth accumulation into a volume (saving/investment-induced) and a relative price (real capital gains/losses-induced) effect. By doing so, the idea is to focus on the *real* drivers of the evolution of national wealth, thereby neutralizing the impact of variations in the average price of consumption goods.⁵⁴ Denote Wn_t the value of national wealth at the end of period t , Sn_{t+1} the flow of net (of depreciation) national saving that adds to national wealth between the end of period t and the end of period $t+1$ and qn_{t+1} the real rate of capital gains or losses on national wealth between the end of period t and the end of period $t+1$. The accumulation of national wealth is simply given by the following equation:

$$Wn_{t+1} = (1 + qn_{t+1})(Wn_t + Sn_{t+1}) = (1 + qn_{t+1})(1 + \frac{Sn_{t+1}}{Wn_t})Wn_t$$

where $\frac{Sn_{t+1}}{Wn_t}$ is the saving/investment-induced real growth rate of national wealth or, put differently, the real growth rate of national wealth that would have prevailed as a result of new net national saving in the absence of real capital gains or losses (i.e. when $1 + qn = 1$, where qn is the capital gains/losses-induced real growth rate of national wealth). In this framework, I assume that the flow of new national saving that accrues between the end of period t and the end of period $t+1$ is affected by capital gains or losses realized between the two periods. By definition, national saving is equal for each period to the sum of saving done by households, retained earnings of corporations and the budget balance of the government net of public investments.⁵⁵ It reflects the level of *national* resources available for investment in capital assets. At the total economy level, saving equals investment, so that for each period

⁵⁴ Thus, to calculate real growth rates and derive real domestic currency returns of capital gains or losses, I express the previous series on wealth, income and saving/investment in constant domestic currency prices. As reference price index for consumption goods, I use the national income deflator (or equivalently the GDP deflator). The national income deflator is computed using the national income series expressed in current and 2010 prices in the AMECO database. One could alternatively use a consumer price index. As reported in Appendix n°7, the national income deflator and the harmonized consumer price index (all items) of the European Commission follow the same trend over our period of interest.

⁵⁵ The total budget balance of the government is equal to its total revenue minus its total expenditure. Public investment flows are part of total expenditure. The gross or net saving of the government is therefore equal to the budget balance net of gross or net public investment flows.

the gross (or net) capital formation is equal to the gross (or net) national saving minus lending to the rest of the world plus borrowing from the rest of the world.⁵⁶ Hence:

$S_t + I_t = Sn_t$ where I_t and S_t respectively denote the net capital formation (gross capital formation minus consumption of fixed capital) and net lending/borrowing to/from the rest of the world at the total economy level⁵⁷ between the end of period t-1 and the end of period t.

Dividing by national income and denoting g_{t+1} the real growth rate of national income between the end of period t and the end of period t+1, we have:

$$\beta n_{t+1} = \frac{(1+qn_{t+1})(1+\frac{Sn_{t+1}}{Wn_t})}{1+g_{t+1}} \beta n_t$$

$$\text{with } g_{t+1} = \frac{Y_{t+1}-Y_t}{Y_t}$$

and $\beta n_t = \frac{Wn_t}{Y_t}$ the national wealth-income ratio.

Cumulating over n years, we obtain a multiplicative breakdown of national wealth accumulation:

$$\beta n_{t+n} = \frac{(1+qn)^n (1+\frac{Sn}{Wn})^n}{(1+g)^n} \beta n_t$$

with $\prod_{i=0}^{n-1} (1 + \frac{Sn_{t+i+1}}{Wn_{t+i}})$ the cumulated saving/investment-induced real growth rate of national wealth

$\prod_{i=0}^{n-1} (1 + qn_{t+i+1})$ the cumulated capital gains or losses-induced real growth rate of national wealth

⁵⁶ This is an open economy setting. Note that I purposefully omit here the net capital transfers to/from the rest of the world which are negligible as a percentage of national income in our case. For any period, gross saving is exactly equal to the gross capital formation plus net capital inflows from the rest of the world and changes in foreign reserves.

⁵⁷ The balance of payments data enable to compute the net lending/borrowing to/from the rest of the world for each period as the sum of the current account balance plus the net foreign capital transfers plus the net errors and omissions (this is equal to the financial account of the balance of payments, i.e. the net acquisition of financial assets less net disposals of financial liabilities).

and $(1+g)^n = \frac{Y_{t+n}}{Y_t}$ the cumulated real growth rate of national income.

Thus, the real growth rate of national wealth can be systematically broken down over any period of time into a saving/investment-induced component and into a real capital gains/losses-induced component.⁵⁸

Quality of capital gains/losses estimates. As a caveat, I stress that real capital gains or losses can only stem from asset price fluctuations or exchange rate movements above or below the variations in the price of consumption goods.⁵⁹ By construction, they are estimated as residuals for each period according to:

$$qn_{t+1} = \left(\frac{\beta n_{t+1}}{\beta n_t} * \frac{1+g_{t+1}}{1+\frac{Sn_{t+1}}{Wn_t}} \right) - 1$$

So the quality of those estimates depends on the quality of the series on net national saving, or alternatively on the quality of the gross capital formation, consumption of fixed capital and balance of payments data.⁶⁰ Indeed, if saving/investment or capital depreciation flows are imperfectly recorded compared to the value of stocks, the estimates of capital gains or losses will *de facto* incorporate measurement errors.⁶¹

Breakdown of national wealth accumulation. Table 3 details the first breakdown of national wealth accumulation over the periods of interest. It shows that, before the crisis, large

⁵⁸ Technically, the saving/investment- and capital gains/losses-induced real growth rates of national wealth that explain the observed annual series expressed in constant domestic currency prices are calculated for each period and then cumulated to get the average annual real growth rates over the four periods of interest.

⁵⁹ Hence, one must have in mind the distinction between the real rate of capital gains or losses of an asset and its yield, which is solely related to the investment or capital income earned on the asset independently of any price variation. The total return of an asset is then the sum of its yield and its rate of capital gains/losses.

⁶⁰ Data on gross capital formation and consumption of fixed capital come from the AMECO database and balance of payments data from the Bank of Greece statistics department. All series comply with the ESA 2010 methodology. National accounts (SNA/ESA) and balance of payments data (IMF Balance of Payments Manual) are in theory fully harmonized in terms of coverage and accounting rule.

⁶¹ One of the main reasons why saving flows might be underestimated is because they do not include research and development (R&D is indeed considered as intermediate consumption). But, R&D flows being very small in Greece throughout the period (between -0.1 percent and 0.5 percent of national income cf. Appendix n°13), including R&D in the national saving series is unlikely to change the magnitude of real capital gains found in this paper. Note also that the advantage of using the perpetual inventory method for the computation of the domestic capital stock over time, as I did previously, is that one directly derives stocks from flow data, thereby minimizing the margin of error compared to a pure market-value series of domestic capital that would have been obtained by census-like methods and from whom saving flows could have been disconnected if badly recorded.

real capital gains of respectively 3.6 and 3.5 percent a year on average over 1997-2000 and 2001-2007 explained the bulk of the real increase in national wealth (61 percent over 1997-2000 and 73 percent over 2001-2007). During the crisis, real capital losses of 4.8 percent a year on average have accounted for 73 percent of the real decline in national wealth (6.7 percent a year on average). Over the whole period (1997-2014), cumulated real capital losses during the crisis have slightly exceeded real capital gains before the crisis, so that in the absence of positive net saving/investment flows, we would have had a drop in the real value of national wealth instead of a slight increase by 0.1 percent a year on average. All in all, it is worth noting that, over the last seventeen years, real capital gains/losses on the one side, and net investment flows on the other, played virtually no role in the accumulation of national wealth. The crisis has not only involved the bursting of the bubble, but has also destroyed the entire wealth accumulated through new investments since the late 1990s. In retrospect, the role of real capital gains and then real capital losses appears of paramount importance to explain the overall dynamics of national wealth accumulation over 1997-2014. This points to the fact the country's growth before the crisis was purely artificial, namely driven by an asset price bubble. In a nutshell, the last two decades are almost "lost decades" for Greece with respect to wealth creation.

	Decomposition of national wealth (% of national income)		Decomposition of the real growth rate of national wealth		
	Beginning of period value	End of period value	Average annual real growth rate (<u>A</u>)+(B)	Saving/investment-induced annual average real growth rate (<u>A</u>)	Capital gains/losses-induced annual real growth rate (<u>B</u>)
Greece whole period (1997-2014)	373%	394%	0.1%	0.2% <i>187%</i>	-0.1% <i>-87%</i>
Greece pre-Euro Area (1997-2000)	394%	408%	6%	2.4% <i>39%</i>	3.6% <i>61%</i>
Greece Euro Area pre-crisis (2001-2007)	408%	451%	4.8%	1.3% <i>27%</i>	3.5% <i>73%</i>
Greece Euro Area crisis (2008-2014)	451%	394%	-6.7%	-1.8% <i>27%</i>	-4.8% <i>73%</i>

Source: author's computations

Notes: the table reads as follows: the real growth rate of national wealth in Greece over a given period has been X% a year on average over the period and can be decomposed into a Y% saving/investment-induced wealth growth rate and a Z% capital gains-induced wealth growth rate. Thus, by construction: X%=Y%+Z%. Besides, the table also highlights in italics the share of total wealth growth coming from saving/investment vs. capital gains/losses.

VI. BREAKDOWN OF NATIONAL WEALTH ACCUMULATION BETWEEN DOMESTIC CAPITAL AND NET FOREIGN ASSETS

Setting. With these preliminary findings in mind, we can now begin examining the national wealth accumulation at a finer level. To do so, I suggest breaking down national wealth into its domestic and foreign components.

$$\beta n_{t+1} = \frac{(1+q_{t+1})(1+\frac{I_{t+1}}{W_t})}{(1+g_{t+1})} \beta_t + \frac{(1+r_{t+1})(1+\frac{S_{t+1}}{NFA_t})}{(1+g_{t+1})} nfa_t$$

q_{t+1} and r_{t+1} are respectively the real returns of capital gains or losses on domestic capital and net foreign assets between the end of period t and the end of period t+1

$Wn_t = W_t + NFA_t$ where W_t and NFA_t denote respectively the domestic capital stock and the net foreign asset position of the country at the end of period t

$\beta n_t = \beta_t + nfa_t$ where β_t and nfa_t are the domestic and foreign wealth to national income ratios.

In order to obtain the respective contributions of the accumulation of domestic capital and of net foreign assets to national wealth accumulation, the investment/saving- and capital gains/losses-induced growth rates on domestic and foreign wealth can be adjusted, as follows:

With respect to the investment/saving-induced wealth growth rates:

$$Sn_{t+1} = I_{t+1} + S_{t+1}$$

$$\frac{Sn_{t+1}}{Wn_t} = \frac{I_{t+1}}{Wn_t} + \frac{S_{t+1}}{Wn_t}$$

$$\frac{Sn_{t+1}}{Wn_t} = \frac{W_t}{Wn_t} * \frac{I_{t+1}}{W_t} + \frac{NFA_t}{Wn_t} * \frac{S_{t+1}}{NFA_t}$$

and to the capital gains/losses-induced wealth growth rates:

$$q_{t+1} = \frac{W_{t+1}}{W_t + I_{t+1}} - 1$$

$$r_{t+1} = \frac{NFA_{t+1}}{NFA_t + S_{t+1}} - 1$$

$$qn_{t+1} = \frac{Wn_{t+1}}{Wn_t + Sn_{t+1}} - 1$$

$$\text{so that } qn_{t+1} = \frac{W_t + I_{t+1}}{Wn_t + Sn_{t+1}} q_{t+1} + \frac{NFA_t + S_{t+1}}{Wn_t + Sn_{t+1}} r_{t+1}$$

Role of foreign and domestic wealth. Table 4 presents the relative contributions of net foreign assets and domestic capital to the accumulation of national wealth. I find that the large pre-crisis real capital gains came entirely from the stock of domestic capital goods and were partially offset by real capital losses on net foreign assets. In other words, the real capital gains, which (artificially) inflated the value of national wealth in Greece before the crisis, are fully attributable to the real estate bubble that affected the country since the mid-1990s (see Appendix n°7). Besides, in addition to the real capital losses on the country's net foreign asset portfolio, the rise in external indebtedness during the decade preceding the crisis (1997-2007) was sustained, in roughly similar proportion, by net borrowings from the rest of the world. At the same time, the stock of domestic capital goods increased as a result of positive net (of capital depreciation) investment flows, which had nonetheless a smaller impact on national wealth accumulation than real capital gains on domestic assets. In short, the investment in overvalued domestic capital goods was sustained before the crisis by net borrowings from the rest of the world, while real capital losses on net foreign assets worsened the country's external position.

During the crisis, in spite of persistent net borrowings from the rest of the world, Greece has managed to stabilize its external imbalance *in real terms* thanks to large real capital gains on its external portfolio. The latter have therefore played a crucial role in the external adjustment dynamics and mitigated the drop in the real value of national wealth. These real capital gains have nonetheless remained small compared to the real capital losses resulting from the crash in domestic real estate prices, so that, in total, national wealth has suffered from very substantial real capital losses over 2008-2014. Interestingly, real capital gains and losses on domestic capital *and* net foreign assets have followed opposite movements before and during the crisis. As a final remark, I stress that the net investment flows on domestic capital have also turned negative during the crisis, thus further strengthening the negative impact on

national wealth of new borrowings from the rest of the world (although in much smaller proportions).

	Decomposition of national wealth (% of national income)				Decomposition of the real growth rate of national wealth					
	Beginning of period value		End of period value		Average annual real growth rate (A)+(B)		Saving/investment-induced average annual real growth rate (A)		Capital gains/losses-induced average annual real growth rate (B)	
	Net foreign assets	Domestic capital	Net foreign assets	Domestic capital	Net foreign assets	Domestic capital	Net foreign assets	Domestic capital	Net foreign assets	Domestic capital
Greece whole period (1997-2014)	-4%	377%	-156%	549%	-1.9%	2%	-1.6%	1.8%	-0.3%	0.2%
	373%		394%		0.1%		0.2%		-0.1%	
Greece pre-Euro Area (1997-2000)	-4%	377%	-37%	444%	-3%	9%	-1.3%	3.6%	-1.8%	5.4%
	373%		408%		6%		2.4%		3.6%	
Greece Euro Area pre-crisis (2001-2007)	-37%	444%	-127%	577%	-3.6%	8.4%	-1.9%	3.2%	-1.6%	5.1%
	408%		451%		4.8%		1.3%		3.5%	
Greece Euro Area crisis (2008-2014)	-127%	577%	-156%	549%	0.2%	-6.9%	-1.4%	-0.4%	1.7%	-6.5%
	451%		394%		-6.7%		-1.8%		-4.8%	

Source: author's computations

Notes: the table reads as follows: the real growth rate of national wealth in Greece over a given period has been X% a year on average and can be decomposed into a Y% saving/investment-induced and a Z% capital gains/losses-induced growth rates (by construction. $X=Y+Z$). Besides, the table highlights the relative contribution of foreign and domestic wealth accumulation (depending respectively on net lending/borrowing to/from the rest of the world and on domestic net capital formation) to national wealth accumulation. Importantly, the reported real growth rates on net foreign assets and domestic capital are *adjusted* growth rates (taking into account the relative size of the respective stocks in national wealth) which means that they are not the respective growth rates of foreign and domestic wealth. Rather, they directly reflect the impact of foreign and domestic wealth growth on national wealth (e.g. between 1997 and 2014, national wealth has increased in real terms by 0.2% a year on average as a result of net positive real capital gains on domestic capital).

VII. THE ROLE OF THE GOVERNMENT VS. THE PRIVATE SECTOR IN NATIONAL WEALTH ACCUMULATION

Setting. So far, I have studied the accumulation of national wealth between domestic capital and net foreign assets at the total economy level. I find it now interesting to move at a more granular level, in order to investigate the role of the government and the private sector in this dynamics. The idea is to break down the accumulation of domestic capital and net foreign assets between sectors, which requires sectoral breakdowns of domestic investment flows (i.e. net capital formation) and foreign saving flows (i.e. net lending/borrowing to/from the rest of the world).⁶² The sectoral breakdown of net capital formation between the government, corporations and households was previously derived using the AMECO database (see Appendix n°6). Now, to obtain the sectoral breakdown of net lending/borrowing to/from the rest of the world, I draw on a non-public balance of payments dataset, which displays a breakdown of the country's financial account at a very disaggregated level (by asset classes

⁶² As a reminder, saving equals investment for each period at the total economy level, so that the distinction between saving and investment was up to now irrelevant for the accumulation of national wealth. But at the sectoral, the difference becomes crucial because the ones who save are not necessarily those who invest. As stated by Samuelson (1970), "The most important single fact about saving and investment activities is that in our industrial society they are generally done by different people and for different reasons."

and sectors).⁶³ Regarding external net lending/borrowing, I divide the economy into three main sectors: the government, financial corporations (including the central bank) and lastly households and non-financial corporations (see Appendix n°14).⁶⁴

$$I_t = I_t^{gov} + I_t^{corp} + I_t^{households}$$

$$S_t = S_t^{gov} + S_t^{fin.corp} + S_t^{NFCs \& household}$$

Sectoral breakdown of saving and investment. At this stage, some comments on the sectoral breakdowns of domestic investment and foreign saving flows are useful. As evidenced in Appendix n°6, the government took part almost continuously to the net capital formation by investing substantial amounts in domestic capital goods between 1997 and 2009 (3 percent of national income per year on average over this period - with low variance). At the same time, domestic investment by corporations steadily declined (3 percent of national income per year on average over 1997-2009 with a clear downward trend), while households invested more and more (6 percent of national income per year on average over 1997-2009 with a continuous upward trend up until 2007). At the height of the crisis, the net capital formation turned negative due to a decline in gross investment and a surge in capital depreciation notably for corporate assets (10 percent of national income per year on average for corporations during the crisis). Besides, the level of investment in domestic capital goods has been much higher than national saving over the entire period (1997-2014) and the gap between the two widened up until the crisis, as the level of national saving steadily declined and the level of investment remained broadly constant (see Appendix n°15). This implies that domestic investment has been largely (and increasingly up until the crisis) financed by external borrowings. Only corporations have exhibited a continuous track record of positive net saving over the whole period (see Appendix n°16). On the contrary, net saving of households became negative in 2000, and has remained so up to now, while the same has occurred for the government starting from 2003.

⁶³ The dataset was made available upon request by the Bank of Greece. Because the data only start in January 2001, I drop the 1997-2000 period, and thus restrict myself from now on to the analysis of wealth accumulation starting from the adoption of the single currency by Greece (January 2001).

⁶⁴ I stress that I have no choice but to merge households and non-financial corporations together because the detailed balance of payments data do not enable to separate the two sectors. Also, separating financial from non-financial corporations is not possible for the analysis of domestic capital accumulation because domestic investment flows are aggregated for corporations as a whole in the AMECO database. It is nevertheless pretty clear that net capital formation primarily concerns non-financial corporations.

