

HOW CAN THE USE OF HISTORICAL MACROECONOMIC DATA SERIES SUPPORT ECONOMIC ANALYSIS AND POLICY-MAKING? THE NEW GREEK MACRO HISTORY DATABASE 1833-1949 AS PART OF THE LARGE DATABASE OF SOUTHEAST EUROPEAN (SEE) COUNTRIES



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I INTRODUCTION

In times of crisis, there is growing interest in identifying appropriate policy responses and in comparing with similar episodes in the past. Policy responses are typically consistent with the current economic orthodoxy. After all, every crisis that emerges is perceived as unprecedented in intensity and duration. From an economic perspective, there are many alternative policies with different benefits and costs, so economists need to look for the option that is the least costly in terms of employment and output. Besides, the world economy has so far experienced several crises that repeat themselves over and over, but with important variations from time to time that make each of them unique, given the different local and international economic, social, cultural and ethical contexts of their development. This uniqueness implies that the ways to tackle the crises cannot be the same. Still, what remains the same is the question: “what is to blame” and “what went wrong”.

The current European crisis triggered a heated debate about the optimal solution. It also made it amply clear that each country is affected differently, depending on the specific features and weaknesses of its economic structure and governance. Those to suffer the most were countries with imbalances, namely with long-standing current account deficits, either because of weak export activity due to low competitiveness or because of strong demand for imports due to unsustainable, domestic consumption-led growth. With the outbreak of the global crisis, the persistent external imbalances of these countries also caused internal imbalances, with rapid accumulation of private and public debt, mass capital outflows, credit crunch, disinvestment, job losses and recession.

Under the pressure of an abrupt drying-up of private financial flows, deficit countries made

painstaking efforts to reverse their external imbalances by increasing competitiveness and exports and reducing wages and incomes. Adjustment was achieved at the cost of high unemployment and capacity underutilisation, while, at the same time, any efforts to restore growth by increasing exports and total investment activity were hampered both by significant financing constraints and by weak aggregate demand in the European and the global economy. Therefore, in countries with low industrial production, shortage of natural resources and low tourism activity, adjustment has been more painful, as it was achieved mainly through lower domestic demand.

Greece is one of the countries that were dramatically affected by the recent crisis, as in six years it lost more than one fourth of its national product and one fifth of total employment.² Although its economic and monetary history is rich in crises and defaults, it has not been systematically studied, thus remaining largely unknown and hazy. This is partly due to the lack of data and of systematic data collection. To address this shortcoming, the Bank of Greece, along with six other European national central banks, has participated in a research

1 I would like to thank the participants in the seminar series (2014-2015) of the Greek Economic History Association, National Hellenic Research Foundation, on 20 October 2014, for their comments and suggestions. Special thanks go to George Kostelenos, Maria Christina Chatziioannou, Leda Papastefanaki and Socratis Petmezas for a constructive exchange of views, as well as to Heather Gibson and Hiona Balfoussia for their pertinent remarks. The Greek statistical database is included in the volume entitled *South Eastern European Monetary and Economic Statistics from the Nineteenth Century to World War II* (SEEMHN 2014) published by the Bank of Greece, the Bulgarian National Bank, the National Bank of Romania and the Oesterreichische Nationalbank (Chapter III: “Greece: from 1833 to 1949”, pp. 101-170). The publication is prefaced by the governors of the central banks of Austria, Bulgaria, Romania and Greece, as well as by Michael Bordo, Luis Catão and Nikos Christodoulakis. The publication is available on the Bank of Greece website: <http://www.bankof-greece.gr/Pages/en/Publications/Studies/> and <http://www.bankof-greece.gr/Pages/en/Statistics/default.aspx>.

The views expressed in this article do not necessarily reflect those of the Bank of Greece. The author is solely responsible for any errors or omissions.

2 Between 2007 and 2013, the gross domestic product at constant 2010 prices dropped by 26.3%. Between 2008 and 2014, total employment fell by 23%.

network established in 2006 for the purpose of preparing a joint publication providing, for the first time, a complete, harmonised and comparable long-run statistical database on key macroeconomic and monetary variables for Southeast European (SEE) countries (see SEEMHN 2014). Part of this large statistical database is the Greek database, which spans over 100 years (1833-1949).

The availability of historical data series supports analysis of past events from a quantitative perspective. This knowledge can serve as important input in decision-making that will shape the future. The purpose of this article is twofold: first, to present the Greek statistical database and, second, using specific examples of historical data series, to demonstrate the value of their use in understanding the mechanics behind the creation and evolution of phenomena.

The article is structured as follows. Section 2, in the light of the current crisis, discusses the reasons why economics has moved away from analysing historical experience. Section 3 explains why history and its quantitative documentation are necessary for appropriate policy-making. Section 4 provides an outline of the Greek statistical database and the underlying methodology, while Section 5 offers policy examples using historical quantitative data. Finally, Section 6 summarises and concludes.

2 ECONOMIC SCIENCE AND CRISES

As soon as the crisis erupted in 2008, the contemporary economic thought was put to question. Some have argued that the “dismal science”, as it had been called earlier is in decline as an academic discipline³ (see *Financial Times*, “Economics needs to reflect a post-crisis world”, 25 September 2014) and that, to stay relevant, it must be grounded in reality, reflecting the post-crisis world (see *Financial Times*, “Universities to revamp economic courses”, 22 September 2014). The debate was dominated by three questions: first, why did economists and economic historians fail to

predict the crisis? Second, could economic policy-makers have addressed the crisis more effectively, limiting its painful consequences for the real economy? And third, why have we not learned from history and from experience of past crisis episodes to avoid repeating the same mistakes and failings? As regards the first question, it would probably be unfair to expect economists, with the tools available to them, to provide safe and successful predictions about a complex reality. This is so for two reasons:

(i) Conventional economic thought has so far relied on a number of critical assumptions such as regularity, linearity, rational behaviour of economic agents, market clearing, full adaptability and risk certainty. Although these assumptions are useful for solving mathematical economic models, they tend to oversimplify the real world, often leading to policy implications that only come with a “normal conditions” caveat. This approach can provide a more or less safe simulation of historical reality but, as a rule, fails to adequately predict the future, since it overlooks information derived from outliers that are frequent and sizeable enough to effectively shape reality.

(ii) From the mid-1980s to 2008, economic thought was dominated by the concept of Great Moderation (see Stock and Watson 2003, Hakkio 2013, Clark 2009). This refers to the perceived and measurable reduction in business cycle volatility after the high volatility that prevailed in the preceding decades. This statistical finding, reflected in low inflation, moderate economic fluctuations and predictable outcomes, was interpreted (Bernanke 2004) as the result of a combination of factors:⁴ (a) an improved monetary policy framework through the recognition of central bank independence, which relieved monetary policy

³ Thomas Carlyle (1795-1881), a racial supremacist and anti-abolitionist, coined this phrase in his dispute with John Stuart Mill about whether the economic development of a nation was determined by race or by institutions.

⁴ The phrase “good luck, good policy, good conduct” best exemplifies the coexistence of all these factors. For a discussion of these factors, see Coric (2011).

from pressure to accommodate the government's fiscal agenda and made monetary policy implementation more transparent; (b) better financial supervision;⁵ (c) the development of counter-cyclical automatic stabilisers that mitigate the adverse impact of business cycle shocks; (d) a structural shift from highly volatile sectors, such as the primary and secondary sectors, to more predictable and less volatile ones, such as the tertiary sector; and (e) the absence of frequent and severe external shocks.

Furthermore, institutional reforms to the functioning of the labour market through the introduction of more flexible forms of employment, as well as firms' improved inventory management thanks to ICT advances were additional factors behind lower macroeconomic volatility. This environment of economic stability made economists believe that they had developed sufficient tools to control the volatility of the business cycle and created expectations of "perpetual growth". However, this same environment in turn shaped a financial environment that encouraged the accumulation of debt and excessive risk-taking, sowing the seeds of the crisis in the years that followed.

One might argue that a historical parallel to Great Moderation was the New Age period on the aftermath of World War I. Rapid economic growth in that period led to a fast rise in asset prices in the late 1920s. High volatility in money and capital markets was also blamed for the foreign exchange crises of the 19th century. It was then considered necessary to introduce a new monetary institution in every country, the central bank,⁶ which would have the exclusive privilege of issuing legal tender and would be mandated to maintain monetary and financial stability. However, as the experience of the Great Depression showed, this new institution failed to prevent the crisis or mitigate its impact on the business cycle; still, it demonstrated the importance of strict supervision of the banking system's on-balance-sheet activities and the need for counter-cyclical fiscal policies.

Turning to the second question, despite the marked progress of economics and the improvement in analytical tools at its disposal, it has not been possible to incorporate the impact of financial uncertainty and instability into the neoclassical model of optimal behaviour, nor to formulate a comprehensive theory that would explain the interaction between financial developments and the macroeconomy.⁷ Economists focus on macroeconomic models that do not properly depict the financial system. Financial analysts, on the other hand, usually disregard the effects of financial instability on the macroeconomy. The recent crisis is a case in point: in its initial phase, the steep fall in real estate prices undermined, through mortgage loans, the stability of the financial system and of the real economy in general.