Full breakdown of national wealth accumulation. The breakdown of the national wealth accumulation can be refined as follows:

$$\beta n_{t+1} = \frac{(1+q_{t+1}^{gov})(1+\frac{I_{t+1}^{gov}}{W_t^{gov}})}{(1+g_{t+1})} \beta_t^{gov} + \frac{(1+q_{t+1}^{corp})(1+\frac{I_{t+1}^{corp}}{W_t^{corp}})}{(1+g_{t+1})} \beta_t^{corp} + \frac{(1+q_{t+1}^{hous})(1+\frac{I_{t+1}^{hous}}{W_t^{hous}})}{(1+g_{t+1})} \beta_t^{hous} +$$

$$\frac{(1+r_{t+1}^{gov})(1+\frac{S_{t+1}^{gov}}{NFA_t^{gov}})}{(1+g_{t+1})} nfa_t^{gov} + \frac{(1+r_{t+1}^{fincorp})(1+\frac{S_{t+1}^{fincorp}}{NFA_t^{fincorp}})}{(1+g_{t+1})} nfa_t^{fincorp} +$$

$$\frac{(1+r_{t+1}^{nfc\&h})(1+\frac{S_{t+1}^{nfc\&h}}{NFA_t^{nfc\&h}})}{(1+g_{t+1})} nfa_t^{nfc\&h}$$

with:

$$\beta_t = \beta_t^{gov} + \beta_t^{corp} + \beta_t^{hous} = \frac{W_t^{gov}}{Y_t} + \frac{W_t^{corp}}{Y_t} + \frac{W_t^{hous}}{Y_t}$$

$$nfa_t = nfa_t^{gov} + nfa_t^{fincorp} + nfa_t^{nfc\&h} = \frac{NFA_t^{gov}}{Y_t} + \frac{NFA_t^{fincorp}}{Y_t} + \frac{NFA_t^{nfc\&h}}{Y_t}$$

and:

$$\frac{I_{t+1}}{W_t} = \frac{W_t^{gov}}{Wn_t} \frac{I_{t+1}^{gov}}{W_t^{gov}} + \frac{W_t^{corp}}{Wn_t} \frac{I_{t+1}^{corp}}{W_t^{corp}} + \frac{W_t^{hous}}{Wn_t} \frac{I_{t+1}^{hous}}{W_t^{hous}}$$

$$\frac{S_{t+1}}{NFA_t} = \frac{NFA_t^{gov}}{Wn_t} \frac{S_{t+1}^{gov}}{NFA_t^{gov}} + \frac{NFA_t^{fincorp}}{Wn_t} \frac{S_{t+1}^{fincorp}}{NFA_t^{fincorp}} + \frac{NFA_t^{nfc\&h}}{Wn_t} \frac{S_{t+1}^{nfc\&h}}{NFA_t^{nfc\&h}}$$

$$q_{t+1} = \frac{I_{t+1}^{gov} + W_t^{gov}}{Sn_{t+1} + Wn_t} q_{t+1}^{gov} + \frac{I_{t+1}^{corp} + W_t^{corp}}{Sn_{t+1} + Wn_t} q_{t+1}^{priv} + \frac{I_{t+1}^{hous} + W_t^{hous}}{Sn_{t+1} + Wn_t} q_{t+1}^{hous}$$

$$r_{t+1} = \frac{S_{t+1}^{gov} + NFA_t^{gov}}{Sn_{t+1} + Wn_t} r_{t+1}^{gov} + \frac{S_{t+1}^{fincorp} + NFA_t^{fincorp}}{Sn_{t+1} + Wn_t} r_{t+1}^{fincorp} + \frac{S_{t+1}^{nfc\&h} + NFA_t^{nfc\&h}}{Sn_{t+1} + Wn_t} r_{t+1}^{nfc\&h}$$

The role of the government vs. private sector. The breakdown of national wealth accumulation by sectors displayed in table 5 shows that the rise in external indebtedness

before the crisis was mostly driven, first of all, by net borrowings from the government and to a smaller extent from banks, and then, by real capital losses of all types of corporations and households on their net foreign asset portfolios. The non-financial corporations and households lent relatively more than they borrowed from the rest of the world but made significant real capital losses that worsened their net external position in real terms. By contrast, the government made zero real capital losses on its net foreign asset portfolio before the crisis: the rise in the public external indebtedness was thus fully driven by borrowing flows. Public investments in domestic capital goods funded by external borrowings increased the value of domestic capital roughly as much as corporate investments. About 60 percent of the growth of the domestic capital stock was nonetheless the result of households' investment in housing. For the government, real capital gains on capital goods were of similar magnitude as investment flows. But overall, the real estate bubble mostly benefitted corporations and above all households.⁶⁵

During the crisis, the government has continued to heavily borrow from the rest of the world. As a consequence, in spite of the reversal in the net foreign asset position of banks from net borrower to net creditor *vis-à-vis* the rest of the world, the country's net foreign asset position worsened as a result of financial transactions with the rest of the world. However, substantial real capital gains on net foreign assets for the government and non-financial corporations offset the negative effect of net external borrowings, thereby stabilizing the country's external imbalance in real terms. Negative net domestic investment flows of corporations have contributed to reduce the real value of national wealth but the bulk of the drop in national wealth has come from massive real capital losses on domestic capital goods (of which 17 percent providing from government assets, 25 percent from corporate assets and 58 percent from households' assets). The reader interested in visualizing the magnitude as well as the timing of cumulated real capital gains/losses by sectors should refer to Appendix n°17.

⁶⁵ On all real capital gains realized on domestic capital before the crisis, 13 percent come from the government, 27 percent from corporations and the remaining 60 percent from households.

Table 5 - Decomposition of national wealth accumulation in Greece (2001-2014): the role of net foreign assets and domestic capital

Breakdown by institutional sectors

	Decomposition of the real growth rate of national wealth																	
	Average annual real growth rate (A)+(B)						Saving/investment-induced average annual real growth rate (Δ)						Capital gains/losses-induced average annual real growth rate (B)					
	Net foreign assets			Domestic capital			Net foreign assets			Domestic capital			Net foreign assets			Domestic capital		
	Government	Financial corporations	Non-fin corporations & Households	Government	Corporations	Households	Government	Financial corporations	Non-fin corporations & Households	Government	Corporations	Households	Government	Financial corporations	Non-fin corporations & Households	Government	Corporations	Households
Greece Euro Area period (2001-2014)	-1.6%	-0.3%	0.3%	0.1%	-0.1%	0.6%	-2.2%	0.2%	0.3%	0.3%	0.1%	1%	0.6%	-0.5%	0%	-0.2%	-0.1%	-0.4%
	-1.7%			-1%			-1.7%			1.4%			0%			-0.7%		
Greece Euro Area pre-crisis (2001-2007)	-2.1%	-1.3%	-0.2%	1.3%	2.1%	5%	-2.1%	-0.5%	0.7%	0.6%	0.7%	1.9%	0%	-0.8%	-0.9%	0.7%	1.4%	3.1%
	-3.6%			4.8%			-1.9%			3.2%			-1.7%			5.2%		
Greece Euro Area crisis (2008-2014)	-1.1%	0.6%	0.8%	-1%	-2.2%	-3.6%	-2.2%	0.8%	-0.1%	0.1%	-0.5%	0.1%	1.2%	-0.2%	0.8%	-1.1%	-1.6%	-3.7%
	0.3%			-6.6%			-1.5%			-0.4%			1.8%			-6.5%		
	-6.6%			-6.6%			-1.9%			-1.9%			-4.7%			-4.7%		

Source: author's computations

Notes: the table reads as follows: the real growth rate of national wealth in Greece over a given period has been X% a year on average and can be decomposed into a Y% saving/investment-induced and a Z% capital gains/losses-induced growth rates (by construction: X%=Y%+Z%). Besides, the table highlights the relative contribution of foreign and domestic wealth (depending respectively on net lending/borrowing to/from the rest of the world and on net capital formation) to national wealth accumulation. In addition, saving/investment induced- and capital gains/losses-induced real growth rates on net foreign assets and domestic capital are systematically broken down between the government, financial corporations, non-financial corporations and households.

VIII. THE EXTERNAL ADJUSTMENT DYNAMICS

Setting. Finally, given the role of transactions with the rest of the world and real capital gains or losses on net foreign assets in the dynamics of national wealth accumulation, I believe it is necessary to further investigate the country's external adjustment dynamics on gross positions by sectors and asset classes. The detailed balance of payments dataset allows deriving the net external lending/borrowing flows at a disaggregated level, namely between gross external assets and liabilities. Thus, such data complement the gross external asset and liability positions in market value available in the country's official financial accounts and enable to compute the real capital gains/losses by disentangling the historical cost component from the valuation effect. I classify external assets/liabilities into three main categories, namely (i) equity and foreign direct investment,⁶⁶ (ii) debt securities and finally (iii) other debt assets/liabilities. The last category typically includes currency in circulation⁶⁷ and deposits, loans and trade credits. Importantly, inter-bank positions are part of deposits. Formally, the accumulation of net foreign assets depends on the accumulation of gross external assets and liabilities, which can be broken down, just like before, into a volume (saving) and relative price (real capital gains/losses) effect as follows:

⁶⁶ This category notably includes all types of shares. Note that most of FDI transactions involve equity but still some of them involve debt instruments. I include the latter in the equity category because it is not possible to identify them precisely.

⁶⁷ Currency in circulation refers to notes and coins that are issued or authorized by monetary authorities. It involves national and foreign currencies.

$$\text{NFA}_{t+1} = (1 + r_{t+1})(\text{NFA}_t + S_{t+1}) = (1 + r_{t+1}) \left(1 + \frac{S_{t+1}}{\text{NFA}_t}\right) \text{NFA}_t = A_{t+1} - L_{t+1}$$

with:

$$A_{t+1} = (1 + r_{t+1}^A) \left(1 + \frac{S_{t+1}^A}{A_t}\right) A_t$$

$$L_{t+1} = (1 + r_{t+1}^L) \left(1 + \frac{S_{t+1}^L}{L_t}\right) L_t$$

and thus:

$$\text{nfa}_{t+1} = a_{t+1} - l_{t+1} = \frac{(1+r_{t+1})\left(1+\frac{S_{t+1}}{\text{NFA}_t}\right)}{(1+g_{t+1})} \text{nfa}_t = \frac{(1+r_{t+1}^A)\left(1+\frac{S_{t+1}^A}{A_t}\right)}{(1+g_{t+1})} a_t - \frac{(1+r_{t+1}^L)\left(1+\frac{S_{t+1}^L}{L_t}\right)}{(1+g_{t+1})} l_t$$

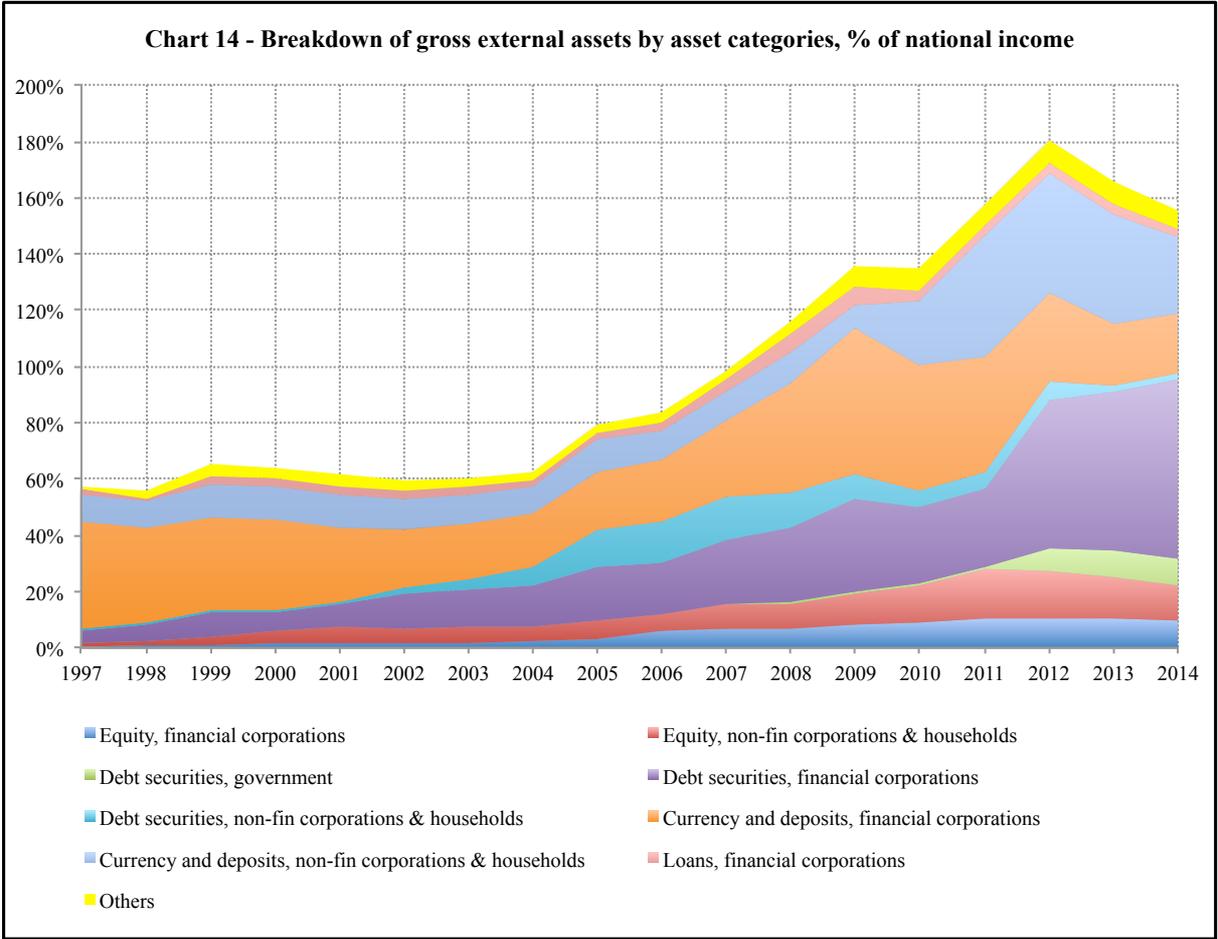
By construction, the real returns of capital gains/losses on external assets and liabilities are weighted sums of the real returns of capital gains/losses on each asset class.⁶⁸

Evolution of gross external positions. To motivate the study of the gross external asset and liability positions, I start by stressing that their relative composition by asset classes has significantly evolved over our period of interest (see chart 14 and 15). On the asset side, the share of foreign equity and debt securities in total external assets has increased significantly (notably the holdings of foreign debt securities by Greek banks), while the initially overwhelming share of other debt assets has decreased gradually except between 2007 and 2011. At a finer level, we see that the deposits of non-financial corporations and households abroad have markedly increased during the crisis. Ultimately, it is therefore the drying up of the interbank market that caused the decline in the share of other debt assets in total external assets.

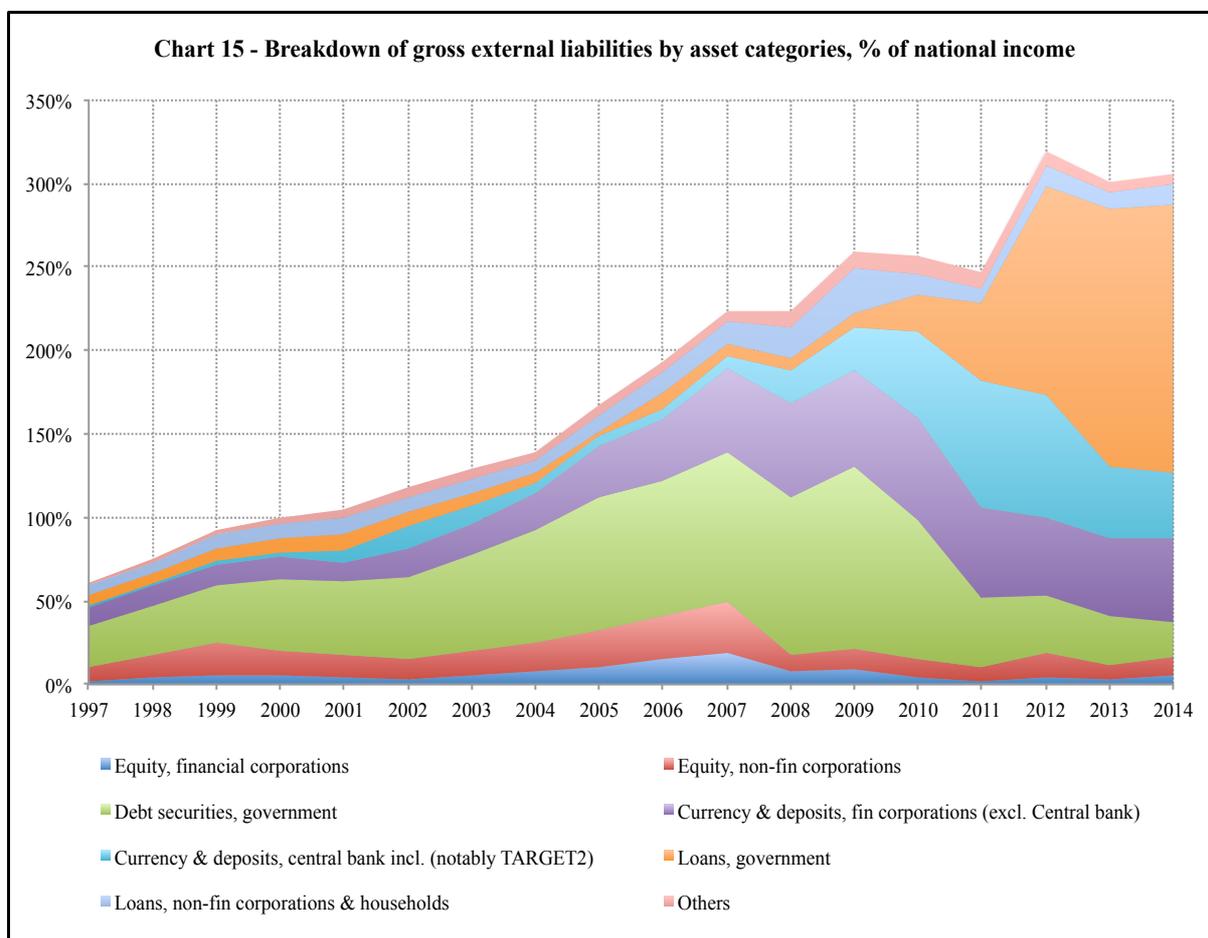
On the liability side, the key pre-crisis trends include (i) the increase in government debt securities owned by foreign investors and (ii) the rising dependence of the domestic banking sector on external funding *via* the interbank market. Then during the crisis, while the

⁶⁸ So the returns reported for gross external assets and liabilities are weighted according to the relative size of each asset class in the gross positions.

government’s successive bailouts have *de facto* replaced the Greek tradable public debt by official loans, the national central bank has also covered the flight of deposits by Greek households and domestic non-financial corporations - clearly visible in the gross external asset position with the increase of deposits abroad - together with the partial withdrawal of interbank deposits by foreign banks, by providing liquidity support to local banks (this is reflected in chart 15 by the increase in the TARGET2 debt⁶⁹). Thus, starting from 2010, the share of other debt liabilities has sharply increased in the gross external liability position and they nowadays account for 90 percent of total external liabilities.



⁶⁹ In Greece, the TARGET2 balance is negative, so that it is considered as an external debt. It is recorded in the currency and deposits category of the central bank’s balance sheet. One could nonetheless question this statistical convention. Is it really a debt? Many argue that it would only become one should Greece exit the monetary union (Whelan 2012). But even in this case, it does not have the characteristics of usual debt instruments: there is neither a requirement to repay nor a maturity date or a collateral. Should there be any repayment of the claim, it could be spread over a very long period of time. There is clearly an uncertainty here, which implies that the Greek external debt could be actually much lower (see chart 15).



Gross external assets. As highlighted in table 6, the gross external asset position of Greece has suffered from real capital losses of respectively 3 and 2.2 percent a year on average over the pre-crisis and crisis periods, while it kept growing at an average real growth rate of respectively 10.3 and 1.7 percent a year due to sustained positive net lending flows to the rest of the world. More specifically, during the pre-crisis period, the real capital losses on gross external assets were concentrated on other debt assets, primarily of financial corporations and secondarily of non-financial corporations and households. During the crisis period, it is mostly the equity and other debt assets abroad held by banks, as well as foreign debt securities held by households and non-financial corporations that supported the real capital losses. The losses incurred during the crisis on foreign equity and debt securities are likely due to downward changes in the market price of securities in the context of the global financial crisis. On the contrary, losses incurred before the crisis on other debt assets may be better explained by exchange rate fluctuations. Insofar as the “other debt assets” category includes claims whose value does not fluctuate on a market (currency in circulation, deposits, loans, trade credits etc.), the real capital losses may arise from the fact that these assets were

denominated in foreign currencies that depreciated against the euro.⁷⁰ Thus, foreign investments of households and corporations (in particular of banks) may have been badly monitored with respect to the exchange rate exposure and excessively concentrated on non-performing assets.⁷¹ Overall, the pattern of persistent real capital losses on gross external assets observed in Greece throughout such a long period of time (2001-2014) is particularly striking. Finally, regarding lending flows to the rest of the world, more than half correspond to purchases of foreign debt securities - notably by Greek banks - during both the pre-crisis and crisis period.

Table 6 - Accumulation of gross external assets in Greece (2001-2014) - breakdown by institutional sectors and asset classes

	Decomposition of the real growth rate of gross external assets																										
	Average annual real growth rate (A)+(B)									Saving-induced average annual real growth rate (A)									Capital gains/losses-induced average annual real growth rate (B)								
	Government			Financial corporations			Non-fin corporations & Households			Government			Financial corporations			Non-fin corporations & Households			Government			Financial corporations			Non-fin corporations & Households		
	Equity & FDI	Debt securities	Other debt assets	Equity & FDI	Debt securities	Other debt assets	Equity & FDI	Debt securities	Other debt assets	Equity & FDI	Debt securities	Other debt assets	Equity & FDI	Debt securities	Other debt assets	Equity & FDI	Debt securities	Other debt assets	Equity & FDI	Debt securities	Other debt assets	Equity & FDI	Debt securities	Other debt assets	Equity & FDI	Debt securities	Other debt assets
Greece Euro Area period (2001-2014)	0%	0.4%	0%	0.6%	3.4%	-0.7%	0.6%	1%	0.8%	0%	0.3%	0.1%	0.9%	3.1%	1%	0.4%	1.6%	1.2%	0%	0%	-0.1%	-0.3%	0.3%	-1.7%	0.2%	-0.6%	-0.4%
	0.4%			3.3%			2.3%			0.4%			5%			3.2%			0%			-1.7%			-0.9%		
	6%									8.6%									-2.6%								
Greece Euro Area pre-crisis (2001-2007)	-	0%	0%	1.2%	4.1%	0%	1%	3.7%	0.3%	-	0%	0%	1.3%	3.6%	2.6%	0.9%	3.5%	1.4%	-	0%	0%	-0.1%	0.5%	-2.6%	0.1%	0.1%	-1.1%
	0.1%			5.3%			5%			0%			7.5%			5.9%			0.1%			-2.2%			-0.9%		
	10.3%									13.4%									-3.0%								
Greece Euro Area crisis (2008-2014)	0%	0.7%	-0.1%	0%	2.7%	-1.3%	0.1%	-1.7%	1.2%	0%	0.7%	0.1%	0.4%	2.6%	-0.5%	-0.1%	-0.4%	1%	0%	0.1%	-0.2%	-0.4%	0.1%	-0.8%	0.2%	-1.3%	0.2%
	0.7%			1.3%			-0.3%			0.8%			2.5%			0.5%			-0.1%			-1.2%			-0.8%		
	1.7%									3.8%									-2.2%								

Source: author's computations

Notes: the table reads as follows: the real growth rate of gross external assets in Greece over a given period has been X% a year on average and can be decomposed into a Y% saving-induced growth rate and a Z% capital gains/losses-induced growth rate. Thus, by construction: X%=Y%+Z%. Besides, the table highlights the relative/respective contributions of the government, financial corporations (banks) and non-financial corporations & households to the accumulation of gross external assets. For each sector, the table also provides a breakdown of the impact of net lending to the rest of the world on the gross external asset position by asset classes (equity & FDI, debt securities and other debt assets which mainly include currency and deposits, loans and trade credits).

Gross external liabilities. As shown in table 7, borrowings from the rest of the world in the form of government debt securities increased the gross external liability position of Greece at an average real rate of 7.7 percent a year over 2001-2007. Most of other external borrowings were in the form of equity issued by corporations (both financial and non-financial) and other debt liabilities of financial corporations (note that this corresponds to external funding on the interbank market cf. chart 15 above). Interestingly, external borrowings by Greek corporations (both financial and non-financial) in the form of debt securities have remained

⁷⁰ Note that in theory it could be possible to observe real capital gains or losses on loans independently of exchange rate movements because statisticians record a “market value” of loans by subtracting to the nominal value of loans the loan loss provisions. However, it seems quite unlikely in the pre-crisis environment that capital losses are attributable to a surge in loan loss provisions.

⁷¹ It might be that such investments are nonetheless profitable in spite of the real capital losses. Indeed, we do not observe the yields of these assets because the balance of payments data do not enable to calculate them at such a level of detail. However, as other debt assets generally include low-yield assets, it is quite likely that these foreign investments actually had a negative total return.

extremely limited up to now. Besides, before the crisis, significant real capital losses on the stock of external liabilities (3.2 percent a year on average) also contributed to worsen the country's external imbalance. These losses were mostly concentrated in the private sector on equity holdings and other debt liabilities, but partly mitigated by real capital gains of the government on its debt securities purchased by the rest of the world. The real capital losses on other debt liabilities would tend to indicate that there was an asymmetry between the gross external asset and liability positions in the currency denomination of these kinds of assets. This would suggest that while deposits or loans in/to the rest of the world were denominated in currencies that depreciated against the euro, the deposits or loans of the rest of the world in/to Greece were denominated in currencies that appreciated against the euro over 2001-2007. Or alternatively, these real capital losses could also be due to measurement errors.⁷²

During the crisis, the country's net foreign asset portfolio benefitted from large real capital gains as a result of falling domestic asset prices (5.1 percent a year on average), first and foremost on debt securities issued by the government, then on equity issued by non-financial corporations and finally on equity issued by financial corporations. The real capital gains on gross external liabilities experienced during the crisis largely offset the real capital losses endured before the crisis, so that over the whole period (2001-2014), real capital gains "relieved" the value of gross external liabilities by an average of 1 percent a year. In addition, external borrowings of Greek corporations (notably banks) decreased significantly during the crisis compared to the pre-crisis period. Conversely, in spite of real capital gains on government debt securities and of the partial write-off (nominal haircut) of the privately held tradable public debt in early 2012,⁷³ the sustained borrowings of the government as part of the country's successive bailouts prevented the external imbalance of the public sector to adjust. New borrowings by the government in the form of (official) loans increased the gross external liability position by 6.6 percent a year on average - a comparable order of magnitude to the increase in external debt generated by the issuance of government debt securities before the

⁷² This would be the case if the market value of the stocks of other debt assets/liabilities reported in the country's official financial accounts was partially disconnected from the corresponding flows in the balance of payments. In principle, this should not be the case as the 2008 SNA or 2010 ESA and the IMF Balance of Payments Manual have harmonized both the coverage and the accounting rules (note that classification still differs: the BPM uses functional categories such as direct investment, portfolio investment etc. whereas the SNA/ESA uses instrument categories such as equity, bonds etc.). Still, Curcuru et al. (2008) argue that one of the reasons why one might simply capture measurement errors is that stock data (in market value) are subject to more revisions than flow data (at historical cost). I do not claim to resolve this difficult debate here.

⁷³ As shown in table 7, the gross liability position decreased on average by 2.2 percent a year over 2008-2014 because of the reduction in the stock of government tradable debt held by the rest of the world.

crisis.⁷⁴ The external adjustment has been therefore much more pronounced and effective for the private sector (and notably banks) than for the government.

	Decomposition of the real growth rate of gross external liabilities																										
	Average annual real growth rate (A)+(B)									Saving-induced average annual real growth rate (A)									Capital gains/losses-induced average annual real growth rate (B)								
	Government			Financial corporations			Non-fin corporations & Households			Government			Financial corporations			Non-fin corporations & Households			Government		Financial corporations		Non-fin corporations & Households				
	Equity & FDI	Debt securities	Other debt liabilities	Equity & FDI	Debt securities	Other debt liabilities	Equity & FDI	Debt securities	Other debt liabilities	Equity & FDI	Debt securities	Other debt liabilities	Equity & FDI	Debt securities	Other debt liabilities	Equity & FDI	Debt securities	Other debt liabilities	Equity & FDI	Debt securities	Other debt liabilities	Equity & FDI	Debt securities	Other debt liabilities			
Greece Euro Area period (2001-2014)	-	0.7%	3.5%	0.3%	0%	2.4%	0.2%	-0.1%	0.2%	-	-2.6%	2.8%	0.7%	0%	1.5%	0.8%	0.1%	-0.3%	-	-1.9%	0.7%	-0.4%	0%	0.9%	-0.6%	-0.1%	0.5%
	4.1%			7.2%			0.3%			5.4%			2.1%			0.6%			-1.3%		0.6%		-0.3%				
Greece Euro Area pre-crisis (2001-2007)	-	6.6%	0%	1.4%	0%	4.8%	1.8%	0.1%	0.8%	-	-7.7%	-0.9%	1%	0%	3.7%	1.4%	0.1%	-0.7%	-	-1.1%	0.9%	0.3%	0%	1.1%	0.4%	0%	1.5%
	6.6%			6.2%			2.6%			6.8%			4.7%			0.7%			-0.2%		1.4%		1.9%				
	15.3%			15.3%			12.2%			12.2%			3.2%														
Greece Euro Area crisis (2008-2014)	-	-4.9%	7%	-0.9%	0%	0.1%	-1.4%	-0.2%	-0.3%	-	-2.2%	6.6%	0.3%	-0.1%	-0.6%	0.2%	0.1%	0.2%	-	-2.8%	0.4%	-1.2%	0.1%	0.8%	-1.6%	-0.3%	-0.5%
	2.1%			-0.7%			-1.9%			4.5%			-0.4%			0.5%			-2.4%		-0.3%		-2.4%				
				-0.5%						4.6%						-5.1%											

Source: author's computations

Notes: the table reads as follows: the real growth rate of gross external liabilities in Greece over a given period has been X% a year on average and can be decomposed into a Y% saving-induced growth rate and a Z% capital gains/losses-induced growth rate. Thus, by construction: X%=Y%+Z%. Besides, the table highlights the relative/respective contributions of the government, financial corporations and non-financial corporations & households to the accumulation of gross external liabilities. For each sector, the table also provides a breakdown of the impact of net borrowing from the rest of the world on the gross external liability position by asset classes (equity & FDI, debt securities and other debt liabilities which mainly include currency and deposits, loans and trade credits).

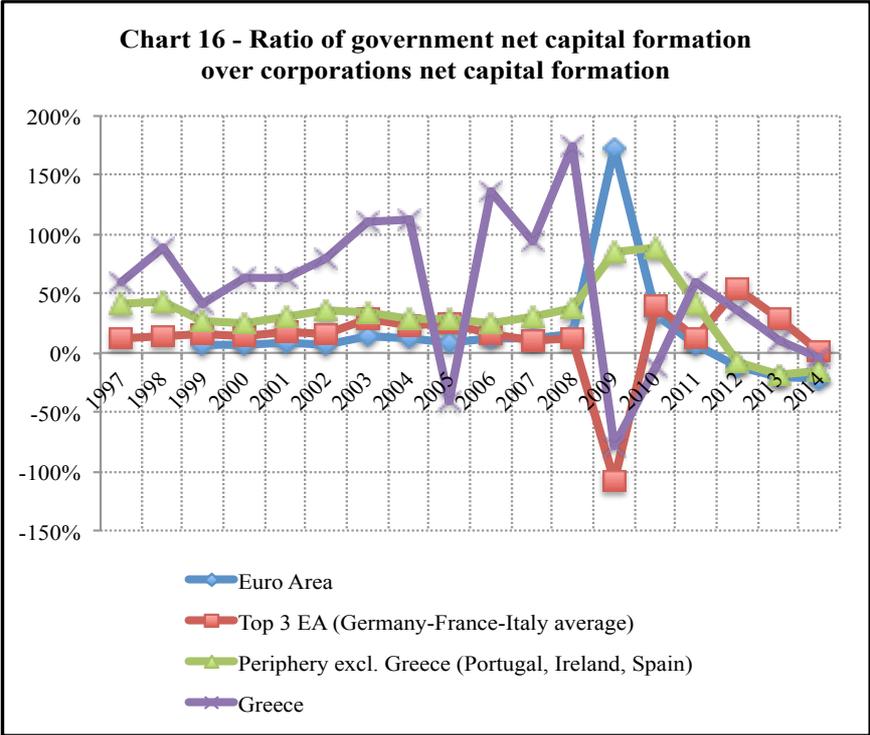
IX. A NEW NARRATIVE OF THE GREEK CRISIS

Detrimental dynamics before the crisis. Summing up what we have learnt so far, the government heavily borrowed from the rest of the world in the form of debt securities before the crisis, while simultaneously investing significant sums in domestic capital goods. All of the evidence indicates that large public investments were funded by external borrowings.⁷⁵ The contribution of these investments to national wealth accumulation was similar to those of Greek firms, which is a key and singular feature of Greece inside the euro area (see chart 16 below). Unlike the government, Greek non-financial corporations borrowed very little from the rest of the world, while investing substantial amounts abroad. For their part, Greek banks borrowed large sums from the rest of the world through the interbank and equity markets, put

⁷⁴ All in all, over 2001-2014, about two-thirds of borrowings from the rest of the world came from the government, of which 48 percent in the form of debt securities and 52 percent in the form of other debt liabilities i.e. official loans.

⁷⁵ First of all, except for three years, the budget balance excluding public investment was negative during the decade preceding the crisis (1997-2007), so that investment had to be financed by debt issuances. Even when the budget balance was positive excluding public investment, i.e. between 2000 and 2002 (see Appendix n°16), public investment was higher than the excess of government revenue, so that it also had to be partly funded by debt. Then, as highlighted in chart 11, the value of public debt held by residents in the form of debt securities decreased in favor of the rest of the world over the period. Hence, it is clear that new debt issuances were subscribed by the rest of the world and that public investment was *de facto* financed by foreigners.

a lot of money in foreign assets (notably foreign debt securities), but remained net debtors *vis-à-vis* the rest of the world. In that sense, a fraction of funds coming from the rest of the world was *de facto* allocated to domestic investment through the local banking system. But households were the first beneficiaries of these funds (see Appendix n°18) and subsequently the key drivers of domestic investment *via* the housing market amid a major real estate bubble (see table 5). To provide an idea of the magnitude of the bubble, the real capital gains of households on housing increased the real value of national wealth as much as all investments of all sectors combined over 2001-2007. The real capital gains of firms and the government on domestic capital goods were lower, but still very substantial. Thus, the relatively low level of corporate investment in the country is quite puzzling, and even more so when we take into account the fact that non-financial corporations had high levels of retained earnings and were suffering from real capital losses on their rapidly growing holdings abroad. The existence of barriers to corporate investment at the domestic level (involving credit constraints - both internal and external - as well as crowding out) appears very likely.



Adjustment during the crisis. The external adjustment at the country level has occurred through (i) real capital gains on net foreign assets by the government and non-financial

corporations, (ii) the reversal of external borrowing flows by banks⁷⁶ and (iii) the 2012 public debt restructuring, but has been partly limited by new borrowings from the government in the context of the successive official bailouts. For the government in particular, the pace of external debt accumulation resulting from new borrowings has barely slowed down compared to the pre-crisis period (in spite of the partial write-off of the privately held tradable debt in 2012) and the real capital gains on external debt securities have not been sufficient to stabilize its external position so far. At the domestic level, public investment has sharply declined over the crisis period. Private investment has also considerably shrunk: once taking into account capital depreciation, it has become negative for corporations and close to zero for households. Overall, notwithstanding real capital gains on net foreign assets, national wealth has dropped in real terms as a result of new net external borrowings, lower net investment flows and massive real capital losses on domestic capital goods following the bursting of the real estate bubble.

A theory on the root causes of the Greek crisis. Drawing on the previous findings, I am now at developing a theory to rationalize the detrimental dynamics that occurred in the 2000s and ended up in the 2009-2010 sudden stop of private foreign capital flows. I argue that the real capital gains on the domestic capital stock resulting from the real estate bubble that begun in the mid-1990s played a pivotal role in driving the external imbalances that accumulated in the run-up to the crisis. Indeed, they increased the perceived wealth of households, and thus their consumption and borrowing at the expense of saving through a classic positive wealth effect.⁷⁷ Then, the resulting low level of national saving forced other economic agents (i.e. the government, banks and firms) to borrow from the rest of the world in order to finance

⁷⁶ In spite of a deceleration of lending to the rest of the world, banks have managed to substantially adjust their net foreign asset position through external deleveraging. This has been, first and foremost, a logical consequence of the drying up of the interbank market and the related replacement of external funding by national central bank liquidity.

⁷⁷ The wealth effect is the change in spending (consumption or borrowing) that accompanies a change in perceived wealth. Naturally, a variation in real capital gains or losses on a portfolio of assets induces a change in perceived wealth. With respect to housing, a growing empirical literature shows strong responses in spending to house price movements, often with strong heterogeneity across households (e.g. between young vs. old, high- vs. low-income): Campbell and Cocco (2007), Case et al. (2013), Mian et al. (2013), Mian and Sufi (2014), Stroebel and Vavra (2014) etc. However, the theoretical rationale behind the wealth effect is not clear-cut. According to the permanent income hypothesis, even a permanent increase in house prices should have only a small (if not zero) effect on spending decisions because there is a trade-off between the positive endowment effect for homeowners and the negative income effect for non-homeowners who suffer from a permanent increase in rental costs. Introducing incomplete markets and collateral effects enable to get out of this apparent contradiction between data and theory. Here, the *timing* of wealth effects matter (rather than just the net present value) and the fact that houses serve as collateral relaxes borrowing constraints to further increase consumption/borrowing. Berger et al. (2015) show that such types of models can deliver the large effects on the marginal propensity to consume found in the empirical literature.

domestic investment. As a side effect, it also induced the government to borrow from abroad to roll over its large amount of outstanding debt held by domestic residents and to finance its fiscal deficit net of public investment (i.e. to finance notably the increase in final consumption expenditure). One of the key features of the pre-crisis period in Greece is that the government in the first place - instead of firms and banks like in Ireland or Spain - borrowed from abroad to help fund domestic investment. I suggest two explanations to account for this fact: (i) financial frictions related to the predominance of micro firms in Greece and to insufficiently deep domestic credit markets, and (ii) the large initial size of the public sector in terms of ownership of assets and particular historical circumstances, namely the 2004 Summer Olympics, that favored large-scale public investments.