Concerning the third question and the ability to learn from historical experience, right after the outbreak of the crisis economists delved into the past trying to draw useful lessons. The Great Depression of the 1930s was the predominant area of focus. Nevertheless, neither economic theory nor economic history aim to formulate generalised lessons that could easily and safely be applied; this is so because the lessons of history are typically time- and state-contingent, in the form of findings or conclusions applying only to the specific period of a given event and to the particular circumstances of its occurrence. In other words, they cannot be universally applied, since no event repeats itself identically. Therefore, an automated, mechanic and generalised application of a lesson may lead to unsound policy implications if taken out of context. The point is thus not to anxiously glean lessons from the past and apply them to the present, but to make the best possible effort to conduct in-depth and extensive historical research in order to generate new

⁵ Mainly with regard to the evolution of on-balance-sheet activities.

⁶ In contrast with a note-issuing bank that also operated as a commercial bank.

⁷ See Fabozzi et al. (2010) and Tobin (1958). For an empirical analysis of the relationship between monetary policy, securitisation and excessive risk-taking, see Jimenez et al. (2012).

knowledge. This knowledge will become a safe roadmap towards a more accurate understanding of the present and appropriate policy-making to shape the future. Therefore, every crisis affirms the need for more and better research into economic history.

To attain this goal, two conditions must be met. First, emphasis should be placed on better understanding and utilising country-specific experience and characteristics at different periods of the past and comparing them with the experience of other countries in a regional or global context. This would build a sample of observations from similar historical episodes, constantly enriched with new ones, which would provide invaluable information about the method and size of responses to a global crisis and their results, since there is no single policy to address a crisis and, even if there were, it would have to be adjusted to the specific temporal and geographical circumstances in order to be effective. The current literature and debate among academics and policy makers mainly focus on the monetary experience of major developed countries in Western Europe and of the United States, which are at the core of the global economic system and have historically played a leading role. At the same time, the monetary and economic history of the weak periphery countries remains inadequately researched. Consequently, policy decisions are largely made on the basis of the experience of a few strong economies. However, their generalised application is not always safe.

The second condition refers to the availability of reliable quantitative data as a necessary tool to study historical experience. Underpinning economic history by long-run macroeconomic time series helps to substantiate and empirically verify historical narratives, provide valid evidence of the nature of determinants of the phenomena and enrich our knowledge of historical events and country experiences.⁸ Although history by definition does not teach us about the present, it passes on knowledge that is instrumental to policy-making.⁹

3 ECONOMIC HISTORY AND POLICY. WHY DOES ECONOMICS NEED HISTORY?

Currently, economics and history are largely separate disciplines. Economists and historians rarely cross paths, and, if at all, only exceptionally. Looking at academic terminology, it is hard to find a commonly accepted definition of economic history. According to Douglas North (1981), economic history should explain the structure and performance of economies over time.¹⁰ The term “performance”, in its original and main sense, denotes the evolution of macroeconomic fundamentals over time (“the typical concerns of economists”, aggregate macro history¹¹), such as production, industrialisation, consumption and investment, inflation and unemployment, optimal allocation of inputs to achieve the highest possible economic growth rate, uneven distribution of income and its effects on growth. In this case, economic history and the statistical processing of quantitative data are the key analytical tools. The term “structure” includes those characteristics of a society which are considered as determinants of its performance, i.e. political and economic institutions, technology, demographics. The word “explain” means “explicit theorising and the potential of refutability”, while the phrase “through time” refers to “temporal changes in structure and performance”.

Others argue that economic history deals with the behaviour demonstrated in the past by spe-

8 The need for economic history and historical statistics to assist the study of economic phenomena was underlined by Paul Samuelson. In one of his last interviews a few months before his death, he expressed the view that economists must “... have a very healthy respect for the study of economic history, because that’s the raw material out of which any of your conjectures or testing will come... But history does not tell its own story. You’ve got to bring to it all the statistical testings that are possible...”. (“An interview with Paul Samuelson”, Part Two, Connor Clarke, June 2009, *The Atlantic*).

9 Apart from the Bank of Greece’s initiative in the context of the SEEMHN research project, the first outcome of which is the compilation of the historical database for SEE countries, it is worth mentioning two other similar activities: that of the Institute for New Economic Thinking, studying the experience of emerging market economies, and that of University College London, with its CORE (curriculum open access resources in economics) project, involving the interactive (ebook-based) teaching of economics with an emphasis on historical quantitative documentation.

10 “I take it as the task of economic history to explain the structure and performance of economies through time” (Chapter 1, *The Issues*).

11 Adelman (2014).

cific economic agents such as enterprises and entrepreneurs, consumers and employees, savers and investors, interest groups, economic policy-makers and administrative bodies (disaggregated history). In this case, it borrows analytical tools from social sciences, such as social anthropology. Once again, quantitative data processing is the main analytical tool for studying how the effects of an event are spread across various economic and social agents, which is the key question that economic history is called upon to answer.

According to all definitions, the subject matter of economic history is the evolution of economic institutions and economic behaviour across time. Economic history does not only study past economic activity, but also sheds light on topical questions of relevance to policy-makers. In this sense, it bridges the past with the present. To do this, it needs to blend economic theory and quantitative data with methods from other disciplines such as demography, statistics and sociology.

A good definition is given by the *New Palgrave Dictionary of Economics*: “economic history focuses on the historical study of economic development and growth...”. From a professional and academic point of view, economic history was distinguished from economics with the emergence of scientific societies in Great Britain in 1926 and then in the United States in 1941. As economics increasingly shifted away from history to the use of mathematical models in the 1960s, the “new economic history” advocated the application of economic theory to history (“but its emphasis on data analysis retained a bridge to other traditions”, see Field 2008).

Against this background, the compilation of long-run time series, using information from historical archives, should not be neglected. By allowing for the quantitative analysis of historical events, these data fill the “knowledge gap” and even bring unknown events to light. In turn, this new knowledge changes the existing historiography and takes us further along the path towards the objective truth.¹²

In Greece, the split between economics and history is clear. Economic history is limited to a simple narrative of events as they unfolded. The importance of a holistic study and teaching of economic theory in the context of a thorough examination of historical episodes is systematically underplayed. Economic historians are misleadingly stereotyped as “economists that use historical statistics in their analysis” or “historians dealing with economics”. There also prevails a wrong view of economic historians as “academics who are only interested in what happened in the past and do not deal with the present and current matters”.

In turn, economics overlooks the value of historical research. To describe and study the behaviour of economic agents, it mostly uses mathematical models, the robustness of which is conditional on the validity of a number of underlying assumptions that provide a simplified picture of a complex economic reality. The solution of these models is based on deduction (hypothetical deductive models): economists propose a general theory and try to test its validity by examining it in specific cases (top-down approach). If the theory is verified, they then draw generalised conclusions, which however are only valid if the initial conditions were correct. However, they do not know the exact functioning of the economy in the real world. Their knowledge is limited to the study of abstract models that are often based on wrong assumptions, since economics, unlike the so-called “hard” sciences, is subject to strong data limitations. Moreover, the experimental method cannot be applied to the collection of observations, since an economy cannot be subjected to experimental conditions.

In other words, while hard sciences construct models to explain actual data collected by observation or experiment, an economist uses a model to describe how the world might work. Theory is empirically verified either by interpreting econometric results or by identifying

¹² See e.g. Deane and Cole (1967), Feinstein (1972), Lindert (2004) and Crafts and Fearon (2013).

stylised facts. However, both processes rely on the use of a limited sample of observations under “normal conditions”; as a result, the absence of a broader, long-term perspective can lead to wrong conclusions as to the robustness of the economic model.

Against this backdrop, it is clear that economists argue on the basis of theory, while historians on the basis of facts. Economic historians have to do both, namely combine theory with facts. Their analytical tools are empirical or historical inductive models.¹³ They are not confined, as historians are, to collecting and studying a sample of events, or, as economists are, to making assumptions and verifying *a posteriori* a general theory. On the contrary, the first step in their analysis is to collect the highest possible number of observations for an actual event. High incidence of these observations ensures the success of the second step, which involves the identification of a recurrent pattern and the construction of a behaviour model that would allow, as a third step, to investigate the causes that generated a phenomenon and make alternative assumptions about its occurrence. The final step is to draw general conclusions or formulate theories. We could describe the methodology by the following scheme:

quantitative data → *pattern* → *assumptions* → *theory*

For an economist, the steps of the technique would be employed in the reverse order.

Therefore, the compilation of reliable statistics that capture, in a condensed manner, the incidence of an event and its specific features (magnitude, duration, intensity) is the groundwork for an economic historian’s research. By extension, the condensation of historical experience and the use of quantitative data to support it provide a deeper insight into the mechanism generating an event and the causes for its repetition. This knowledge is vital to drawing useful conclusions that will help in economic policy-making.