According to the first explanation, most Greek firms remained credit-constrained and thus did not benefit from increasing financial integration and the related decrease in the cost of capital following the adoption of the single currency in 2001 as opposed to the government and a limited number of big corporations and banks. These credit constraints might be due to the small size of firms themselves⁷⁸ or to the pre-crisis fragmentation of the domestic banking system.⁷⁹ The data show that, at the domestic level, firms benefited less than households from the - still substantial - funds secured by Greek banks from the rest of the world (see Appendix n°18), and that, at the international level, they were almost unable to borrow in the form of debt securities. These observations indicate that it is more likely that credit constraints are attributable to the firms themselves. Finally, the government might have had no choice but to substitute to corporations in order to boost domestic investment and thus aggregate demand. According to this view, the origin of the external over-indebtedness of the government would come partly from the corporate sector.

Conversely, the second explanation puts forward the size of the public sector as opposed to the size of firms. I focus on a problem that has not been raised so far, namely the large size of the assets side of the Greek government balance sheet and the possible crowding out of

⁷⁸ As indicated in the European Commission 2015 SBA report, Greek firms are particularly small and family-run compared to firms in other European countries and suffer from a very poor access to finance. Privately held companies predominate by a wide margin in Greece (excluding investment fund shares, the value of unlisted shares of Greek firms accounted for almost 70 percent of the value of total shares according to the official financial accounts at the end of 2014). Besides, according to the financial platform Bloomberg, only twenty Greek firms have tapped (and for relatively small amounts) the bond market (in chart 15, we see that the share of debt securities issued by Greek firms and purchased by the rest of the world in the total gross external liabilities has remained very tiny throughout our period of interest).

⁷⁹ Before the 2012-2013 restructuring and consolidation of the Greek banking system into four major banks, there were many small banks. It could be that these smaller banks had relatively more difficulties than bigger banks in other periphery countries to access the interbank market and thus to allocate foreign saving to domestic investment. Then, credit constraints would be due to insufficiently deep domestic credit markets and precisely to the pre-crisis fragmentation of banks.

corporate investment by public investment over the pre-crisis period.⁸⁰ Given the distribution of assets in the economy and the fact that investments in *existing* capital goods always make up an important part of total investment, it appears logical that the government was a major investor before the crisis. On top of that, it had a great incentive to finance investment in *new* physical assets through external debt, as it was enjoying real capital gains, first, on its large stock of domestic assets,⁸¹ and second, on its stock of tradable debt owned by foreign investors. One should also not neglect the role of the 2004 Summer Olympic Games (an “exogenous shock/event”) that provided additional incentives - or simply required - to upgrade the country’s infrastructure through major public investments.⁸² From this perspective, public investments funded by external borrowings crowded out private investment opportunities at the domestic level by selecting projects that could have been undertaken by the private sector otherwise.

So, acknowledging the initial role of the real estate bubble in driving down national saving through a wealth effect, the debate on the root causes of the Greek depression boils down to the following question: was the government too big or the firms too small? Several facts tend to prove that none of the two explanations can be fully satisfactory but rather that they are complementary. The financial frictions related to the size of firms can explain the low level of external borrowings by Greek firms (external credit constraint) and the allocation of the majority of foreign funds secured by Greek banks to households rather than to firms (domestic credit constraint). However, this approach fails to understand why corporate investment at the domestic level was relatively low and, above all, progressively decreased in spite of (i) substantial retained earnings (i.e. corporate net saving, see Appendix n°16), (ii) real capital gains on the stock of domestic capital goods, and (iii) real capital losses on the ever-growing portfolio of foreign assets. Instead, the explanation centered on the size of the assets side of the government balance sheet can better account for this fact: by sustaining a high level of public investment, the government crowded out private corporate investment

⁸⁰ As evidenced previously, the ratio of government assets to national income was substantially higher in Greece than in the main euro area countries at the end of the 1990s, and remained so thereafter, boosted by large public investments and real capital gains (see chart 12 and table 5).

⁸¹ For a given rate of capital gains, the larger the initial size of the stock of assets, the higher the capital gains as a percentage of national income. From a political economy perspective, if we think about the government as a short-sighted agent because of the existence of electoral cycles that encourage political incumbents to make public investments in order to bolster growth prospects and hope for reelection, the wealth effect may play an even bigger role.

⁸² We need only mention for instance the expansion of the Athens Metro system and the construction of the Eleftherios Venizelos International Airport, the “Tram” (metropolitan light rail system), the “Proastiakos” (suburban railway system linking the airport and the suburban towns of Athens), the “Attiki Odos” (motorway encircling Athens) as well as obviously many stadiums and sport complexes – all these are large-scale public investments related to the hosting of the Olympics.

opportunities in Greece and left no choice to the biggest local firms but to use their savings to invest abroad. Having said that, this explanation assumes that there was a limited number of physical investment opportunities in the economy.⁸³ Also, the high level of retained earnings in Greek firms might be simply the consequence of credit constraints mentioned before. Overall, there is no simple explanation and a more detailed study would be required in order to quantify the relative importance of both effects. In any case, this resulted in a doubly unsustainable dynamics in the public - high level of net domestic investment and accumulation of external debt - and private - low level of net domestic investment coupled with growing external assets suffering from real capital losses - sectors. Hence, the unsustainable dynamics of the government should not hide that of the private sector: both are instead intrinsically linked.

Still, public investment only represents about 30 percent of the increase in external borrowings by the government as indicated in table 5. The remainder is attributable to the accumulation of successive negative fiscal balances net of public investment - what I deliberately label in a somewhat simplistic and provocative manner “fiscal indiscipline” - and to the roll-over of debt securities previously held by domestic residents (see chart 11). We can break down the increase in external public debt according to these three effects - investment, indiscipline and roll-over of domestic debt. Table 8 below highlights that the three effects played roughly the same role in driving up the external debt of the government. In other words, about two-thirds of the increase in external public debt during the pre-crisis period inside the euro area can be attributed to factors other than fiscal indiscipline, and precisely be viewed as the consequence of the real estate bubble.⁸⁴

Table 8 - Decomposition of the increase in external public debt over 2001-2007	
Fiscal indiscipline*	36%
Public investment	28%
Roll-over domestic debt	36%
<i>Source: author's computations</i>	
<i>Note: *fiscal indiscipline relates to the deterioration of the fiscal balance net of investment</i>	

⁸³ Note that the “crowding-out” expression should be taken with caution here. I am not referring to the usual sense of the term, namely to the crowding out of national saving by government spending i.e. “resource crowding out”, but rather to the crowding out of private firms from specific investment projects at the domestic level.

⁸⁴ Indeed, the roll-over effect can be directly linked to the real estate bubble and the decreasing level of national saving.

Towards a comprehensive view of the euro area crisis. With respect to the discussion on the root causes of the euro area crisis, this narrative of the Greek depression as triggered by an external debt crisis can be seen as the missing piece in the puzzle. Indeed, I can now provide a comprehensive framework to understand what went wrong in the periphery during the first decade of the euro area, thereby avoiding continuing to view Greece as an enigmatic outlier. As evidenced by the BIS data (see Appendix n°19), Spain and Ireland experienced, just like Greece, severe real estate bubbles starting from the mid-1990s.⁸⁵ Their net foreign asset positions also deteriorated sharply in the run-up to the crisis - although relatively less in Ireland.⁸⁶ Combined with high saving rates and low expected returns of domestic investment in Northern countries (e.g. in Germany),⁸⁷ it resulted in foreign capital flows within the euro area. Instead of flowing into productive activities, capital flows inflated the real estate bubbles. The sudden stop of private foreign capital flows following their burst in the wake of the 2008 financial crisis put immediately at risk the economies that were relying on these inflows to (artificially) prosper. So the euro area crisis is the result of an accumulation of external debts that proved to be unsustainable because they were used to finance overvalued assets in the periphery. What distinguishes the periphery countries from each other is not the nature of the crisis *per se* (all experienced an external debt crisis), but rather the sectors where the imbalances emerged before the crisis and which were subsequently the first affected: the public sector in Greece and Portugal, as opposed to the private sector in Spain and Ireland. I argue that, whether external borrowings came from the public or private sector, ultimately depended on the relative incentives or comparative advantages of the governments to borrow from the rest of the world to finance domestic investment, as well as on the relative size of firms and their ability to access foreign savings channeled by local banks. To take a concrete example with Greece and Spain where the magnitude of the real estate bubbles and the worsening of the net foreign asset positions as a percentage of national income were of similar magnitude before the crisis, the reasons for which the unsustainable external debt turned out to be private in Spain and public in Greece were: (i) the greater ability of Spanish firms to tap the international credit market (bonds and loans) and/or to borrow from local

⁸⁵ In real terms, the Spanish and Greek property bubbles appear to be of comparable magnitude (see Appendix n°19). By contrast, the Irish bubble was even more severe. The data for Portugal are not available on a sufficiently long period to allow for a meaningful comparison, even if official data, starting from 2008 onwards, indicate that nominal and real prices have declined less than in the other periphery countries, so that the real estate bubble - if it ever existed - could be of lower magnitude prior to the crisis.

⁸⁶ Indeed, the level of national saving was substantially higher in Ireland throughout the period.

⁸⁷ In Germany for instance, real estate prices stagnated over the whole period - and even slightly decreased in real terms before the crisis (see Appendix n°19).

banks funds coming from the rest of the world, and (ii) the greater influence of the public sector in the Greek economy (higher concentration of physical assets in government hands and unfolding dependency on public investments).⁸⁸

Policy implications. In closing, this attempt to rationalize the notorious “fiscal indiscipline” of Greece has several policy implications to improve the functioning and resilience of the euro area. First of all, the priority remains to reach a credible deal involving debt-relief measures to achieve public debt sustainability in Greece, as the external imbalance of the government has kept deteriorating during the crisis (cf. table 5).⁸⁹ But beyond this immediate policy issue, the euro area has still to find the right track to recover from the current deadlock and ensure it has a future. Much has been done since the beginning of the crisis to design mechanisms to *tackle* the next crisis (e.g. OMT, ESM, SRB etc.), but much less to actually *prevent* it from happening - arguably because of a lack of consensus on the root causes of the current crisis. In that respect, the most important lessons one can draw from this paper relate to the monitoring of asset bubbles - in particular real estate bubbles - and, in return, to the role of productive capital flows in the euro area. Greece is the perfect example of how unproductive investments in overvalued assets supported by foreign capital flows can first create a false sense of growth, and then end up in a crisis that completely wipes out the previously accumulated wealth. As analyzed by Bernanke (2005), the emerging market economies responded to the balance of payments crises endured during the 1990s and beginning of the 2000s by becoming net creditors *vis-à-vis* the rest of the world.⁹⁰ Obviously, this is not a way out for countries in a monetary union where capital flows that matter are not those with the rest of the world but those inside the union. Hence, the real challenges for policymakers are (i) to improve the current architecture of the euro area in order to achieve an efficient allocation of saving towards productive and innovative investment (i.e. sustainable

⁸⁸ This reasoning is relative and does not mean that Spanish firms were not credit-constrained. For instance, Gopinath et al. (2015) propose a model to explain the pre-crisis misallocation of capital across firms in the Spanish manufacturing sector following the entry in the monetary union: heterogeneous firms face financial frictions in a period of large foreign capital inflows and firms that have higher net worth but that are not necessarily the most productive end up being the main beneficiaries of foreign funds.

⁸⁹ According to the public debt sustainability analysis published by the IMF in July 2015, “Greece’s debt can now only be made sustainable through debt relief measures that go far beyond what Europe has been willing to consider so far.”

⁹⁰ More precisely, this has involved building buffers against potential capital outflows through the accumulation of foreign exchange reserves and the issuance of domestic debt to pay down external debt. Note that these emerging market crises undeniably display a lot of similarities with the euro area crisis: loss of lender confidence, capital outflows, overvalued fixed exchange rates, debt overhang issues, sharp decline in domestic asset prices and ultimately weakened banking systems and recessions.

and efficient capital flows between member countries) and (ii) implement appropriate reforms in order to avoid any accumulation of unsustainable external debts in the public sector.

The first element points to the necessity to prevent the emergence of regional bubbles that can perniciously attract foreign capital in an unsustainable way like in Greece, Ireland or Spain. Monetary policy levers appear very limited if not inexistent due to the single policy rate in the euro area. However, national central banks could be given the mandate to closely watch the emergence of regional bubbles and governments commit to increasing tax rates on real capital gains with the aim of “flattening” the bubbles once a predefined threshold of real price increase is crossed. Another essential aspect to prevent *ex ante* the emergence of bubbles on unproductive assets (e.g. housing) is (i) to foster investments in productive corporate assets (e.g. factories, machinery etc.) as well as in innovation (e.g. R&D) and (ii) to promote entrepreneurship i.e. the creation of new and innovative firms. Thus, it is urgent to remove financial frictions and size-related credit constraints that currently impede the funding of firms in the periphery.⁹¹ This involves dealing with the financial and real aspects of the problem. On the financial side, it includes improving the deepness of the European and domestic financial markets to allow a much higher number of firms to tap bond markets and diversify their financing sources away from the sole bank financing. In that respect, the creation of a European corporate debt market with a standardized European governing law would be useful. On the real side, it requires removing inefficient regulations that may distort the size of firms by preventing free entry or artificially imposing limits on firm capacity, as well as implementing adequate size-based fiscal incentives to encourage partnerships and efficiencies of scale. Identifying these very inefficient regulations is by nature a delicate exercise. In practice, hurdles that prevent firms to grow and enjoy economies of scale may be due to legal or structural reasons but also to all sorts of different causes: cultural, historical etc. As a matter of fact, 35 percent of employed persons were self-employed in Greece in 2014 vs. 15 percent in the euro area (including Greece) and 14 percent in periphery countries other than Greece.⁹² Besides, the OECD/EU 2015 study “The Missing Entrepreneurs” reveals that 50 percent of adults in Greece say they prefer self-employment to working as an employee and that most newly created businesses have been weighted towards low-value added sectors, typically restaurants, bars and retail stores (“mom and pop stores”). We are

⁹¹ The European Commission 2015 SBA (Small Business Act for Europe) fact sheet for Greece indicates that Greek micro firms (that represent 98 percent of all firms) have an extremely low rate of accession to finance compared to the European average.

⁹² Data are from the European Commission (AMECO) database. The Greek rate is the highest in the euro area. Note that these figures roughly apply for the whole period 1997-2014 (see Appendix n°3).

therefore far from the image of the innovative entrepreneur that one could have in mind when looking at the self-employment statistics at first glance. These findings are consistent with the empirical literature that focuses on self-employed motivations and the dynamics of firm size. Hurst and Pugsley (2011) warn against any confusion between small and young firms: most small firms are not oriented towards innovation or growth potential and a lot of firms can stay durably small, non-productive and still continue to exist because of people's preference for self-employment.⁹³ Haltiwanger et al. (2013) look at the relation between economic performance and the size of firms. They show that small and mature (i.e. durably small) businesses have a negative impact on job creation as opposed to startups and young firms that are also inherently more volatile. All in all, if the reasons for the small size of firms in Greece are legal in nature, then it may be useful to deregulate specific markets or sectors.⁹⁴ Improving contract law and law enforcement to foster partnerships through modern contracting might be also necessary. On the contrary, if the small size of firms is due to a preference for self-employment, then one could think about implementing size- and age-based fiscal incentives to increase the size of firms (e.g. direct fiscal incentives to foster partnerships and/or taxing relatively more the profits of a micro business that stays durably small after some years of existence with an adequate threshold to be set by sector). It is good to have in mind these two dimensions and to work on both fronts of the problem. Finally, the EU should develop a global plan for innovation to reinforce the allocation of financial capital to key sectors and national governments implement adequate fiscal incentives for entrepreneurs and innovators. Thinking about the right policy mix to discourage inefficient firms and encourage young and innovative firms in specific technology fields should become a top priority on the European economic policy agenda. Only then, capital flows within the monetary union would become a strength instead of a weakness as in the past.

Besides, in anticipation of situations where asset bubbles nonetheless emerge and policymakers prove to be unable to quickly stop them, we must think about appropriate reforms to make the economy more resilient to the burst. With regard to the private sector and banks in particular, we now have restructuring/resolution mechanisms including the new bail-in rules and the Single Resolution Mechanism/Board to manage potential difficulties and avoid spillovers to the sovereigns. But the Greek crisis shows that unsustainable external

⁹³ They document in particular that most small firms are started with non-pecuniary motivations. The preference for self-employment can therefore be a very strong motive.

⁹⁴ Alfaro et al. (2014) study for instance the impact of deregulation of compulsory industrial licensing on firm size and dynamics in India and observe that following deregulations, the most dynamic firms expand, while young firms enter the market.

imbalances can also materialize in the public sector simply because the large size of the government balance sheet (i.e. the volume of public assets and liabilities) may push the government to over-borrow from the rest of the world. In the absence of a common standardized sovereign debt restructuring mechanism, resolving fiscal problems in the euro area must go through official financial assistance and adjustment programmes that necessarily trigger negative spillover effects to the rest of the economy.⁹⁵ As such, reducing the size of the governments' balance sheet in order to avoid these situations may be appropriate. On the assets side, this can involve privatizations of carefully selected assets (in particular of underexploited ones),⁹⁶ and on the liabilities side, first, an upfront deal to reduce the size of the currently large stock of public debt, and then, the implementation of stricter debt ceilings.⁹⁷ Importantly, public investments should not be mistakenly considered as bad *per se*. The problem in Greece is the way state assets were financed and then managed. Indeed, the government funded large-scale infrastructure investments, i.e. very long-term and illiquid assets, with relatively short-term external debts. Besides, as suggested by the stagnation of government revenue, public assets remained largely underexploited: they were not generating enough revenue to pay off the debt. In a few words, there was a strong asset-liability mismatch in the government balance sheet that contributed to jeopardize the public debt sustainability. Better monitoring and financing public investments at the euro area level with a common debt could help to avoid that.

Tax evasion and tax base. Last but not least, a key policy objective for periphery countries should be to secure a strong tax base. As evidenced at the beginning of the paper, the fiscal deficit increased in Greece before the crisis because government revenue failed to keep pace with government spending. The pre-crisis stagnation of the government revenue to national income ratio is all the more worrying that the economy was in a boom phase at the time with a steadily increasing value of government *and* private - thus potentially taxable - assets expressed as a percentage of national income (see charts 7 and 10). A mismanagement of public assets (generating insufficient cash flow compared to the money invested), and a potential surge in tax evasion - both "internal" i.e. underreporting of private income or wealth

⁹⁵ Even the activation of the OMT program that can give right to the ECB to buy sovereign bonds on the secondary market is strictly conditional to the implementation of an "appropriate EFSF/ESM programme" (http://www.ecb.europa.eu/press/pr/date/2012/html/pr120906_1.en.html).

⁹⁶ Importantly, any privatization agenda must be understood in the broad set of policies mentioned previously, i.e. notably as a complementary measure to the release of financial frictions in the private sector. Also, one should be very careful when thinking about privatizing in a country like Greece where the risk of fire sales is currently very high in the low price/low confidence environment.

⁹⁷ In that sense, the fiscal targets of the Stability and Growth Pact could be given greater credibility.

and “external” i.e. offshore tax evasion - cannot be ruled out. Although researchers cannot precisely track changes in tax evasion over time, all the evidence suggests that it is a rampant phenomenon in Greece. Artavanis et al. (2015) estimate for instance that roughly 50 percent of self-employment income went unreported in Greece in 2009: this amounted to €28.2 billion, i.e. €11 billion in foregone tax revenues or 30 percent of the fiscal deficit.⁹⁸ Drawing on the methodology developed by Zucman (2013), Roussille (2015) estimates that the amount of offshore assets held by Greek households in Switzerland reached €67 billion i.e. 52 percent of households’ financial wealth (or 12 percent of private wealth) at the end of 2013. If the government could track down this hidden wealth in Switzerland, it would obtain a one-time revenue resulting from *ex post* taxation plus penalties of approximately €8 billion with an additional yearly revenue of €600 million resulting from the regular taxation of these assets at the prevailing tax rates on dividends and interest.⁹⁹ Overall, the loss of income to public finance resulting from tax evasion is therefore extremely substantial. Securing a tax base necessarily involves a struggle against all forms of tax fraud.¹⁰⁰ As a final remark, I stress that endemic offshore tax evasion is more generally a structural drag on national saving and ultimately a pressure on the country’s external constraint. I have focused throughout the paper on official data regarding net foreign assets, which by construction do not report the assets held by households in offshore tax havens. Alongside with the real estate bubble and the related wealth effect, offshore tax evasion may also explain the low level of national saving reported in official data. This less orthodox approach of the “national saving deficit” could prove to be particularly relevant in Greece given the magnitude of offshore tax evasion. Bringing back, taxing and finally using these offshore savings for domestic investment purposes would definitely ease the country’s dependence on external financing.

X. CONCLUSION

After constructing and documenting new series on national wealth and its main components in Greece since 1997, I have studied the dynamics of national wealth accumulation and

⁹⁸ They focus on self-employed workers because the latter are particularly prone to tax evade. They use micro data on household credit from local banks and notably banks’ assessment of the individuals’ true income for granting loans and crosscheck with reported income in tax files.

⁹⁹ Assuming an average 6 percent return on these assets.

¹⁰⁰ It must be said that securing a strong tax base is all the more difficult that the percentage of self-employed workers in total employment (see Appendix n°3) and the share of internationally mobile activities (namely the shipping industry in Greece) are extremely high relative to neighboring countries.

external adjustment in the country before and during the crisis. Because detailed series on the ownership of produced assets by sectors were only available for the year 2012, I had no choice but to use the perpetual inventory method to obtain market value series over the whole period of interest. This approach has some methodological drawbacks. It requires in particular relying on official (net) investment flow series to derive the value of wealth at historical cost, and on an aggregate asset price index to obtain wealth series at market value. Investment flows or capital depreciation might be imperfectly recorded, thus leading to over- or underestimate the resulting series at historical cost, while the actual asset price dynamics of produced assets might not be adequately reflected by the aggregate price indicator chosen to estimate the series, thus leading, in turn, to over- or under-estimate the resulting series at market value. In order to obtain finer estimates of the value of produced assets, it would be necessary to have detailed historical breakdowns by asset categories of net investment flows as well as price indexes for a broader range of non-financial assets (e.g. non-residential buildings, equipment, land etc.). Finally, official estimates of the value of non-produced assets (land and natural reserves) by sectors would also facilitate the measurement and the breakdown of national wealth. In that respect, it is essential to clarify as soon as possible the notion of property in Greece. The current uncertainty linked to the absence of a modern cadaster is obviously a structural hurdle for statisticians to estimate the sectoral breakdown of land. Overall, there is a room for data improvements regarding both flow and stock series in order to better estimate the market value of the domestic capital stock. As I have highlighted in the paper, monitoring its evolution and notably the real capital gains on domestic assets is crucial as soon as we want to understand the underlying drivers of international capital flows. At the time of the financial globalization, there is no doubt that constructing homogenous and detailed series on domestic capital in every country to better account for valuation effects is important for our understanding of international finance. In this study, I have tried to overcome the data limitations to construct the best wealth-income series possible because I think that better understanding the dynamics of capital accumulation in Greece is too important to wait for the publication of perfect data.

Drawing on the detailed analysis of national wealth accumulation presented from sections V to VIII, I have suggested a new narrative of the Greek crisis that aims to refine the traditional “political view” focusing exclusively on fiscal indiscipline and notably on the hidden fiscal imbalances as the exogenous trigger of the crisis. The idea is not to deny the existence of the budgetary drift in Greece but to understand it against the background of a broader and

endogenous dynamics. In that perspective, I argue that the Greek crisis is best understood as an external debt crisis triggered by the combination of a real estate bubble and specific structural features of the Greek economy, rather than as a “pure” sovereign debt crisis.¹⁰¹ Specifically, I have related the pre-crisis growth of external public debt to the national saving deficit initiated by the real estate bubble *via* a positive wealth effect on households. The country had to tap foreign savings in order to roll-over its outstanding debt and to finance investment in overvalued domestic assets. The government primarily fulfilled this task because (i) most firms - notoriously small in a country where the number of self-employed workers reaches record levels for the region - were credit-constrained (both domestically and externally) and thus unable to use foreign savings to finance investment, and (ii) the large initial size of its balance sheet in terms of both assets and liabilities provided great incentives to do so. So the debate on the root causes of the Greek crisis boils down to investigating whether the government was too big or the firms too small or how both features were interrelated. In any case, the resulting accumulation of external debt in the public sector proved to be unsustainable because (i) investments were made in assets whose value was artificially inflated by the bubble until its burst in 2008, (ii) markets were unable to assess the actual market value of the government assets given the lack of official estimates and (iii) the fiscal capacity of the state was limited given the poor quality of the fiscal administration, the magnitude of local and offshore tax evasion and the mismanagement of public assets. The adjustment was inevitable at one point and the underreporting of the fiscal deficit simply delayed the sudden stop in external financing and worsened its impact on the euro area by adding a confidence shock.

More generally, we thus see a coherent framework to understand the euro area crisis and stop thinking about Greece as an enigmatic outlier. Ultimately, the euro area crisis appears to be the result of an accumulation of external debts that proved to be unsustainable because they were used to finance assets in the periphery whose value was artificially high due to the regional real estate bubbles. Depending on the structural characteristics of periphery countries such as the size of firms and the government, these external debts accumulated in the public (e.g. Greece and Portugal) or private (e.g. Spain and Ireland) sector.¹⁰² Hence, by facilitating cross-border capital flows in the run-up to the crisis, the adoption of the euro undoubtedly

¹⁰¹ Hence, the proper metric to be taken into account is not the rise in the fiscal deficit, but rather the rise in the external public debt.

¹⁰² The Portuguese case nonetheless deserves more investigation. The current lack of official data on real estate prices on a sufficiently long period of time makes it difficult to draw general conclusions.

acted, not as a cause, but as a catalyst - in the chemical sense of the word - in the detrimental self-fulfilling dynamics that hit periphery countries. In the light of this analysis, I have discussed some policy proposals to improve the strength and viability of the euro area at the end of section IX. The first decade of the monetary union undeniably shows that free movement of capital does not necessarily lead to sustainable growth. As evidenced in this paper, Greece is the example of a country where investments in overvalued assets supported by foreign capital flows generated an enrichment (capital accumulation) that was purely artificial. Now, European policymakers should think about implementing the right policy mix to monitor regional asset bubbles and encourage productive capital flows within the euro area. In that sense, much more support needs to be given by member states to the Capital Markets Union project. As long as this strategic agenda is not clearly recognized as a top priority, we are doomed to keep thinking about how we will manage the next crisis.

Finally, there are many issues that need to be further investigated. The detailed analysis of capital accumulation should be extended to other periphery countries (e.g. Ireland, Spain and Portugal) and to creditor countries (e.g. Germany, the Netherlands, Finland etc.) in order to confirm the intuitions regarding the euro area as a whole. Besides, writing a model based on these findings to explain the build-up of imbalances and the resulting 2010-2012 sudden stop would be a step forward in the formalization of a comprehensive theoretical framework for the euro area crisis. Last but not least, disentangling using more detailed data the role of credit constraints vs. crowding-out in restricting corporate investment during the pre-crisis period in Greece is an area for future research. In the end, this is what will enable to determine to what extent the accumulation of external debt in the public sector was caused by structural deficiencies of the private sector and (or) by a too big government.

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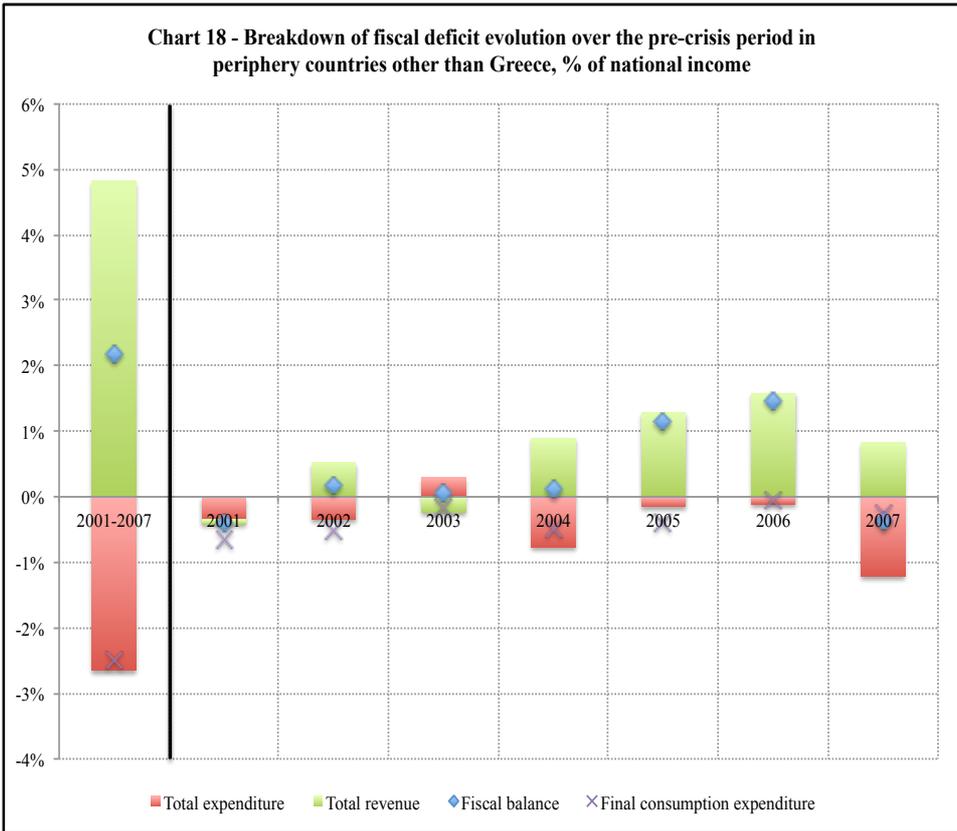
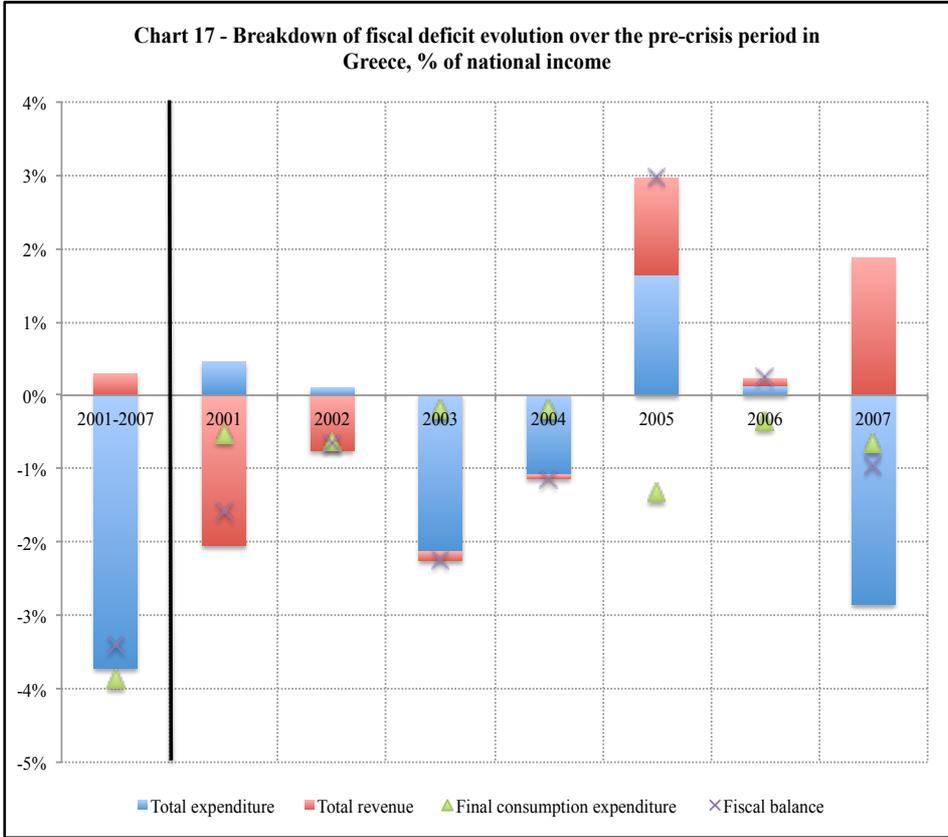
Whelan K. (2014), “Ireland’s Economic Crises: The Good, the Bad and the Ugly,” *Journal of Macroeconomics*, Volume 39, Part B, March 2014, Pages 441–443.

Zucman G. (2013), “The Missing Wealth of Nations: Are Europe and the U.S. Net Debtors or Net Creditors?” *Quarterly Journal of Economics*, 128 (2013), 1321-1364.

APPENDIX

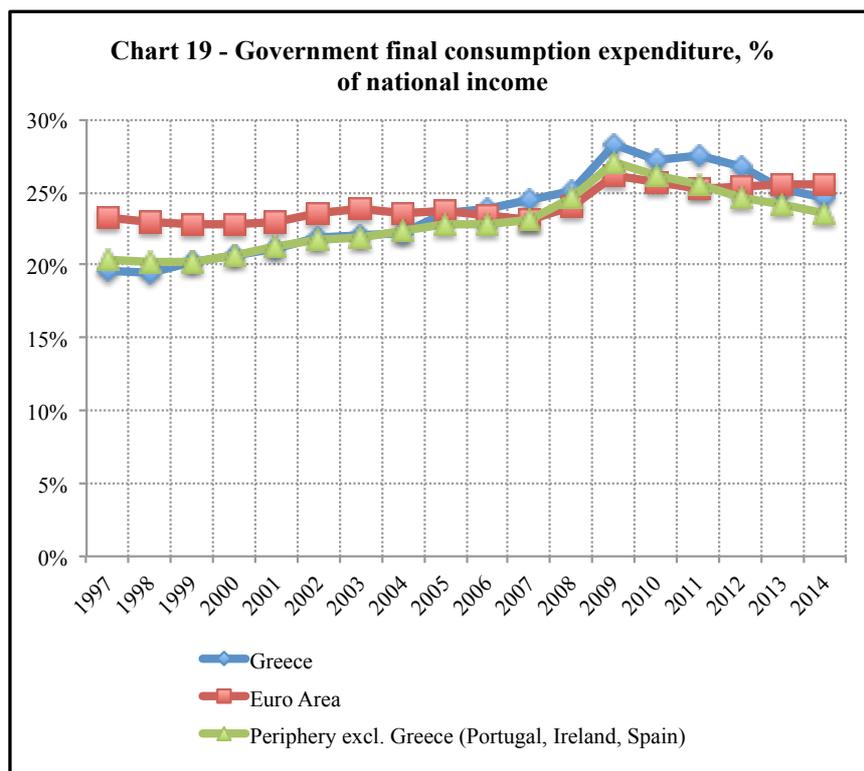
Appendix n°1: Breakdown of the fiscal deficit evolution over 2001-2007 in Greece vs. periphery excluding Greece (Ireland, Portugal, Spain).

Source: own computations based on AMECO (European Commission macroeconomic database).



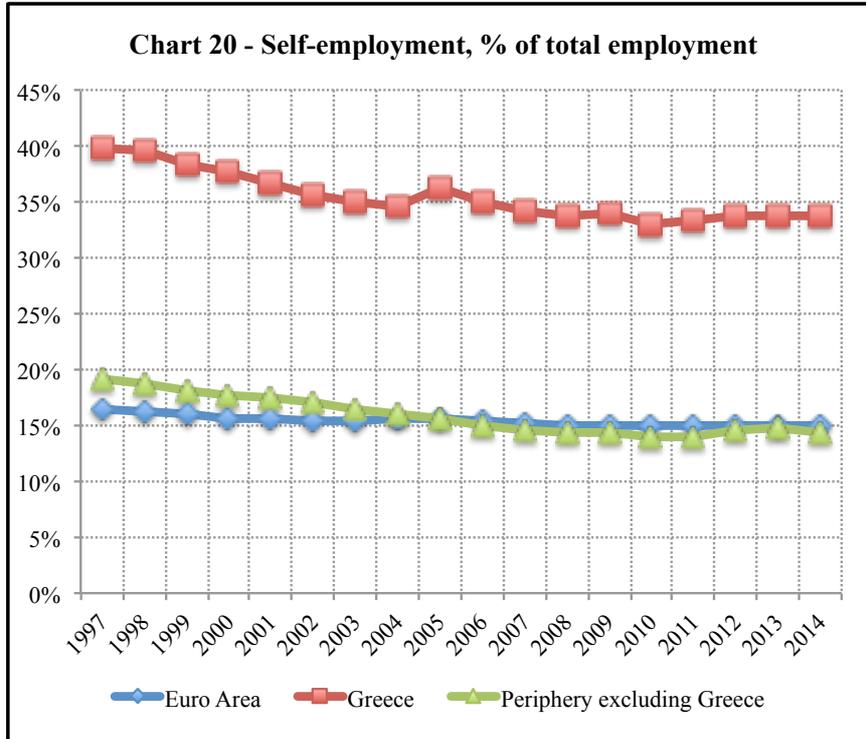
Appendix n°2: Government final consumption expenditure of the government, percentage of national income in Greece vs. euro area vs. periphery excluding Greece (Ireland, Portugal, Spain).

Source: own computations based on AMECO (European Commission macroeconomic database).