4 THE NEW GREEK HISTORICAL STATISTICAL DATABASE, 1833-1949

4.1 OUTLINE

The monetary history of the modern Greek State has not been adequately researched to date. Although there is an extensive body of literature, it largely consists of anniversary publications, chronicles, albums and biographies, exhibition catalogues or, at best, reprints of past monographs and papers. These mainly focus on a simple chronological narration of monetary events, without attempting to identify and interpret the underlying mechanisms, or on empirical verifications of some theory or assumption using available long-run data series. However, both approaches are far from a comprehensive and systematic study of monetary phenomena in Greece.

An important obstacle has been the absence of a comprehensive and reliable statistical historical database on the Greek economy. The statistical series available so far are incomplete, insufficient, fragmented and unofficial, and largely unknown to the broader research community; as a result, efforts to utilise such data have only been sporadic, and the case of Greece only randomly features in the international literature.

By making the new statistical database available to the international research community, the groundwork is laid for more systematic research into the economic, monetary and banking history of modern Greece, with a view to building on existing knowledge and adding new knowledge that would contribute to informed policy-making. In greater detail, the use of this database as a tool for the quantitative documentation of the historical narrative is expected to help identify any parallels between the past and the present and draw appropriate policy implications, which is the ultimate goal of the endeavour. In this respect, the database should help to answer topical questions such as:

¹³ Known as bottom-up approach.

1. What are the specific characteristics that classify an economy in the periphery of the global monetary and economic system?
2. Which factors can explain the economic backwardness of a country?
3. Why does a country often experience an elusive stability?
4. What are the factors behind the persistent trust deficit, which is understood as the lack of credible fiscal and monetary institutions, causing a country to suffer repeated confidence crises?
5. What were the benefits and risks of Greece's effort to borrow policy credibility by joining an economic or monetary club of strong economies and pegging to a monetary anchor?
6. What were the specific problems faced by Greece whenever an international crisis occurred? and
7. What did the day after look like?

The answers to all these questions will provide an in-depth understanding of the architecture of the international monetary system which prevailed in each historical period and was joined by Greece; it will also help us identify the reasons why the country failed to reap the benefits of membership of successive monetary systems.

The Greek statistical database (Greek Macro History Database) is part of the large historical statistical database of SEE countries (SEE Macro History Database), included in the joint publication entitled *South-Eastern European Monetary and Economic Statistics from the Nineteenth Century to World War II* (SEEMHN 2014, Chapter 3). It is accessible on the Bank of Greece website, <http://www.bankofgreece.gr/Pages/el/Publications/Studies/SeemhnDataVolTables.aspx>). It covers the period between 1833 and 1949 and

comprises a total of 98 time series of annual and monthly data, grouped in six categories. For the period 1833-1939, there is a complete set of annual and monthly time series for the following broad categories of macroeconomic data:

- (1) monetary variables;
- (2) interest rates;
- (3) exchange rates;
- (4) government finances;
- (5) prices, production and labour; and
- (6) national accounts and population.

For the period 1940-1949, there is a complete set of data on an annual and monthly basis for three variables:

- (1) monetary base;
- (2) exchange rates; and
- (3) the cost-of-living index.

The database is divided into three parts. The first part provides a brief but comprehensive account of the most important monetary events in the country and an accurate analysis of the institutional framework of monetary policy in each reviewed period. This was deemed necessary because collecting, recording, processing and verifying data and compiling indicators for such long and distant periods require in-depth knowledge of the domestic and international institutional environment of economic and monetary policy. This knowledge helps us to more strictly define the variables published.

The second part sets out definitions of variables and provides detailed explanation of each time series separately, in each of the six categories. It also details the method for compiling new variables; for instance, money supply, long-term government borrowing costs and a proxy for public debt are given each two definitions.

The third part presents in detail all the sources of information. There is a focus on an accurate description and discussion of primary sources, such as regular or occasional publications of

statistical bulletins, statistical yearbooks, banks' balance sheets and annual reports, government budgets and ex-post reports. Secondary sources are also discussed, mainly including published original research, which is mostly used to cross-check quantitative data found in primary sources or to address gaps and breaks in the relevant time series.

To facilitate users, an index table at the beginning of the Greek statistical database summarises all useful information, i.e. the definition of the group of key variables and their components, time span, data frequency, unit of account and series code. Finally, the database is accompanied by charts plotting the evolution and interactions of selected variables over time.

4.2 METHODOLOGY

To ensure reliability, accuracy and comparability of quantitative data, all central banks participating in the project agreed¹⁴ on a common methodology as regards a number of fundamental matters, such as selection and definition of variables, methods for the collection of information, techniques for compiling new indices and missing data handling.

In more detail, *first*, the statistical database comprises information about a minimum but adequate set of variables, common to all countries. Emphasis was placed on monetary variables, in an aim to utilise the comparative advantage offered by the archives of national central banks.

Second, the time series were compiled on the basis of commonly used definitions, as the best way of achieving maximum conceptual accuracy and harmonisation across countries and across time (historical vs. current series) for the same variable, thereby ensuring consistency and continuity.

Third, each variable is described in detail, enabling to identify variations in the recording method across countries and across time within

the same country. These variations typically reflect different monetary policy regimes.

Fourth, data were collected only from primary sources.

Fifth, the method of presentation was the same across countries, with both aggregated and disaggregated data series. The time span of each series is the longest possible, the unit of account is the legal tender of each country, the frequency is annual and monthly, while the method of linear interpolation was used in the case of missing data.

Sixth, the compilation of new indicators mainly relates to GDP, government borrowing costs, money supply and a proxy for public debt.

5 GREEK HISTORICAL TIME SERIES AND ECONOMIC POLICY: EXAMPLES

The analysis of simple policy examples using specific historical time series demonstrates their importance for policy assessment. This section focuses on four groups of variables.

5.1 MONETARY AGGREGATES

Monetary aggregates are divided into two categories of variables: (i) the country's reserves; and (ii) measures of domestic money supply. For the purposes of quantitative presentation, the first category is defined as the sum of: total reserves in precious metal (gold and silver) in the form of barren metal or minted coins held in the vaults of all note-issuing banks until 1927 and of the Bank of Greece since 1928); gold-based foreign exchange (usually French francs and pounds sterling) in the form of

¹⁴ The successful completion of the project is primarily due to the strong team spirit among participants. Regular meetings (13 in 7 years) and daily online communications ensured that any problem was promptly and effectively addressed. The roundtable format of regular meetings provided an opportunity for a fruitful exchange of progress reports, knowledge and information. Moreover, the setting up of sub-groups contributed to a quick, sound and useful process of peer review and editing. At the same time, the early utilisation of time series to study specific monetary phenomena has been a first test of their accuracy.

interest-bearing deposits with foreign central or correspondent banks, used to settle the country's international payments and back the convertibility of banknotes; and gilt-edged bonds held as part of the central bank's assets.

In selecting the items under the quantitative definition of the reserves variable, we addressed two issues: conceptual content and method of valuation. Specifically, in metallic monetary regimes, reserves were meant to ensure banknote convertibility. Nowadays, reserves data are built on two different concepts (see IMF 2013, Balance of Payments and International Investment Position Manual): "international reserves" or "official reserve assets", and "foreign currency liquidity". According to the first concept, international reserves are used for the country's international transactions and for foreign exchange market interventions aimed to influence the international price of the currency. They are recorded on the assets side of the central bank's balance sheet. The second concept is broader and refers to both on- and off-balance-sheet items, not only of the central bank, but also of the government, which are aimed to meet demand for foreign exchange.

To avoid an overestimation of reserves, we adopted the first definition, which narrows the concept of the variable. Similarly, to avoid an underestimation, we took into account the total level of reserves, not just the statutory lower limit¹⁵ as defined in the founding law and the statute of the note-issuing/central bank. The latter would perhaps be relevant if the objective of monetary policy was only to ensure the statutory lower limit of reserves and the upper limit of currency in circulation. However, since the country's reserves were used to fulfil foreign payment obligations arising from international borrowing and a net liability position, the concept of "official reserves" or "international reserves" is more relevant.

A second issue refers to the method of valuation. Note-issuing banks used to report their metallic and foreign exchange reserves not at

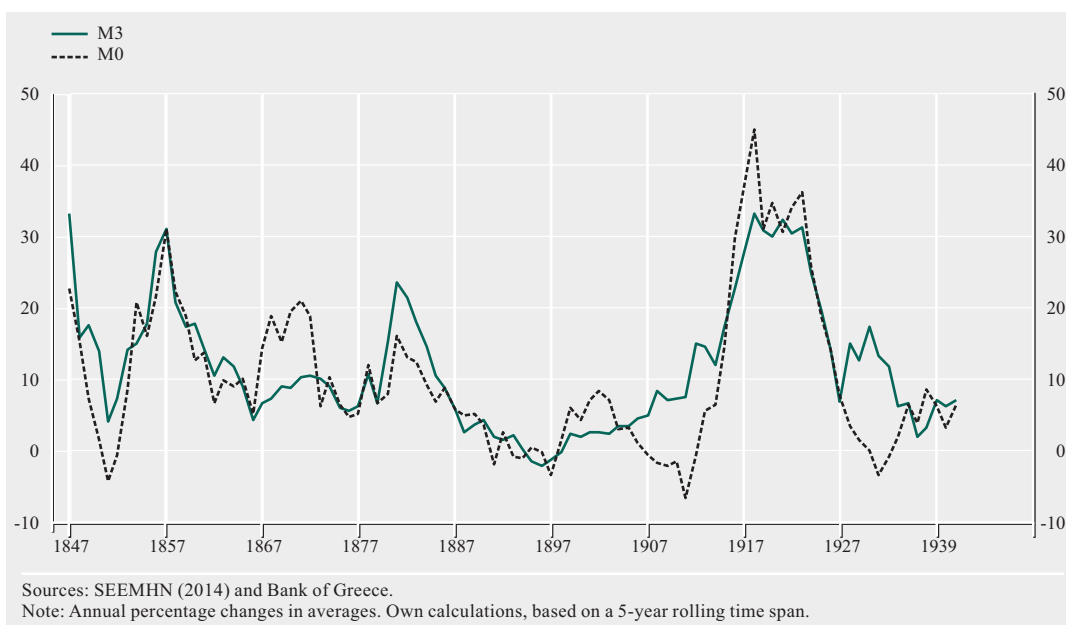
the market exchange rate, but at the parity rate of the domestic currency vis-à-vis gold or gold-based foreign exchange. However, due to strong and constant depreciation pressures on the domestic currency, the note-issuing/central bank, under its respective founding act, reported all balance sheet items (assets and liabilities) expressed in the domestic currency on the basis of the market exchange rate as at the balance sheet date.

The second category of monetary variables relates to measures of money supply. On the first page of their classic book, Friedman and Schwartz (1970) note that "... measuring money is an activity that dates back to the beginning of the republic". This is so because knowing exactly how much money there is in the economy at any given time enables the conduct of monetary policy that can support growth in an environment of monetary and foreign exchange stability. This was very important in metallic monetary regimes, since the scarcity of precious metal forced the authorities to establish a minimum ratio of reserves to banknotes in circulation, as excess uncovered note issue would undermine confidence in the banknote and strengthen inflationary and depreciation pressures, thereby jeopardising the monetary regime.

In Greece, although a national monetary system was introduced right after independence, with the circulation of silver coins and paper notes (uncovered money), the systematic recording of banknotes in circulation on an annual and monthly basis only started in 1841, with the establishment of the National Bank of Greece as a note-issuing bank. However, the concepts of narrow or broad money used today are nowhere to be found in those records. This was so because, according to the Currency School of the 19th century, banknotes were the only substitute for physical money. Other types of what we now see as money, such as bank deposits, were not included in the calculation

¹⁵ 25% of currency in circulation for the National Bank of Greece and 40% of the monetary base for the Bank of Greece.

Chart 1 Monetary aggregates (1847-1939)



of money supply. Therefore, although metallic and foreign reserves were endogenously determined, the statutory reserve-to-banknote ratio was determined exogenously, necessitating the precise knowledge of the stock of banknotes in circulation. However, with the emergence of a bourgeois class in the last quarter of the 19th century, the domestic economy gradually shifted from barter to a money economy, and the banking system grew. This implied a broadening of the concept of money, at least as a medium of exchange. Until then, the time series of currency in circulation underestimated domestic money supply. Therefore, the formulation of two alternative definitions of money, one narrow as medium of exchange and one broader as two measures of liquidity, helps to make safer estimates of the variable.

In this context, and given the quantitative data limitations, we compiled two monetary aggregates: M3 (broad money), including less close substitutes for money, such as bank deposits of any type and bank bonds, and M0 (narrow money), also known as “monetary base”.¹⁶ We used the monetary approach, according to

which an optimal measure should meet three criteria: (i) high correlation with national output; (ii) inclusion of several items treated as money; and (iii) the highest correlation with either current or lagged values of real GDP.

The importance of monitoring the evolution of these aggregates for the purposes of policy-making is illustrated by two examples of policy pursued in the 1910s and 1930s. In particular, Chart 1 shows that, in the first decade of the 20th century, M0 and M3 moved in opposite directions. M0, tracking banknote circulation, which was at the time fully controlled by monetary authorities, follows a downward path, as a result of the very tight monetary policy under a strict stabilisation programme agreed with foreign creditors in 1898. Through a sterilisation policy, any increase in the country’s foreign reserve assets, mainly as a result of higher foreign trade, was fully offset by a larger decrease in banknote circulation. This policy was aimed to restore monetary and exchange rate stability, but did not yield the

¹⁶ Two other indicators were also compiled: the reserve-to-banknote ratio and the M3 multiplier.

expected results: excess demand for money intensified upward pressures on the exchange rate, causing deflation and keeping lending rates at high levels. The rising path of M3 during the same period, solely driven by increases in private deposits and cash transactions because of higher foreign trade, although implying satisfactory liquidity, failed to finance growth. Growth remained weak after the recession of the 1890s, since it was forbidden by law to exceed a maximum, but narrow, limit of uncovered circulation.

The policy implemented in the context of the new monetary regime after 1910, with the delayed decision to link the drachma to the French franc at par, in an effort to counter deflation and the rapid appreciation of the currency, did not help at all to restore monetary stability. This time, as shown in the chart, M0 and M3 moved in the same direction. Their comovement is explained by the fact that the increased inflow of foreign exchange led, in the context of full and free convertibility, to continuous and equal increases in the monetary base and therefore in liquidity, which fuelled domestic inflation. The adverse effects of this policy on the real exchange rate and the reserve asset position of the country became visible after 1914, when Greece insisted, after the collapse of the international gold standard, to maintain a *de jure* regime of stable exchange rates.¹⁷

A second example is the monetary policy of the interwar period. In 1925, the Greek authorities began a monetary tightening to counter the post-war very high inflation and marked depreciation of the currency. As shown in Chart 1, although the monetary base also declined after 1925, the liquidity index in the pre-crisis years followed a steep upward path, driven by high bank deposits accumulated during the strong monetary expansion of the war period. Most of these deposits were very short-term (sight deposits) because of low public confidence in the currency. On the other hand, banks were very liquid but were extremely reluctant to extend long-term loans, thereby maintaining

very high lending rates. The central bank, taking into account the size of the monetary base, assessed (perhaps erroneously) that monetary conditions were tight and, right after its establishment, cut its discount rate.

The monetary policy implemented since mid-1931 proved to be equally ineffective. The banking crisis, as manifested by the mass deposit withdrawals and bank defaults, squeezed liquidity in the economy, as shown by the steep downward path of M3. At the same time, however, the Bank of Greece further tightened its monetary policy stance by successively raising its policy rate, which pushed further upwards market lending rates, thereby causing a credit squeeze that deepened the recession. Meanwhile, the requirement on commercial banks to hold reserves with the central bank, a measure aiming at improving bank supervision in the wake of the banking crisis, implied an additional monetary policy tightening, reflected in the upward path of M0, as opposed to the downward path of M3.

5.2 INTEREST RATES AND BORROWING COSTS

5.2.1 Discount rate

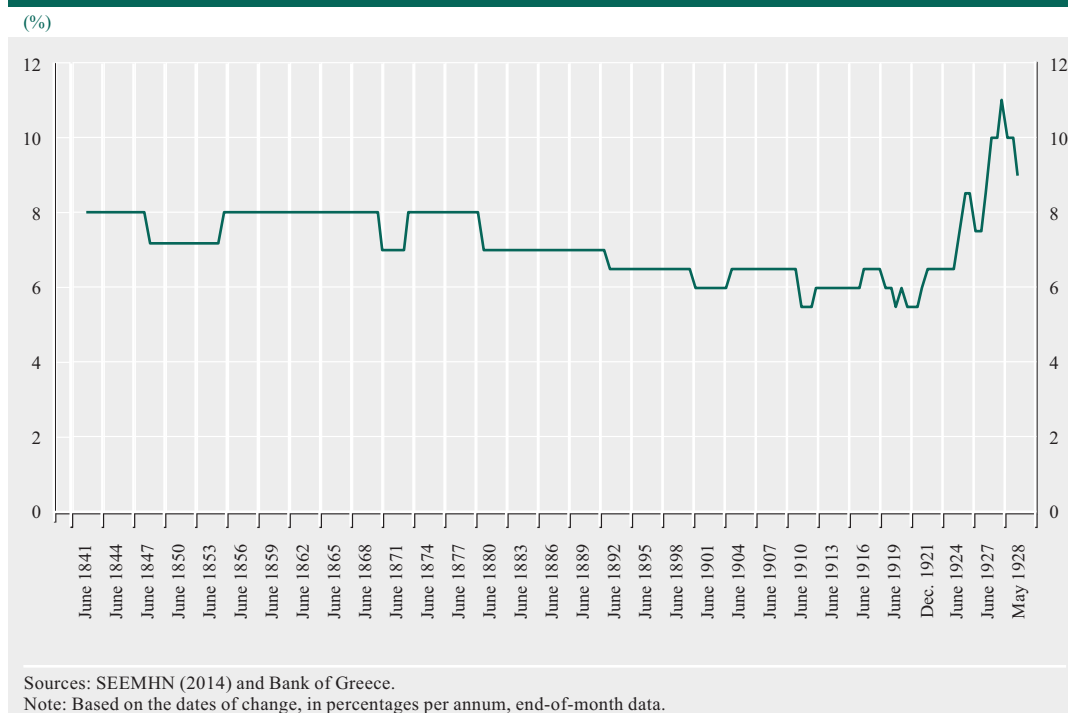
In metallic monetary regimes, money supply was controlled through changes in the interest rate¹⁸ at which the note-issuing or the central bank usually refinanced the domestic economy by discount and credit facilities to commercial banks. In the case of Greece, in the absence of a central bank until April 1928, the National Bank of Greece, being both a note-issuing and a commercial bank, controlled liquidity in the economy through the interest rate at which it discounted three-month commercial bills and notes. It applied the same rate on lending to merchants, other commercial banks, as well as the government.¹⁹ Chart 2 shows the evolution of the dis-

¹⁷ For a detailed discussion of monetary policy implementation in Greece during the period of the gold standard, see Lazaretou (1995) and SEEMHN (2014, Chapter 3).