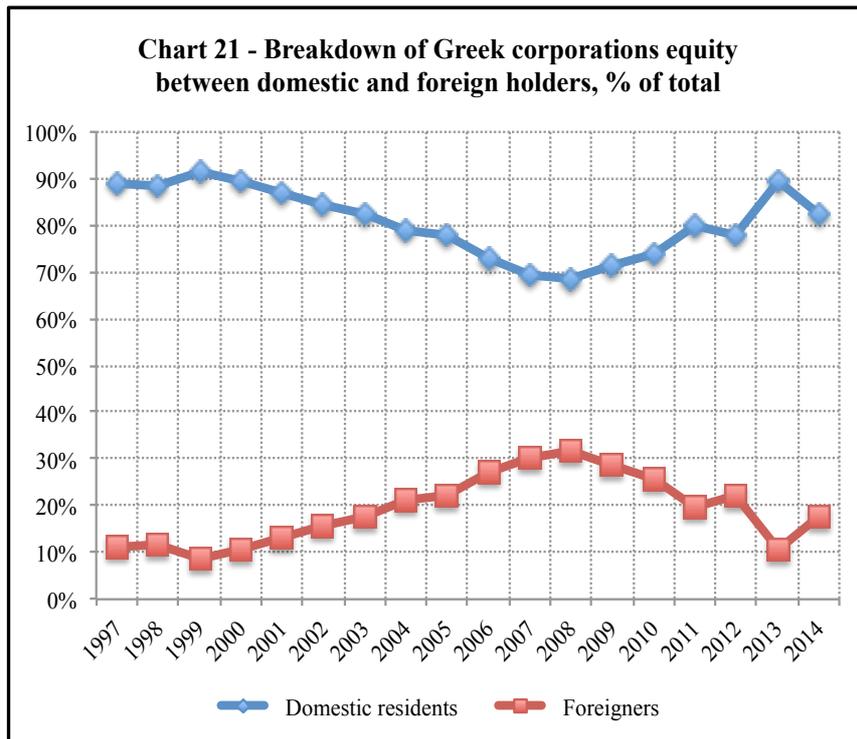
Appendix n°3: Self-employment in Greece vs. the euro area, percentage of total employment.

Source: AMECO (European Commission macroeconomic database).



Appendix n°4: Equity holdings of domestic corporations, breakdown between residents vs. non-residents.

Source: own computations based on Bank of Greece financial accounts.



Appendix n°5: Adjusted book-value national wealth.

We can adjust the book-value national wealth series directly obtained by using the official national balance sheet data in order to measure the shares of domestic corporations owned by the rest of the world in book- rather than market value. We start by deriving the aggregate book-value of domestic corporations' equity as follows:

$$\begin{aligned} & \text{Book_value of equity} \\ &= \text{Fin. assets (corporations)} + \text{Nonfin. assets (corporations)} \\ & - \text{Fin. liabilities (corporations)} + \text{Market_value of equity} \end{aligned}$$

Then, calculate the implied Tobin's Q:

$$\text{Tobin's Q} = \frac{\text{Market_value of equity}}{\text{Book_value of equity}}$$

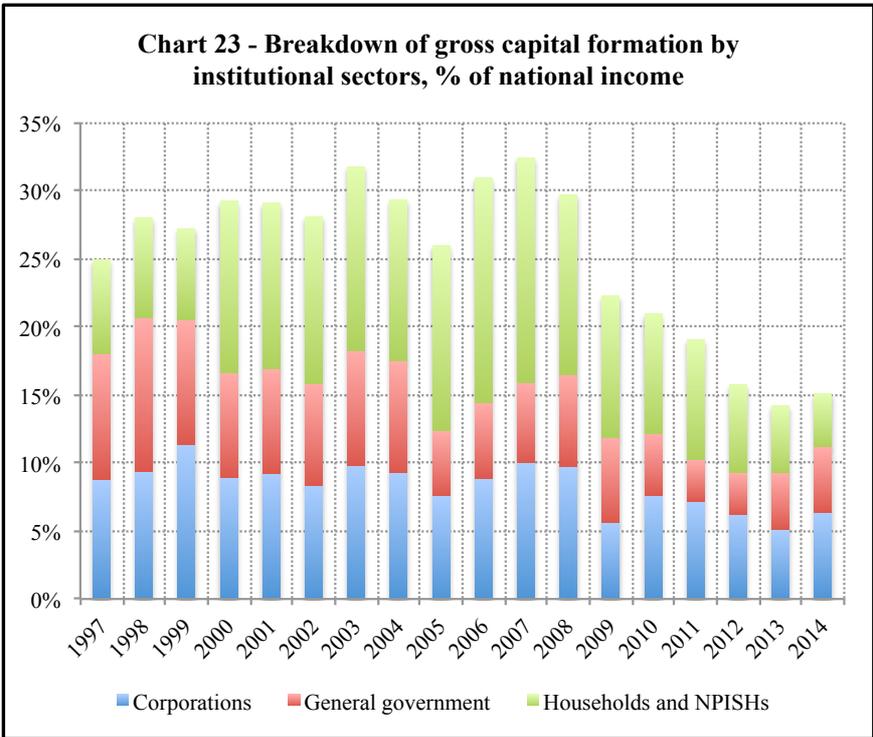
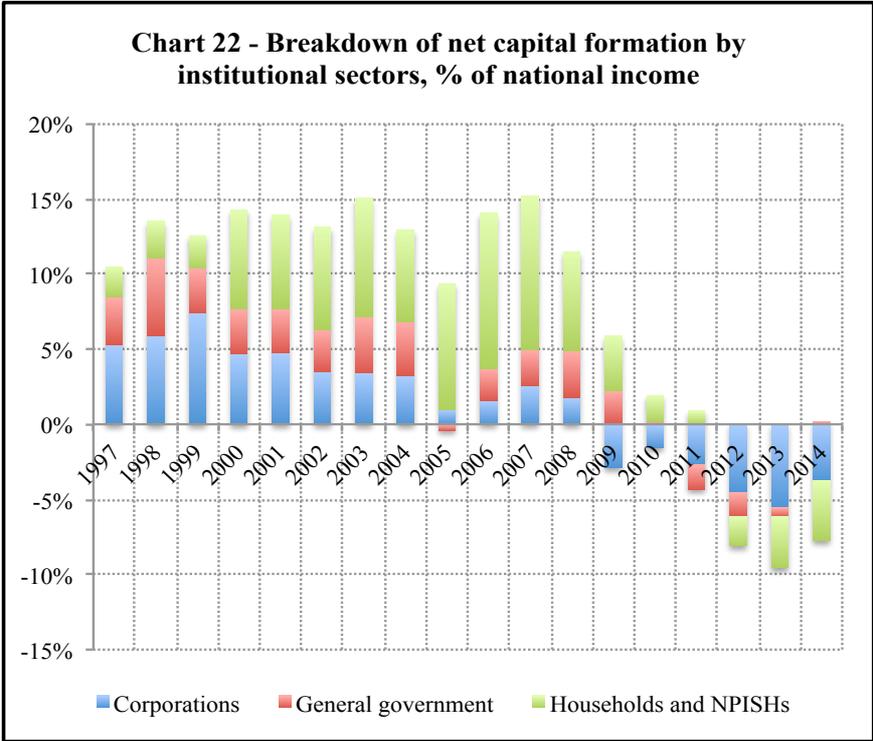
And finally use the Tobin's Q to adjust the market-value series of domestic shares owned by the rest of the world in the net foreign asset position:

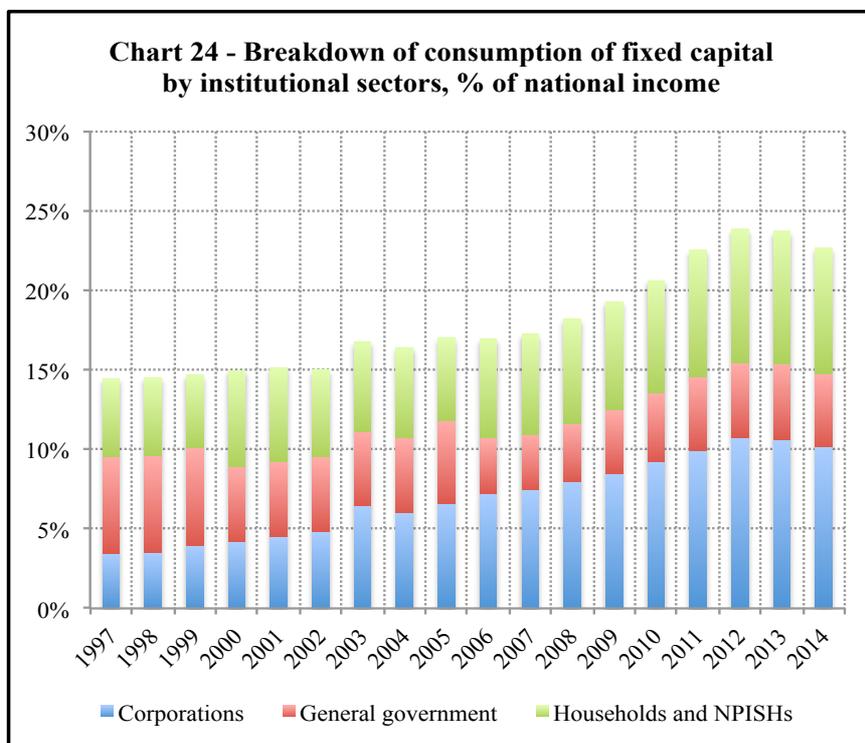
$$\text{Book_value of equity owned by RoW} = \frac{\text{Market_value of equity owned by RoW}}{\text{Tobin's Q}}$$

Ultimately, this approach enables to derive detailed breakdowns of foreign vs. domestic and government vs. private wealth with equity at book value. In particular, after adjusting the market-value series of equity using the implied Tobin's Q calculated above, the sum of the private and government wealth series should be exactly equal to the *adjusted* book-value national wealth.

Appendix n°6: Breakdown of gross and net capital formation by sectors, percentage of national income.

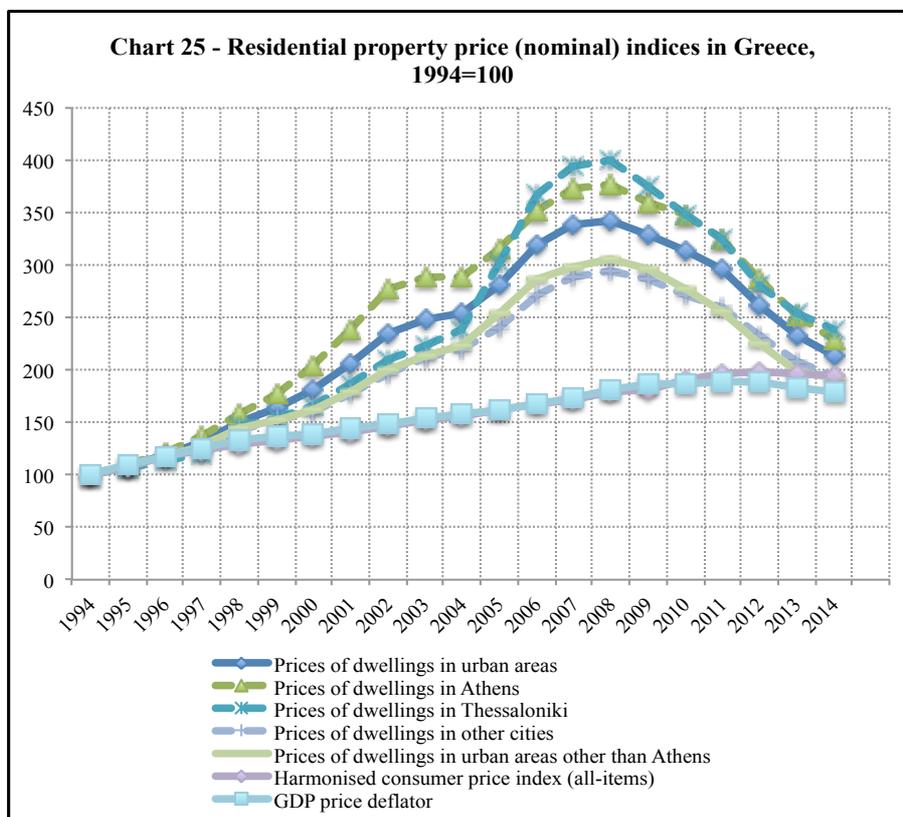
Source: own computations based on AMECO (European Commission).





Appendix n°7: Residential property prices in Greece (nominal prices) vs. consumer price index and GDP deflator.

Source: own computations based on Bank of Greece data for real estate price indices and European Commission AMECO for GDP price deflator and harmonized consumer price index.



Appendix n°8: Portfolio of non-financial assets by sectors in 2012, breakdown by asset types.
Source: own computations based on ELSTAT data (produced in accordance with Eurostat and OECD methodologies).

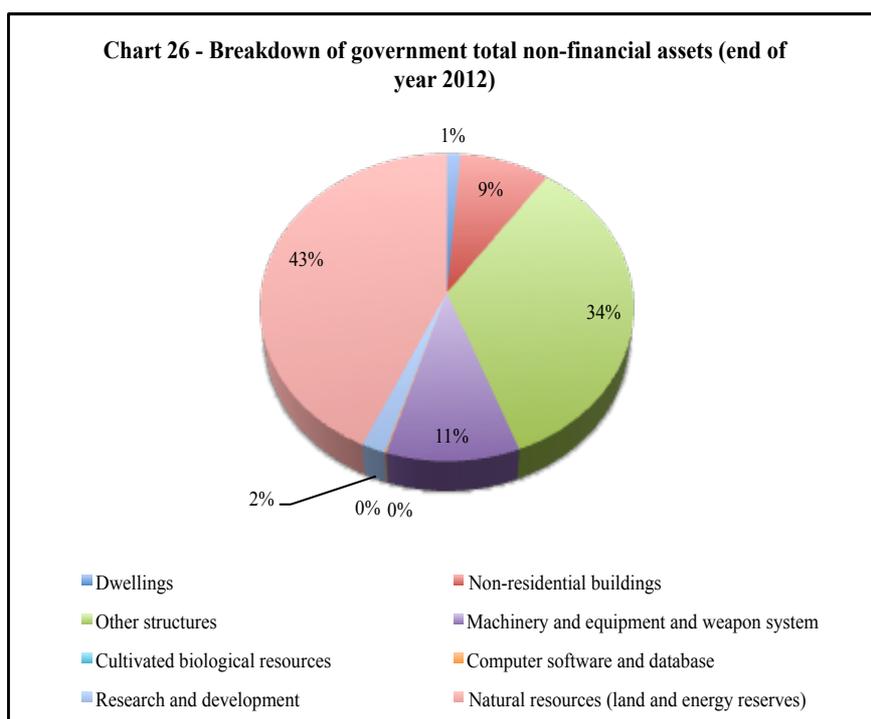


Chart 27 - Breakdown of households total non-financial assets (end of year 2012)

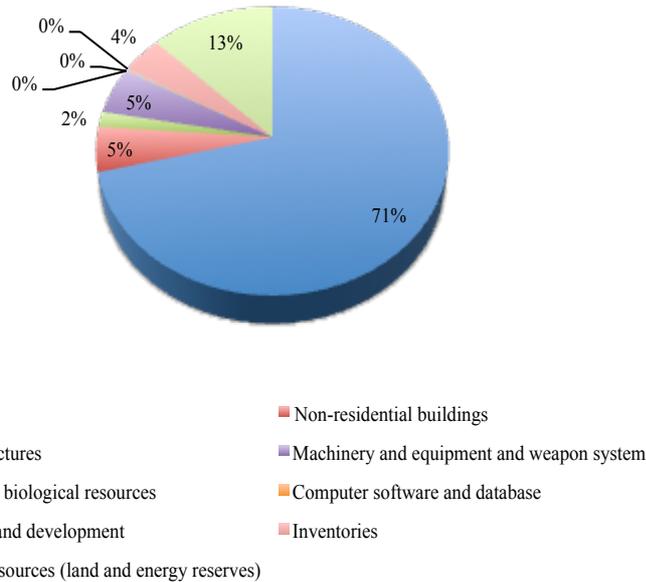
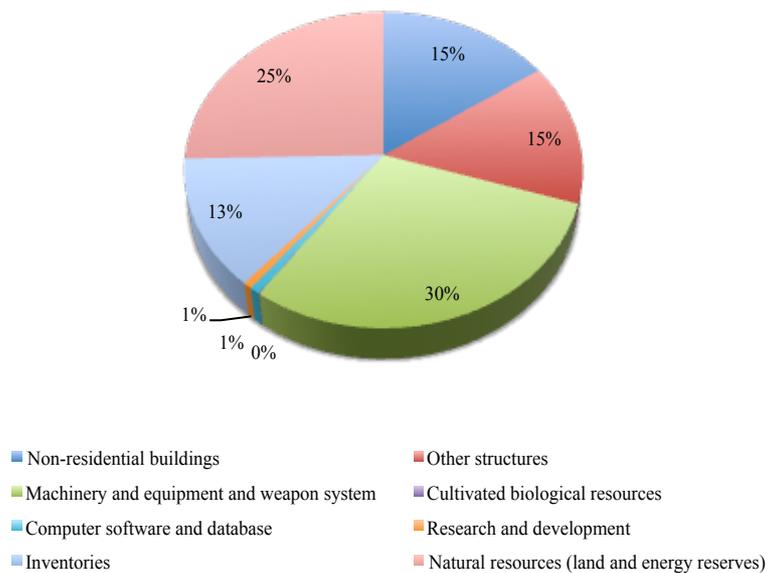


Chart 28 - Breakdown of corporations total non-financial assets (end of year 2012)



For the sake of clarity, I point out that:

- **Dwellings** typically include buildings or equipment such as houseboats, mobile homes or caravan that are used entirely or primarily as residences (including the associated

structures such as garages). Importantly, the value of dwellings is net of the value of land underlying dwellings which is a non-produced asset included in “natural resources” (as “land”).