¹⁸ Also known as “bank rate” or “Lombard rate”.

¹⁹ Until 1880, when Greece regained access to international capital markets, the National Bank of Greece was the almost exclusive holder of public debt.

Chart 2 The discount rate of the National Bank of Greece (1841-1928)



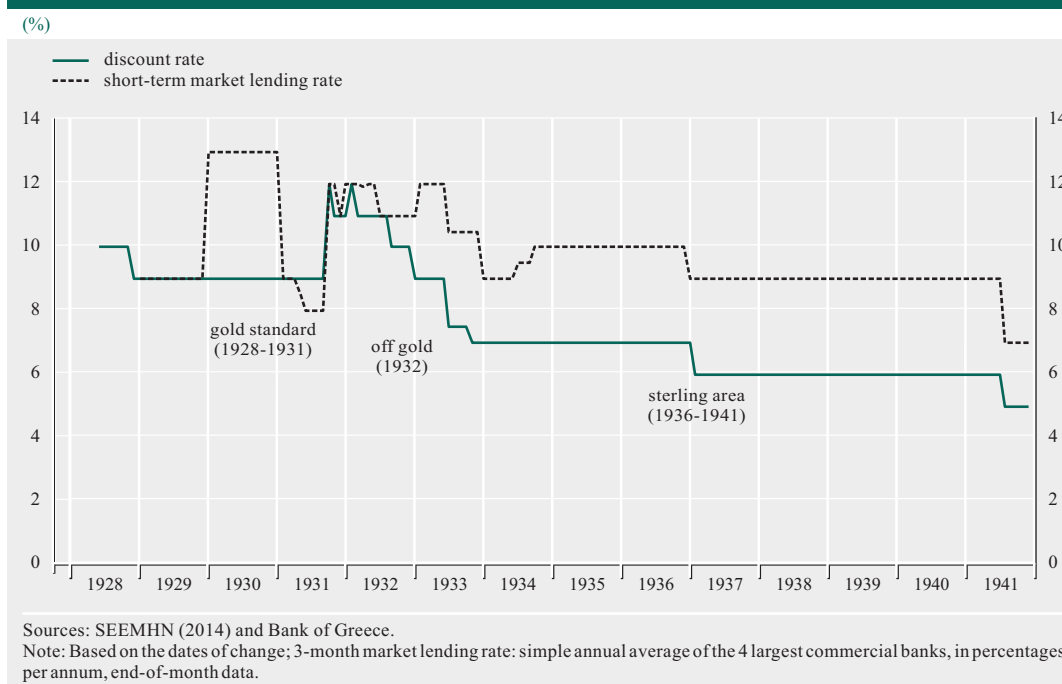
count rate over time. The series was constructed on the basis of the available dates of interest rate changes, as derived from the minutes of general meetings of shareholders and annual reports of the National Bank of Greece.

A simple look at the chart shows that the National Bank of Greece never considered its discount rate as a monetary policy tool. Its changes were rather infrequent. In 80 years, it changed this rate only 27 times. Decisions to change the interest rates were dictated by its commercial banking activities, competition with other, smaller commercial banks, to which it was usually reluctant to provide the required liquidity, and its concerns about public confidence in its banknote, rather than by macroeconomic considerations. For instance, although at the start of its operations in March 1841 it set its rate at 8%, much lower than the non-banking lending rate (20%), it kept it virtually unchanged until the early 1890s. Only at the turn of the century was

there a small and slow decline in the discount rate, at a time when the Greek economy started developing fast and there was a great need for cheap loans. The reluctance to change the interest rate policy stance, as shown in the chart, does not seem to have significantly helped to finance the growth efforts of this period. It was only after 1923 that the bank began to take the macroeconomy into account, given the high post-war inflation and strong depreciation pressures.

The interest rate policy of the Bank of Greece was equally ineffective, as seen in Chart 3, which shows the discount rate and the short-term market lending rate. Both series were constructed on the basis of the dates of interest rate changes. We note that the central bank's effort to reduce market lending costs by cutting its rate from 10% to 9% in November 1928 and keeping it at this low level until September 1931 ended up in failure since, because of the excess liquidity then available to commercial banks, they did not need to resort to

Chart 3 The discount rate of the Bank of Greece and the market lending rate (May 1928–November 1941)



central bank money for their refinancing.²⁰ At the onset of the Great Depression, the Bank responded by successive increases in its rate,²¹ pushing further upwards the market rate and causing a credit squeeze at a time when monetary policy relaxation was needed to promptly counter the negative impact of the recession.

5.2.2 Government borrowing costs

A country's creditworthiness is reflected in long-term government bond yields. The market prices (annual since 1901 and monthly since 1928) of the bonds of ten major foreign loans in gold allow us to calculate the current yield as the product of the face value and the coupon rate divided by the market price. Both in theory and in practice, it is now a well-known fact that the less developed economies at the periphery of the system suffered from the "original sin", i.e. they were unable to issue international debt in their own currency (Eichengreen and Hausmann 1999, Eichengreen et al. 2003, Catão and Milesi-Ferretti 2014). To prevent the risk of debt monetisation and loss of their investment,

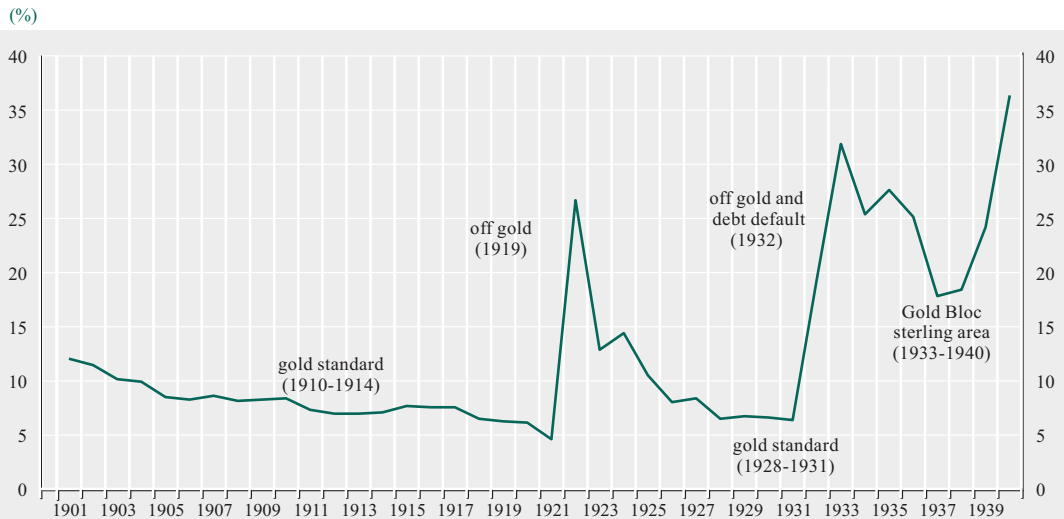
foreign creditors were not willing to buy government bonds unless these were denominated in an international hard currency. In the years of the gold standard, the issuance of debt by a developing country included a "gold clause" or "currency clause", i.e. a promise to repay the debt either in gold or in "gold-based foreign currency". The high share of debt liabilities increased the country's foreign dependence, since they were serviced through fixed payments in hard currency, which were not linked to the current economic situation.

As seen in Chart 4, which shows the average annual unweighted current yield of ten gov-

²⁰ In the years before the crisis, to raise liquidity, commercial banks used to have recourse to the National Bank, where they kept their deposits. Despite the decrease in the Bank of Greece's rate, the National Bank raised its own rate from 9% to 11%-13%; as a result, the three-month market lending rate increased sharply.