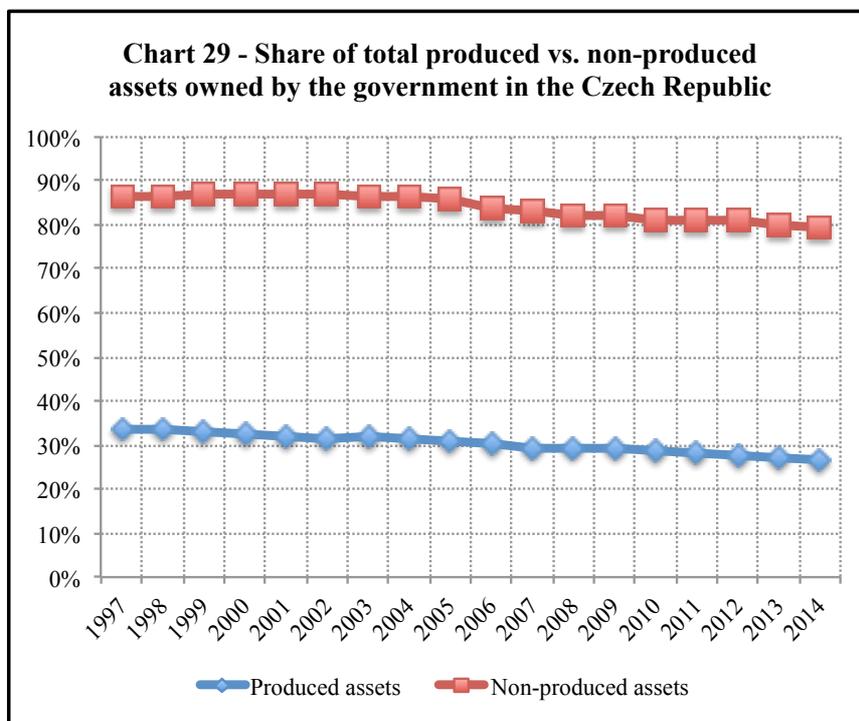
- **Non-residential buildings** include buildings other than dwellings such as warehouse and industrial buildings, commercial buildings, buildings for public entertainment, hotels, restaurant, schools (educational buildings), hospitals (health buildings) and also public monuments identified as non-residential buildings because of particular historical, national, regional, local, religious or symbolic significance.
- **Other structures** include typically highways, streets, roads, railways, airfield runways, bridges, tunnels, subways, dams, harbors, pipelines, communication and power lines, construction for sport and recreation etc. Structures intended to improve land adjacent but not integral to them such as sea-walls, dykes or flood barriers are classified as other structures and not land. Other structures also include public monuments not classified as dwellings or non-residential buildings.
- **Machinery and equipment and weapon systems** include transport equipment, information and communication technologies equipment other than acquired by households for final consumption (e.g. vehicles, furniture, kitchen equipment, computers i.e. all durable goods of households are excluded because considered as final consumption). Machinery and equipment integral to buildings are excluded and included in dwellings or non-residential buildings. On top of that weapons systems are vehicles and other equipment such as warships, submarines, military aircraft, tanks, missile carriers and launchers. Note that most single-use weapons (ammunition, rockets) are nonetheless recorded as inventories.
- **Cultivated biological resources** include livestock for breeding, dairy, draught etc. and vineyards, orchards and other plantations of trees yielding repeat products that are under the direct control, responsibility and management of institutional units.
- **Computer software and database** consist of computer programs and files of data.
- **Research and development** corresponds to the value of expenditure on creative work undertaken on a systematic basis in order to increase the stock of knowledge. The value of R&D is determined in terms of economic benefits expected in the future. In practice, it is often valued as the sum of the costs.
- **Inventories** consist of goods and services that came into existence in the current period or in an earlier period held for sale, use in production or other use at a later

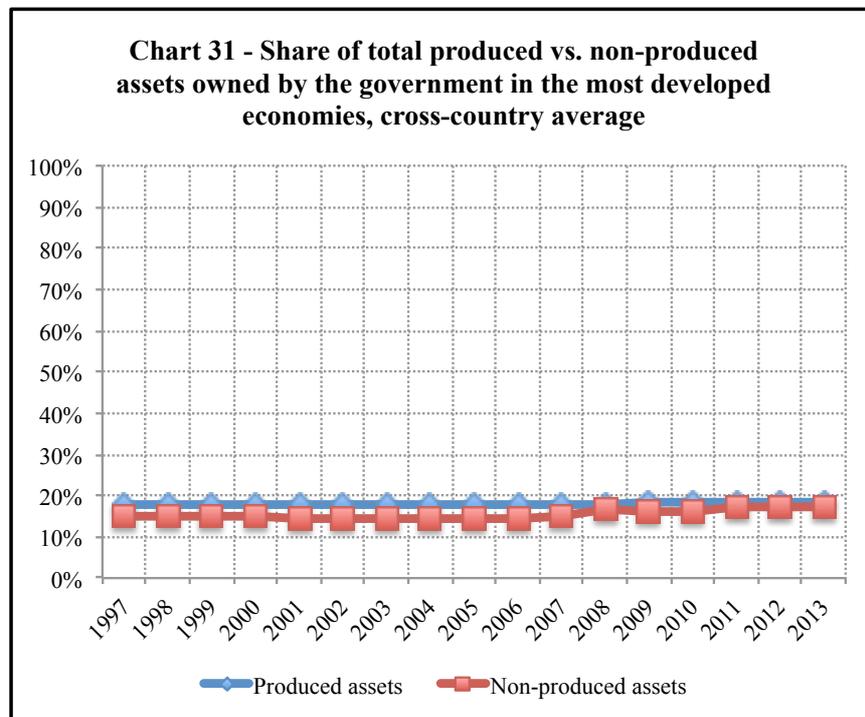
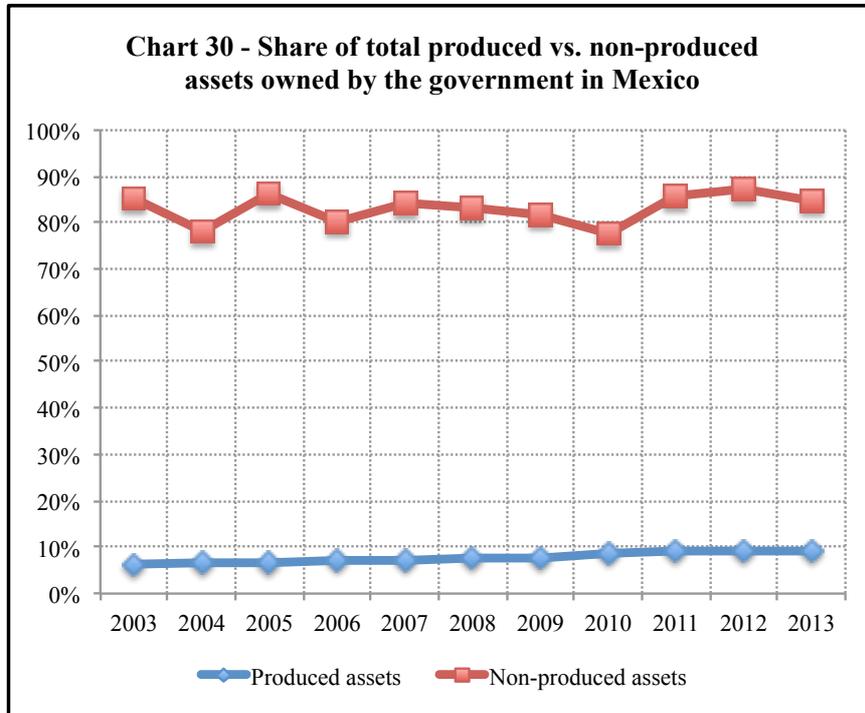
date. They include materials and supplies, work-in-progress, finished goods and goods for resale.

For more details about the classification of assets and composition of each category, I refer to the ESA 2010 manual, available online: http://www.lb.lt/n22873/esa_2010-en_book.pdf (Annex 7.1, p182).

Appendix n°9: Share of total produced vs. non-produced assets owned by the government in other countries.

Source: own computations based on OECD annual national accounts (balance sheets for non-financial assets).



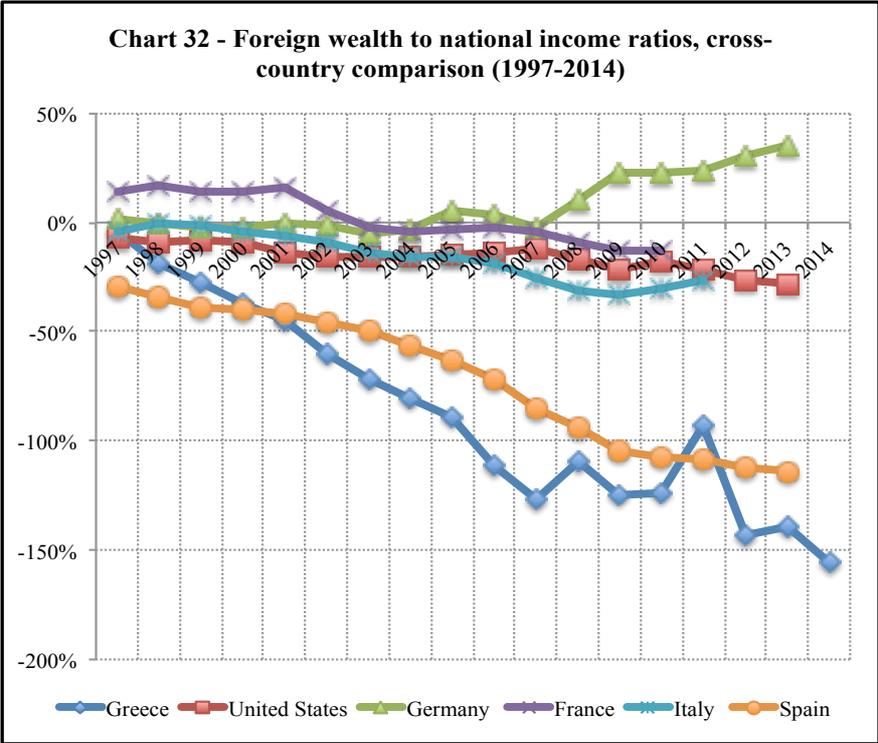


The reference dataset for the construction of these series in all countries is the OECD annual national accounts (non-financial balance sheets). The sample of the “most developed economies” includes five countries, namely Australia, Canada, France, Japan and Korea. The variance of the percentage of total produced and non-produced non-financial assets owned by the government between these countries is very low. I construct the cross-country average

series by simply calculating for each period between 1997 and 2013 the arithmetic mean of all series included in the sample. The graphs clearly show that in the relatively less developed economies (namely the Czech Republic and Mexico) the government holds throughout the period a disproportionately large share of the total non-produced assets. Note that the data before 2003 are not available for Mexico.

Appendix n°10: Cross-country comparison of net foreign asset positions, percentage of national income.

Source: own computations for Greece based on Bank of Greece data (financial accounts) and The World Wealth and Income Database (WID) for other countries.



Appendix n°11: Market-value national wealth-income series.

Source: own computations.

Chart 33 - National wealth in Greece, breakdown between government vs. private wealth, % of national income

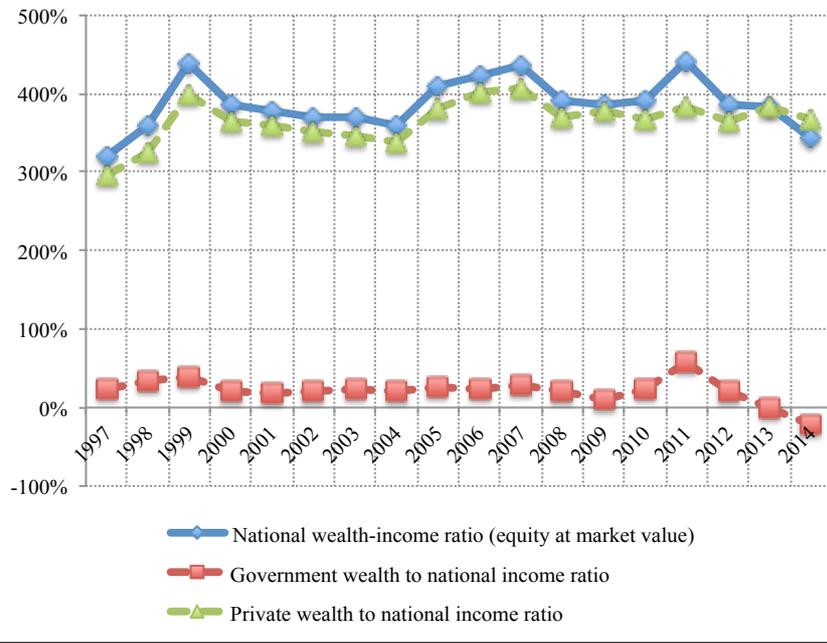
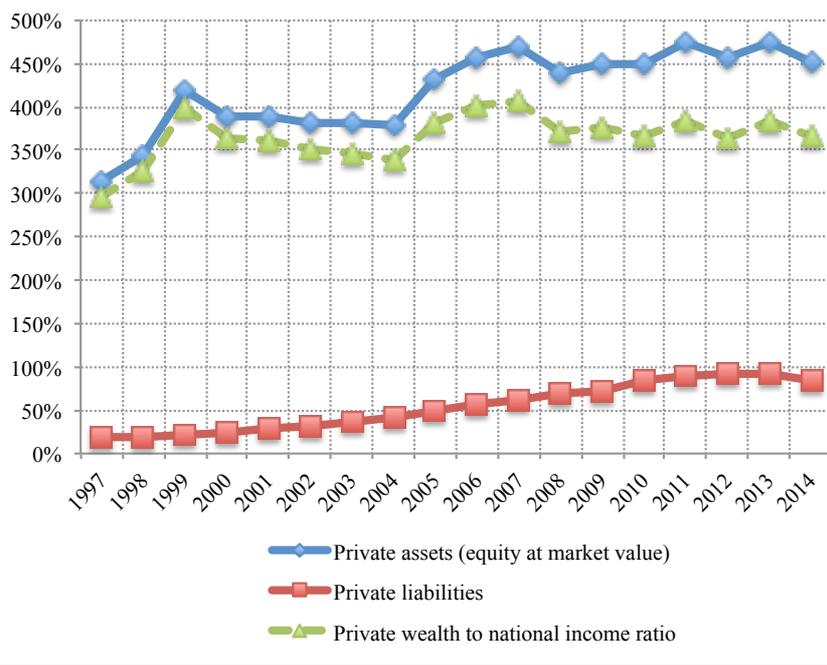
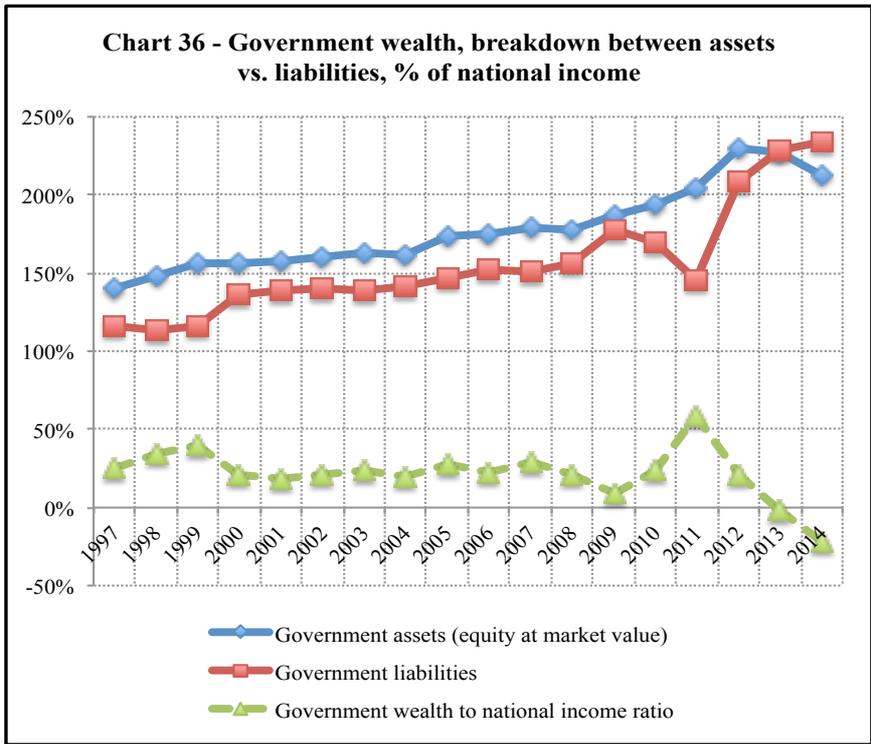
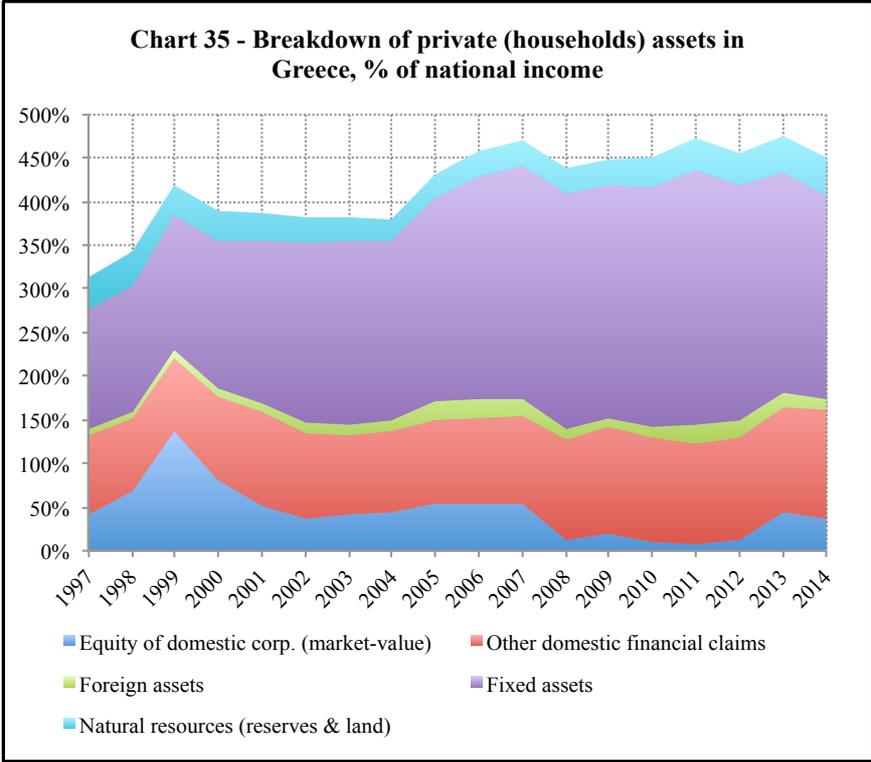
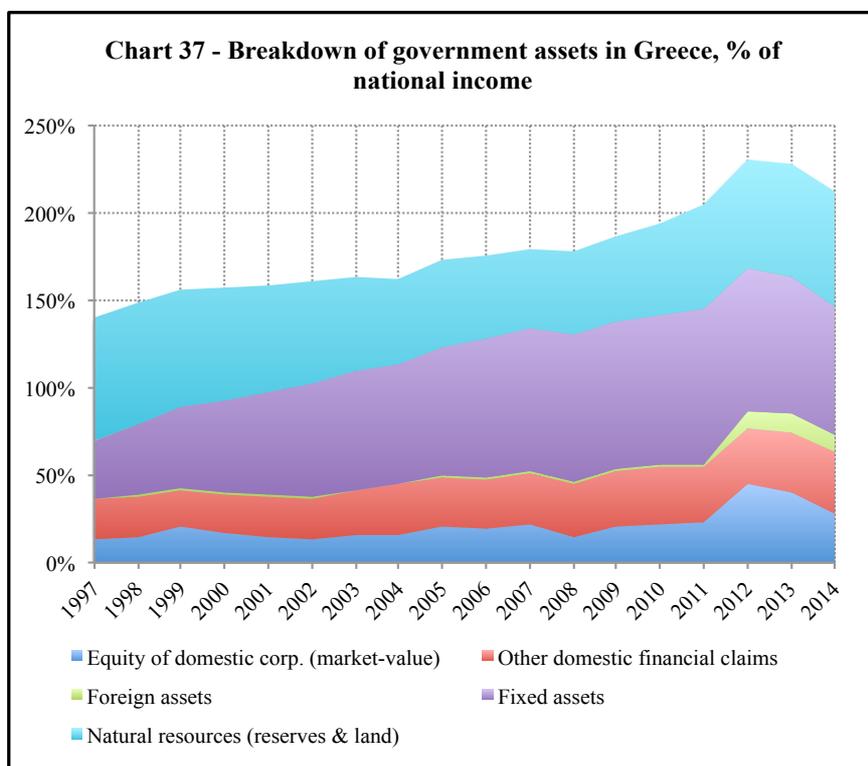


Chart 34 - Private wealth, breakdown between assets vs. liabilities, % of national income







Appendix n°12: November 2008 Hellenic Republic bank support plan.