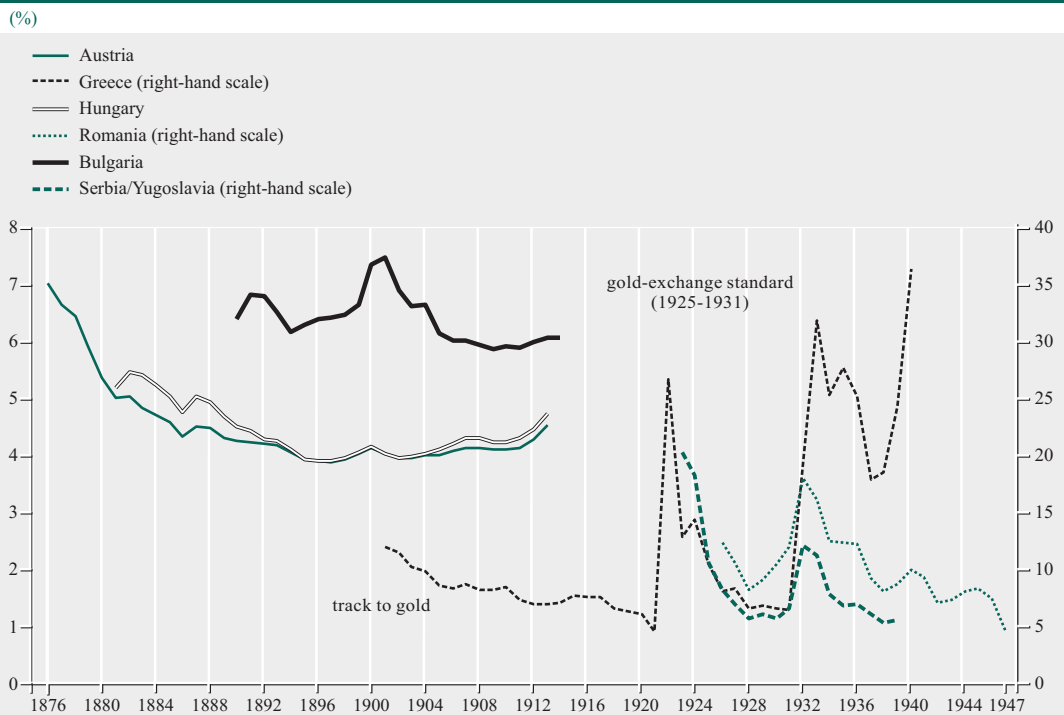
²¹ In 1931, the Greek economy was already in recession and a credit crunch (economic downturn and a drop in employment, bank runs, bank defaults and cash hoarding). The policy response was haphazard and intensified uncertainty. Finally, opting to support a stable relationship with gold, the Bank of Greece increased its rate from 9% to 12% in end-September 1931. One month later, it lowered it to 11% and raised it again to 12% in mid-January 1932. One month later, it cut it again to 11%. The slow but gradual decline in borrowing costs began in the second half of 1932.

Chart 4 Government bond yields (1901-1940)



Sources: SEEMHN (2014) and Bank of Greece.
 Note: Current yield, simple annual average of the current yield of 10 long-term foreign fixed-rate government bonds in gold. Own calculations based on released market bond prices.

Chart 5 Current yield on fixed-rate government bonds in gold of SEE countries (1876-1947)



Sources: SEEMHN (2014) and Bank of Greece.
 Note: Current yield, simple annual averages of long-term foreign loans in gold.

ernment bonds in the period 1901-1940, whenever the country made credible efforts to join the international monetary system, its borrowing costs decreased substantially.²² By contrast, periods outside the international monetary system were associated with very high borrowing costs or even inability to borrow. For example, after the country left in 1932 the – by then collapsing – gold-exchange standard, and also unilaterally defaulted on its public debt, borrowing costs increased steeply within one year, up to three times compared with the preceding year. What is particularly interesting is that, despite the eagerness to find a compromise solution and re-peg the currency to a monetary anchor in the context of the Gold Bloc in 1933 and, after its collapse, the sterling area in 1936, borrowing costs never returned to reasonable single-digit levels, such as those prevailing in the gold-exchange standard period (1928-1931). The global shortage of liquidity in a climate of international mistrust after the 1929 crisis, as well as the past experience of unilateral debt default, prejudiced the country's creditworthiness and drove yields more than four to five times higher, as shown in the chart.

It is worth noting that the pattern of borrowing costs was common to all SEE countries (see Chart 5). Joining and staying on the gold standard, and even the effort and prospects of joining, increased the credibility of economic policy and improved the access of the periphery to international capital markets.

5.3 FISCAL INDICATORS

The recent compilation and publication of statistics of key fiscal aggregates, such as revenue and expenditure, as well as a proxy for public debt allow us to study the fiscal policy implemented from 1833 to 1939. A simple look at Charts 6 and 7 reveals four salient features of fiscal policy in this period:

(i) It is clear that the fiscal authorities failed to increase tax revenue. Between the start and the end of the sample period, the tax-to-GDP

ratio remained at the same low level of about 18%, whereas primary expenditure in times of peace was three to four times higher than taxes. This failure was due to the small tax base, high tax collection costs and the unclear and segmented tax framework.

(ii) Data on Greece empirically confirm the procyclical effect of fiscal policy, which is a common characteristic of poor countries (see Kaminsky et al. 2004, Alesina et al. 2008, Woo 2010).²³ In good times, fiscal policy responded by increasing expenditure, thereby widening the imbalance and amplifying the adverse effects in bad times.

(iii) Any increase in tax revenues stemmed from a significant rise in indirect taxation, which accounted for over 70% of total tax revenue. Although indirect taxation immediately increased public revenues, it also caused strong social discontent, as it fell heavily on consumer staples and mainly affected weaker income brackets. This caused prolonged political instability, e.g. in the late 1880s and the first half of the 1930s, leading to adverse economic effects as well as to major changes in the form of government.

(iv) The government's systematic recourse to borrowing to finance its expenditure increased its liabilities vis-à-vis the note-issuing/central bank, which was its main domestic creditor. As shown in Chart 8, since early 1880, the ratio of government debt to the central bank's total assets, with only a few exceptions, rose to over 40%. The tight entanglement of the monetary authority with the fiscal authority caused an immobilisation of a substantial part of its assets and limited its scope for action to safeguard monetary and financial stability.

²² The yield differential between Greek and British bonds in the years of the gold standard never exceeded 380 basis points. In addition, when the country joined the gold-exchange standard in 1928, the government's borrowing costs less than halved, from 14.3% to 6.7% in 1923.

²³ The regression coefficient of the cyclical component of real output in the estimates of bivariate regressive schemes of public expenditure at constant prices and/or the fiscal deficit on the basis of historical time series is positive and highly statistically significant. The cyclical component has been estimated as the deviations from a logarithmic time trend.

Chart 6 Public revenue and indirect taxes (1833-1939)

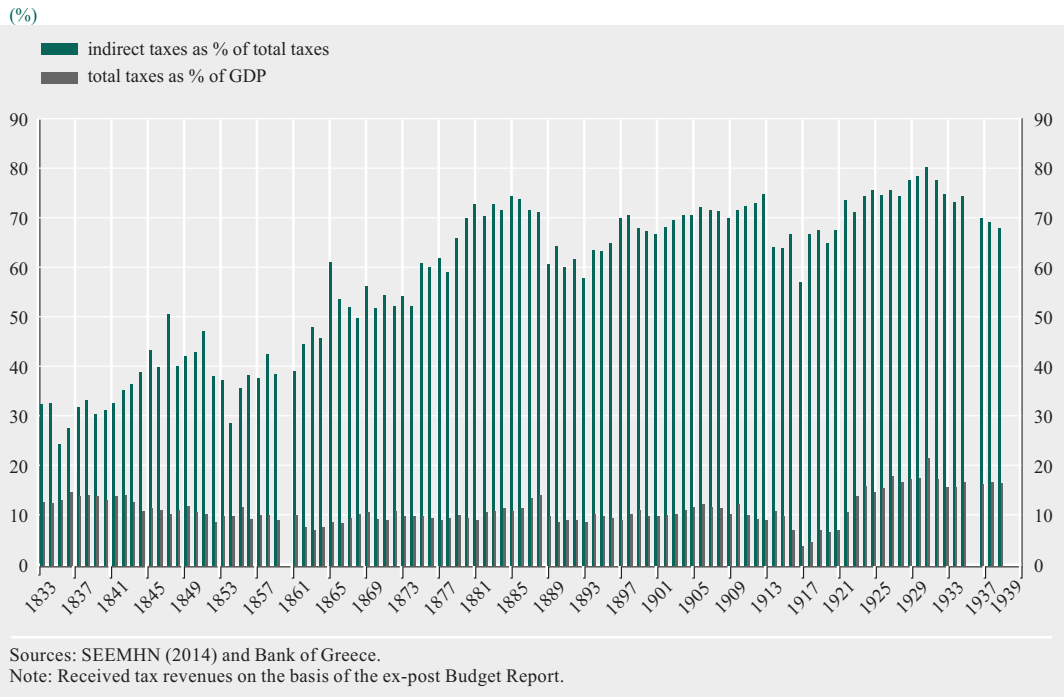


Chart 7 Expenditure to tax revenue (1833-1939)

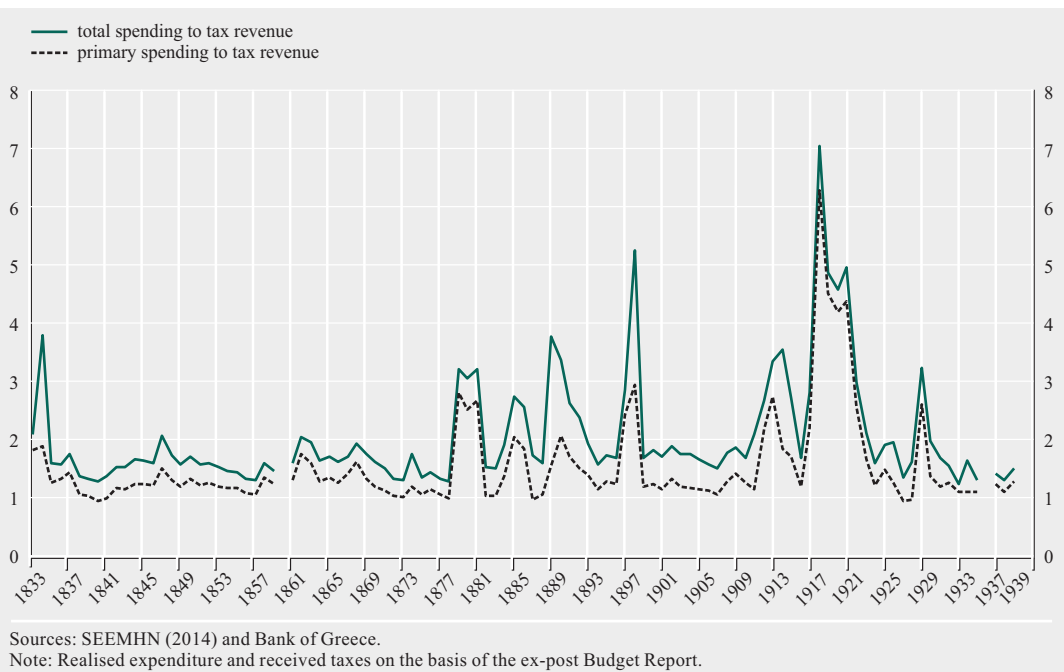
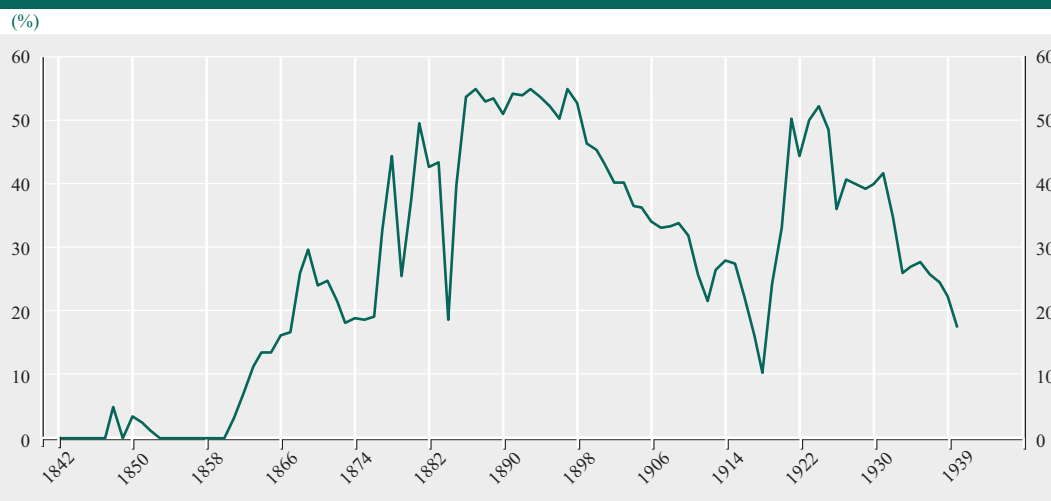


Chart 8 Public debt as a percentage of the note-issuing/central bank's total assets (1842-1939)



Sources: SEEMHN (2014) and Bank of Greece.

Note: Debt liabilities (stock) of the central government to the National Bank of Greece and the Bank of Greece, as a percentage of their total assets. Own calculations based on the data from the National Bank of Greece's balance sheet (1842-1927) and the Bank of Greece's balance sheet (1928-1939). This series can be considered a proxy for public debt stock since, for its construction, due to lack of data, all information on the bank's claims on the government has been retrieved from its balance sheet. They refer to total liabilities of the Greek central government, including loans in banknotes, foreign exchange and gold, as well as Treasury bills and government bonds, that were issued under national jurisdiction, regardless of the nationality of the creditor and/or the debt denomination currency. See Reinhart and Rogoff's (2010) debt glossary.

5.4 THE GREEK HYPERINFLATION

Hyperinflation in Greece, according to Cagan's definition²⁴ (1956), began in November 1943 and ended in November 1944 (see Chart 9), although strong inflationary pressures re-emerged, but were short-lived, in the last four months of 1945. It was one of the 56 hyperinflation episodes in human history and one of the eight worst in terms of the daily rate of increase in the price index (see Hanke and Krus 2012). Two reasons accounted for this. First, the complete lack of goods on the Greek market, since almost the entire production had been confiscated by the occupation forces, and second, the continuous issuance of new (uncovered) money to finance, through inflation, the maintenance costs of occupation troops and military operations in the eastern Mediterranean. Runaway inflation triggered a flight from the drachma to the only safe haven, gold, thereby leading to the so-called *chrysoiphilia* (love of gold), which

plagued the Greek economy until the mid-1960s.

The availability of monthly observations on the monetary base and a cost-of-living index allow us to calculate inflation tax revenue (seigniorage). Its evolution between January 1939 and December 1948 is shown in Chart 10. We note that, despite continuous issuance of new money, inflation tax revenue declined dramatically month after month, eventually leading to a steep rise in inflation, which approached three-digit figures. Mounting distrust in the national currency, since no one wanted to hold paper drachmas because of the extremely high and rapid loss of their value, and the increasing circulation of gold sovereigns reduced demand for liquid assets in drachmas. Consequently, the inflation tax base

²⁴ Hyperinflation is defined to begin in the month when the rise in prices exceeds 50%, month on month, and end in the month before the monthly price increase drops below such percentage and remains below 50% for at least one year. Although this is an ad hoc definition, it adequately captures all hyperinflation episodes to date.

Chart 9 The Greek hyperinflation episode (1943-1944)

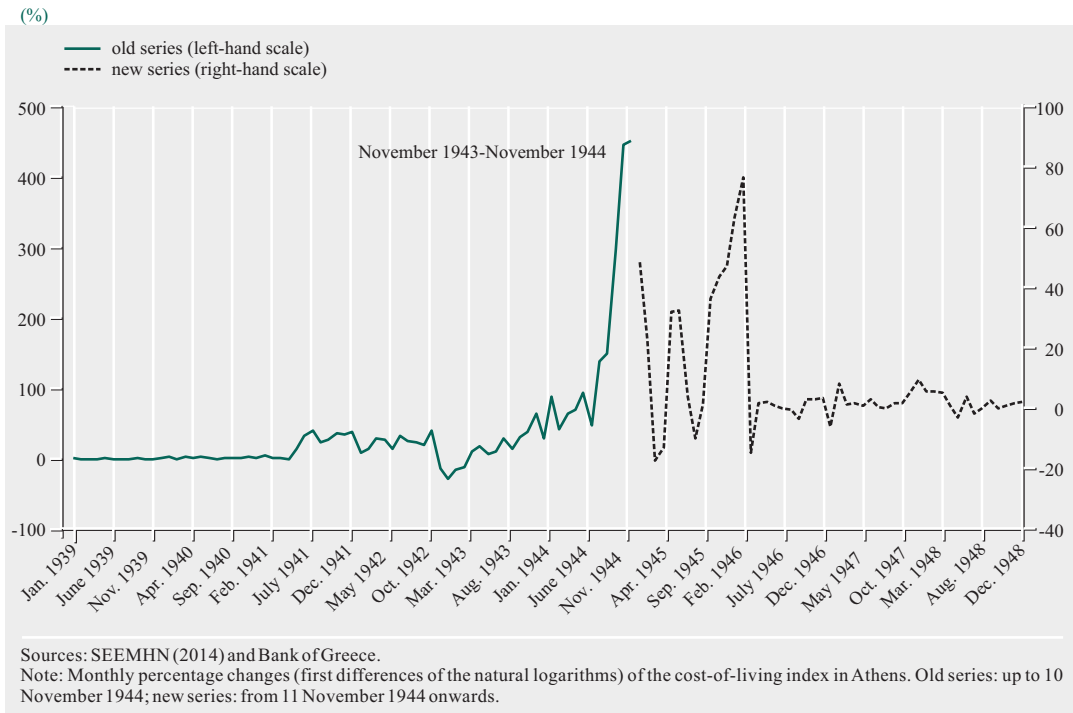
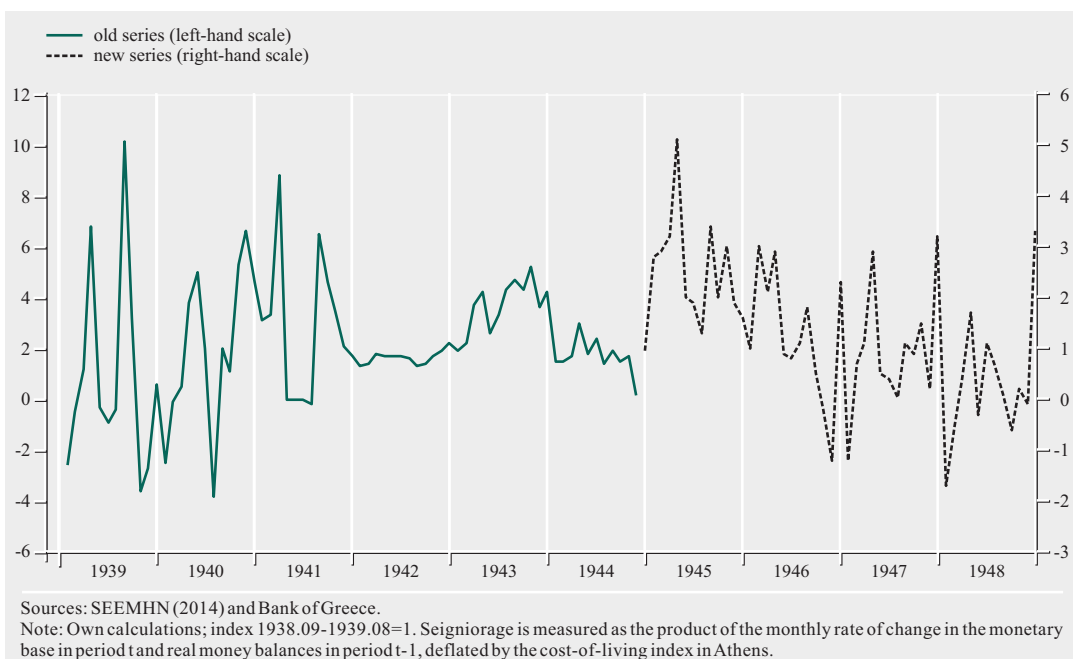