Sources: Law 3723/2008, Greek banks' annual financial statements.

The Hellenic Republic bank support plan (Law 3723/2008) was implemented at the end of 2008 to strengthen domestic banks' capital and liquidity positions in the midst of the global financial crisis. The (initially) €28bn rescue package consisted of three pillars:

- **Pillar I:** non-dilutive capital increase for domestic banks with redeemable preference shares (with a 10% fixed rate of return) to be issued by banks, bought by the Hellenic Republic with Greek government bonds (equivalent of cash) and redeemed at the issue price at most five years after their issuance. Greek government bonds (with a coupon rate of 6-month Euribor plus 130 basis points premium) were transferred to the banks' securities portfolio.
- **Pillar II:** government-guaranteed borrowings facility (initially limited at €15bn but quickly expanded well beyond this threshold) to allow domestic banks to issue to "themselves" government-guaranteed notes (recorded off-balance sheet) used as collateral for refinancing purposes (regular refinancing with the ECB up until February 2015 and then for specific refinancing with the national central bank through the Emergency Liquidity Assistance (ELA) procedure). The nominal value of

government guaranteed notes issued under Pillar II has become colossal starting from 2010 (e.g. €42bn Pillar II bonds outstanding at the end of 2010). However, because they are guarantees, these debts are neither recorded in the annual fiscal deficit of the government nor in the stock of public debt.

- **Pillar III:** facility aiming at transferring to domestic banks special Greek government bonds collateralized with consumer loans. The law specifies that these special GGBs had to be kept in the banks' portfolios and use only for refinancing purposes.

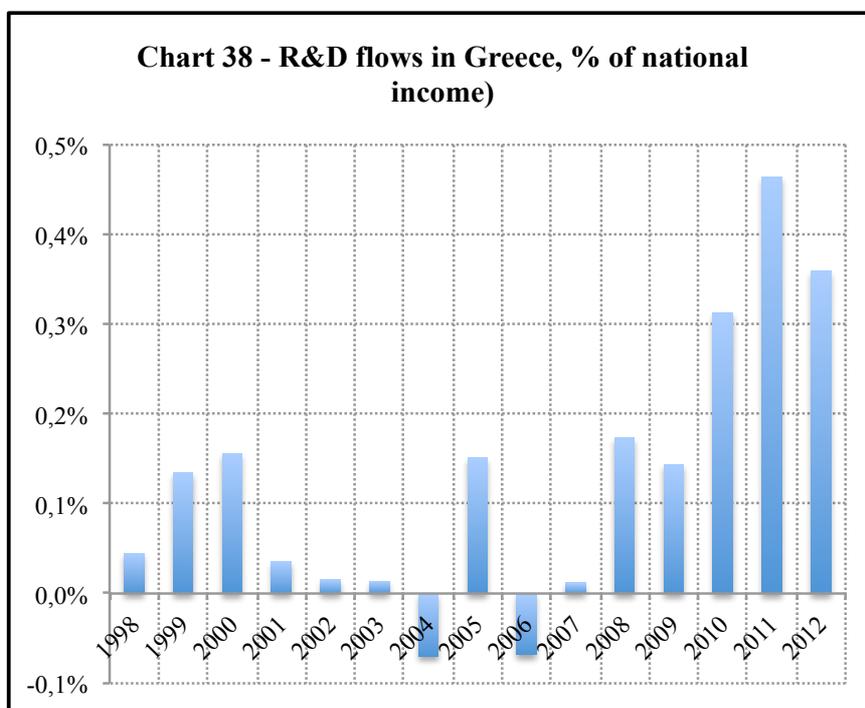
Table 9 - Hellenic Republic 2008 Bank Support Plan - Key Data for Top 4 Greek Banks							
		2009	2010	2011	2012	2013	2014
Alpha Bank	Pillar I preference shares	940	940	940	940	940	-
	Pillar II government-guaranteed notes	1000	9500	14000	9800	9800	9800
	Pillar III special government bonds	-	1600	500	500	500	1600
Piraeus Bank	Pillar I preference shares	370	370	750	750	750	-
	Pillar II government-guaranteed notes	n.a.	8200	13100	11200	7600	6300
	Pillar III special government bonds	865	1300	424	n.a.	1426	2998
Eurobank Ergasias	Pillar I preference shares	950	950	950	950	950	950
	Pillar II government-guaranteed notes	-	12050	17776	16276	13932	13667
	Pillar III special government bonds	900	1737	-	-	-	1918
National Bank of Greece	Pillar I preference shares	350	350	1350	1350	1350	1350
	Pillar II government-guaranteed notes	500	11966	14798	14798	14798	8766
	Pillar III special government bonds	n.a.	787	787	787	847	2109
Total "core banks"	Pillar I preference shares	2610	2610	3990	3990	3990	2300
	Pillar II government-guaranteed notes	1500	41716	59674	52074	46130	38533
	Pillar III special government bonds	1765	5424	1711	1287	2773	8625

Source: banks' end-of-year financial statements (available online on banks' websites)

Notes: amounts are in € million and at nominal value; "n.a." means the corresponding figure is not available.

Appendix n°13: R&D flows in Greece, percentage of national income.

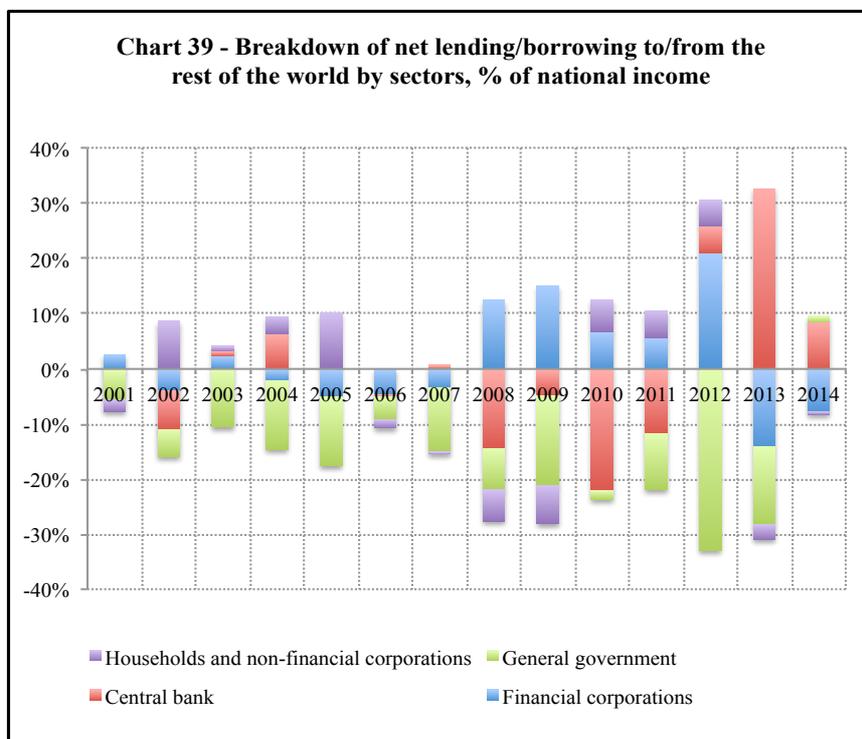
Sources: own computations based on OECD annual national accounts.



I extrapolate data on the value of the stock of R&D available in the OECD annual national accounts (section: balance sheet, non-financial assets) for Greece. As highlighted in the graph, the value of R&D flows is generally very small compared to the extent of national saving flows. Including R&D flows in the official saving flow series would not change the magnitude of real capital gains and losses.

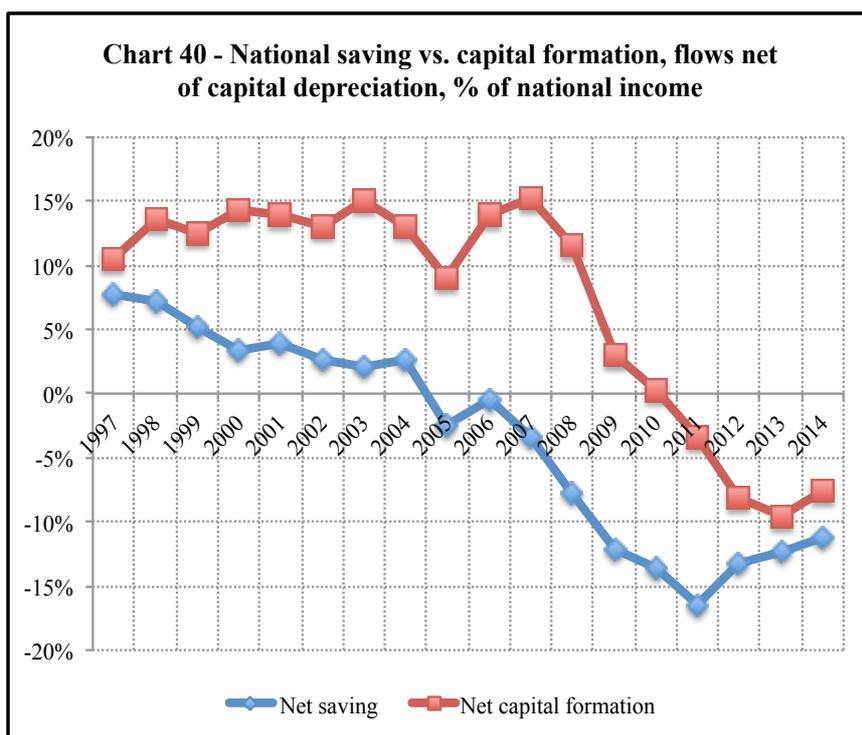
Appendix n°14: Breakdown of external (net) lending/borrowing flows by sectors, percentage of national income.

Source: own computations based on Bank of Greece detailed balance of payments dataset.



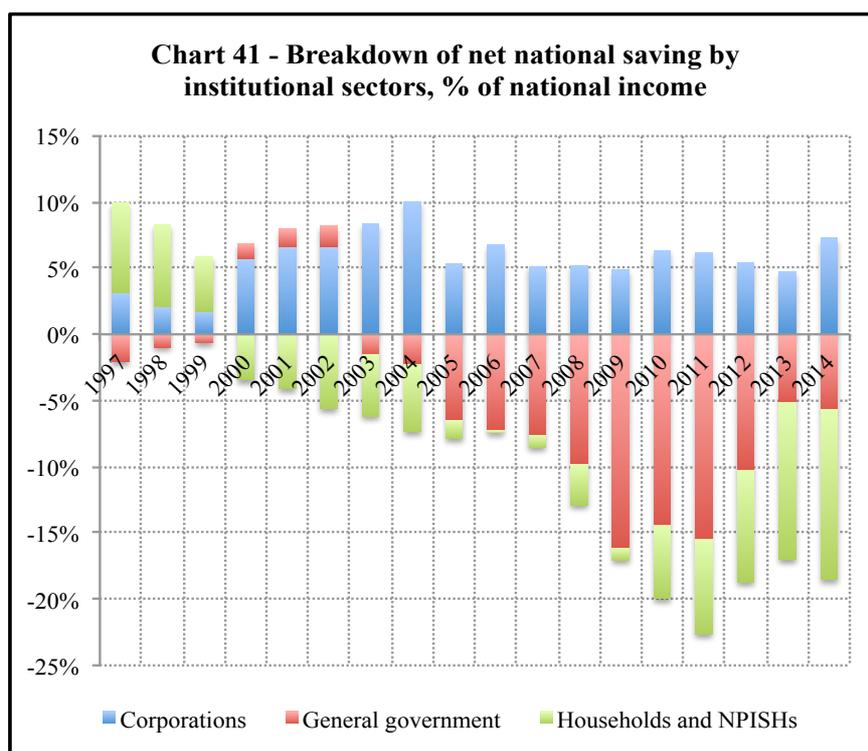
Appendix n°15: Gap between net national saving and net capital formation, percentage of national income.

Source: own computations based on AMECO (European Commission).



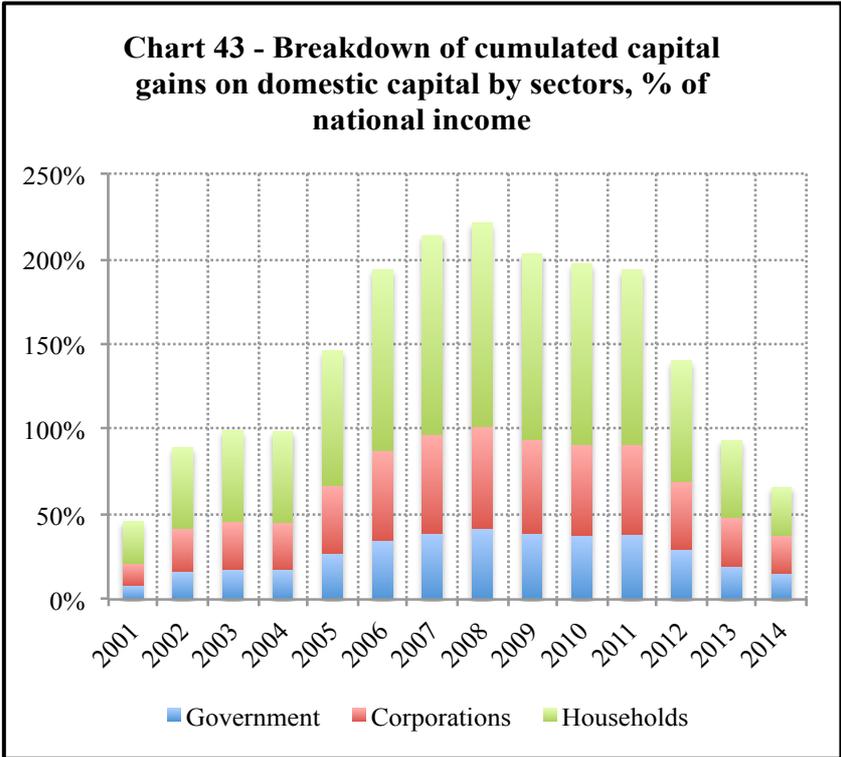
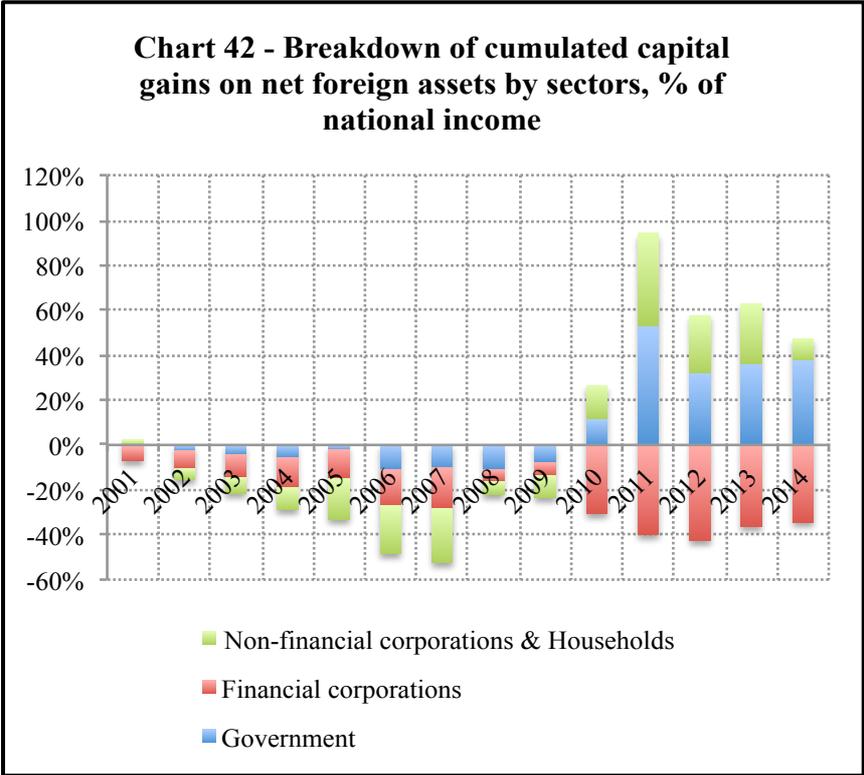
Appendix n°16: Breakdown of net national saving by sectors, percentage of national income.

Source: own computations based on AMECO (European Commission).



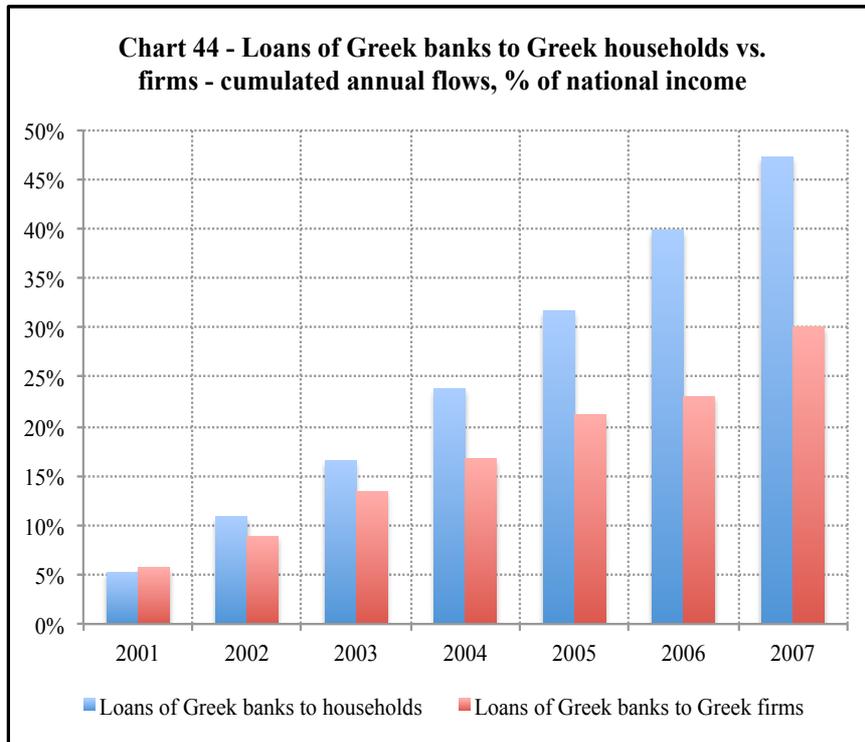
Appendix n°17: Annual breakdown by sectors of cumulated real capital gains/losses on net foreign assets and domestic capital.

Source: own computations.



Appendix n°18: New loans of Greek banks to households and firms, cumulated annual flows over 2001-2007.

Source: own computations based on Bank of Greece official financial accounts.



Appendix n°19: Residential property (real) prices in the euro area and the U.S. (nominal prices deflated using GDP deflator).

Source: own computations based on BIS property prices for all countries except Greece; for Greece, Bank of Greece main real estate price indicator (price of dwellings in urban areas); GDP price deflators obtained via the AMECO database.

Chart 45 - Cross-country comparison of residential property price (real) indices, 1994=100