Chart 10 Seigniorage revenue (1939-1948)



(i.e. liquid assets in drachmas) decreased to a minimum; as a result, tax revenue was non-existent despite the very high inflation rates.²⁵

In other words, the occupation period was an extreme example of the limitations of monetisation of public deficits: while a sudden (unexpected) increase in money supply to cover the deficit may yield important revenue, an expected – even accelerating – increase causes, from a certain point on, such a large decrease in the demand for money and in the tax base that revenue falls. If the government insists on such a policy, the accelerating increase in money supply leads to the substitution of legal tender with other commodities that fulfil the functions of money, driving government revenue down to zero.

6 CONCLUDING REMARKS

As regards European monetary developments, 2015 started with two pieces of good news: the euro area entry of Lithuania, an emerging market and peripheral economy of New Europe, and the ECB's announcement of the launch of its quantitative easing programme. Both events in themselves send a hopeful message about the monetary future of Europe, at a time when the core economies, after six years of crisis, are facing the challenge of stagnation or weak growth and deflation, while the economies in the periphery continue to suffer from high debt, extremely low employment rates, mass and long-term unemployment, and recession.

The recent adoption of the single currency by an emerging market peripheral economy attests to the intention of small and weaker European economies to keep pace with European monetary developments and become members of the European economic family. The publication, for the first time, of a complete and comparable statistical database of economic and monetary variables for the SEE countries spanning more than 100 years reveals

that this has been a constant pursuit of economic policy-makers in these countries.

The purpose of this article was to introduce the Greek statistical database and demonstrate its importance for the empirical documentation of the specific features of the Greek economy over time and the assessment of the policies implemented. It discusses certain policy examples using quantitative data such as monetary indicators, borrowing costs and fiscal aggregates. The examples show that the same thread runs through the monetary history of Greece and the SEE countries: an agonising - and not always successful - effort to join an economic and monetary club of strong economies. The benefits were readily measurable, reflected in low borrowing costs and access to cheap financing necessary to support growth in a context of low national saving levels. The country's intention to import policy credibility by participating in the international monetary system and adopting a monetary anchor (i.e. by establishing a minimum level for the reserve-to-banknote ratio and adhering to an irrevocable currency peg) was dictated by the need to encourage its external trade and attract foreign capital, as well as by the effort to put an end to periods of serious economic and political instability.

The statistical series show that, although there has been a measurable benefit in terms of borrowing costs, there have also been visible risks, especially when the country's entry was not always accompanied by sound and credible fiscal and monetary institutions. Often, also in view of negative international conjunctures, the gap between will and skill has led to collapse and failure.

²⁵ The Greek confidence crisis, which peaked in July 2015 and took the form, at least initially, of a liquidity crisis and a bank run, leading to the imposition of a bank holiday and capital controls, presents all the typical features of economic agents' reaction to economic panic and hyperinflation: distrust of money (plastic or electronic) as a medium of exchange, an abrupt fall in demand for transaction balances, hoarding of the "good" currency, i.e. the euro, increased electronic money velocity, growing demand for consumer durables and luxury goods. However, keeping the euro as legal tender in the Greek economy prevented hyperinflation, which would have emerged under a national or parallel currency scenario.

REFERENCES

- Adelman, P. (2014), "What is Economic History?", *History Today*, 35:2.
- Alesina, A., F. Compante and G. Tabellini (2008), "Why is fiscal policy often procyclical?", *Journal of European Economic Association*, 6, 1006-1036.
- Bernanke, B. (2004), "The Great Moderation". Speech at the 2004 meeting of the Eastern Economic Association, 20 February.
- Cagan, P. (1956), "The Monetary Dynamics of Hyperinflation", in Milton Friedman (ed.), *Studies in the Quantity of Money*, 25-117, Chicago, University of Chicago Press.
- Catão, L. and G.M. Milesi-Ferretti (2014), "External liabilities and crises", *Journal of International Economics*, 94, 18-32.
- Clark, T. (2009), "Is the Great Moderation over? An empirical analysis", Federal Reserve Bank of Kansas City, *Economic Review*, 94, 5-42.
- Coric, B. (2011), "The sources of the Great Moderation: A review", University of Split, <http://dx.doi.org/10.2139/ssrn.1641201>.
- Crafts, N. and P. Fearon (eds) (2013), *The Great Depression of the 1930s: lessons for today*, Oxford University Press.
- Deane, P. and W.A. Cole (1967), *British Economic Growth, 1688-1959: Trends and Structure*. Cambridge: Cambridge University Press, second edition.
- Eichengreen, B. and R. Hausmann (1999), "Exchange rates and financial fragility", *New challenges for monetary policy*, a symposium sponsored by the Federal Reserve of Kansas City, 329-368.
- Eichengreen, B., R. Hausmann and U. Panizza (2003), "Currency mismatches, debt intolerance and original sin: Why they are not the same and why it matters", NBER Working Paper no. 10036.
- Fabozzi, F.J., F. Modigliani and F.J. Jones (2010), *Foundations of financial markets and institutions* (Fourth Edition), Prentice Hall.
- Feinstein, C. (1972), *National income, expenditure and output of the United Kingdom 1855-1965*, Cambridge University Press.
- Field, J.A. (2008), "Economic History", in: Steven N. Durlauf and Lawrence E. Blume (eds), *The New Palgrave Dictionary of Economics*, second edition, Palgrave, Macmillan.
- Friedman, M. and A. Schwartz (1970), *Monetary statistics of the United States*, NBER.
- Hakkio, C.S. (2013), "The Great Moderation 1982-2007", www.federalreservehistory.org.
- Hanke, S. and N. Krus (2012), "World hyperinflations", Cato Working Paper no. 8.
- IMF (2013), *International reserves and foreign currency liquidity. Guidelines for a data template*.
- Jimenez, G., S. Ongena, J.-L. Peydró and J. Saurina (2012), "Credit supply and monetary policy: Identifying the bank balance sheet channel with loan applications", *American Economic Review*, 102, 2301-2326.
- Kaminsky, G., C. Reinhart and C. Végh (2004), "When it rains it pours: Procyclical capital flows and macroeconomic policies", *NBER Macroeconomic Annual*, 19, 11-82.
- Lazaretou, S. (1995), "Government spending, monetary policies and exchange rate regime switches: The drachma in the gold standard period", *Explorations in Economic History*, 32, 28-50.
- Lindert, P.H. (2004), *Growing public: Social spending and economic growth since the eighteenth century*, Cambridge University Press.
- North, D. (1981), *Structure and change in economic history*, WW Norton and Company, Inc.
- Reinhart, C.M. and K.S. Rogoff (2010), "From financial crash to debt crisis", NBER Working Paper no. 15795.
- SEEMHN (2014), *South-Eastern European monetary and economic statistics from the nineteenth century to World War II*, Bank of Greece, Bulgarian National Bank, National Bank of Romania, Oesterreichische Nationalbank, Athens, Sofia, Bucharest, Vienna.

- Stock, J. and M. Watson (2003), “Has the business cycle changed and why”. Paper presented at the Federal Reserve Bank of Kansas City symposium “Monetary Policy and Uncertainty: Adapting to a Changing Economy”, Jackson Hole, August 28-30.
- Tobin, J. (1958), “Liquidity preference as behavior towards risk”, *Review of Economic Studies*, 25, 65-86.
- Woo, J. (2010), “Growth, income distribution and fiscal policy volatility”, IMF and DePaul University, July.